OCCUPATIONAL ANALYSIS

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

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ABSTRACT

The development of the Occupational Structure is a preliminary process in developing relevant National Occupational Skills Standard (NOSS). The NOSS in turn will be developed to be used as the basis to conduct skills training and certification of competent personnel. In order to complete the Occupational Analysis on the Mechanical & Electrical Service and Maintenance job areas, all the information related to the job area was gathered through literature survey and interviews with the experts from the public and private sectors. A workshop was held in an attempt to get a better understanding of the organizational structure, job titles, hierarchy objectives and primary activities of the job titles. This document is divided into several chapters, the first being an industry overview highlighting the definition and scope of the industry, the current analysis of the local industry and its skilled worker requirements, Government bodies and development plans supporting the growth of the industry, then the next chapter will explain the methodology of the Occupational Analysis development. The final chapters will present the findings of the Occupational Analysis that is translated into the Occupational Structures, levels of competencies and critical areas. These findings will in turn be the basis of reference for the development of the National Occupational Skills Standard (NOSS) document. In order to conduct the Occupational Analysis on the Mechanical & Electrical Service and Maintenance job areas, all the information related to the aforesaid industry was gathered through literature survey and further discussed in workshop sessions with experts from the industry. During the development workshops, the panel members had identified **six (6) sub sectors, nineteen (19) job areas and a total of seventy-three (73) job titles** that reflect the main category of Mechanical & Electrical Service and Maintenance in Malaysia. In Malaysia, this sector has great employment opportunities. Furthermore, with strong support from the government and private sectors, these areas could expand further in the future.

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LIST OF ABBREVIATIONS

DESCUM	Development of Standard and Curriculum
DSD	Department of Skill Development
ETP	Economic Transformation Programme
EU	European Union
GDP	Gross Domestic Product
OA	Occupational Analysis
OAA	Occupational Area Analysis
OD	Occupational Description
OS	Occupational Structure
OAS	Occupational Area Structure
MOSQF	Malaysian Occupational Skills Qualification Framework
MQA	Malaysia Qualification Agency
MSC	Malaysian Skills Certificate
NOSS	National Occupational Skills Standard

1. INTRODUCTION

1.1 Chapter Introduction

The Economic Transformation Programme (ETP) represents a marked change in approach that builds on the Tenth Malaysia Plan (RMK10). The ETP focuses on key growth engines or National Key Economic Areas (NKEAs). It relies heavily on private sector-led growth, describes very specific investments and policy actions and has a clear transparent implementation roadmap with strong performance management.

As the core element in ETP, an NKEA is defined as a driver of economic activity that has the potential to directly and materially contribute a quantifiable amount of economic growth to the Malaysian economy. The 12 NKEA's consist of 11 industry sectors; Oil, Gas and Energy; Financial Services; Wholesale and Retail; Palm Oil; Tourism; Electronics and Electrical; Business Services; Communications Content and Infrastructure; Education; Agriculture; and Healthcare, and a geographical sector; Greater Kuala Lumpur/Klang Valley. The **eleven (11)** sectors in NKEA's are expected to deliver 74 percent of the Gross National Income (GNI) growth potential over the next decade. Overall, these NKEA sectors are sectors, in which Malaysia has current or potential competitive advantage, representing a mix of service, manufacturing, agriculture and extractive industries.

1.2 Background Study Of The Industry

Since the Industrial revolution, devices, equipment, machinery and structures have grown increasingly complex, requiring a host of personnel, vocations and related systems needed to maintain them, to ensure a unit is fit for purpose, with maximum availability at minimum costs. There are five methods applied to Engineering Service Maintenance, which form and change through time. The method of breakdown maintenance was commonly used before 1950's. In 1951 preventive maintenance was introduced, and later

the development continues with corrective and preventive maintenance. Finally in 1960's it reached the scheme of unifying them, productive maintenance.

Mechanical & Electrical service and Maintenance sector refers to services and maintenance of all mechanical and electrical structure. This includes services and maintenance of related mechanical and electrical structure on all buildings, office and non-office, public and private.

For the purpose of preparing NOSS for related employment, this sector employment is categorized into four employment sub sectors; Building, Facilities, Industrial Automation and Industrial Machinery and Equipment. Services and maintenance employment within the building sub sector covers services and maintenance of Electrical System, Plumbing, Fire Protection System, People Mover, Ventilation & Air Conditioning System within a building. The facilities sub sector refers to the maintenance of all types of facilities provided both by the authorities and developers. Among others the facilities include Lift & Escalator, Cable Car, PA system, Security System, Card Reader/Access Control, CCTV and Automatic Gates.

In the Industrial Automation, this refers to the services and maintenance of Conveyor System, Hydraulic System and Pneumatic System, including Computer Control industrial process and usage of Robotic Technology. As for the industrial machineries and equipment, it refers to services and maintenance of machines and equipment, mobile or stationary, in an industrial or production plant.

Table 1 summarizes engineering service maintenance development stages due to the advancement and complexity of engineering equipment.

Table 1 : Development of Engineering Service Maintenance

BM	Breakdown Maintenance
PM	Preventive Maintenance
CM	Corrective Maintenance
MP	Maintenance Prevention
PM	Productive Maintenance

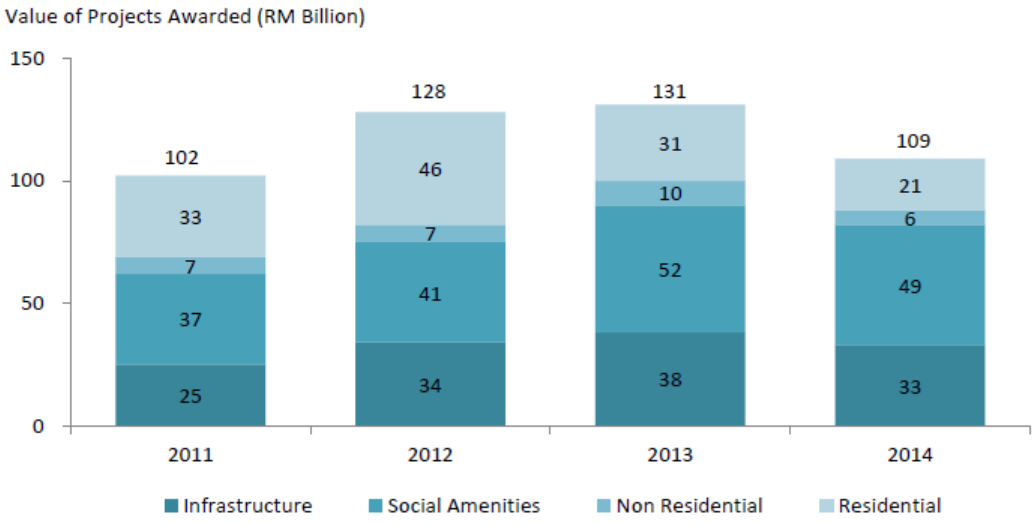
Mechanical and Electrical (M&E) Service Maintenance is the discipline and profession of applying engineering concepts to the optimization of equipment, procedures and departmental budgets to achieve better maintainability, reliability and functionability of equipment. The key deliverable is effective, timely repairs, and maintenance to coordinate with production schedules, cost considerations, sales needs and regulatory directives.

M&E Service Maintenance has become a necessity due to the rapid pace and wide extent of Malaysia's national development over the past decades and the foreseeable future. These advanced developments have resulted in extensive increase in the content and importance of M&E engineering systems and installation.

The career path of M&E Service Maintenance personnel can begin from an apprentice fitter or technician, and build up experience and usually take further qualifications to then progress through the career. In particular M&E Service Maintenance career path requires the personnel to achieve certain standard such as:

- Business skills - maintenance Personnel may be responsible for managing budgets, leading a team and liaising with suppliers;
- The capacity to understand a wide range of engineering functions and procedures;
- The ability to lead and motivate others;
- Team-working skills to work cooperatively and liaise with people at all levels;
- The ability to negotiate with, and persuade others;
- Good diagnostic and problem-solving skills;
- The confidence to respond positively when under pressure;
- People management skills.

Another sector of concern for M&E Service Maintenance is the derived-demand construction industry. The industry recorded a double digit average annual growth rate of 11.1% during the Tenth Malaysia Plan (RMK10), faster than the overall economy which grew by 6.3%. In 2015, the construction sector is estimated to contribute 4.5% to the GDP supported by strong growth in civil engineering and non-residential subsectors. The sector provided 1.2 million jobs which constituted 8.9% of the total workforce in the Plan period. For a period from 2011 to 2014, a total of 29,435 construction projects, valued at RM470 billion were awarded. Private sector projects contributed RM387 billion, or 82% from the total value of the projects, while the remaining RM83 billion was contributed by public sector. The number of construction projects and value are shown in Figure 1.



Sector	2011	2012	2013	2014
Residential	*2,253*	*2,276*	*2,302*	*1,716*
Non-residential	*2,661*	*2,847*	*2,995*	*2,085*
Social Amenities	*820*	*906*	*723*	*523*
Infrastructure	*1,991*	*1,863*	*2,008*	*1,466*
Total	***7,725***	***7,892***	***8,028***	***5,790***

Figure 1 : Projects by Category and Value, 2011 - 2014

Source: Construction Industry Development Board Malaysia (CIDB)

Despite registering vibrant growth, productivity of the construction sector is low due to limited modernization of construction methods and practices, low technology adoption as well as the reliance on low-skilled labour. Approximately 34% of the construction workforce is foreign, of which 93% are low-skilled. The issue on high dependency on low-skilled labour is further compounded by the presence of illegal foreign labour.

The Eleventh Malaysia Plan will focus on transforming the construction industry by enhancing knowledge content, driving productivity, fostering sustainable practices and increasing global competitiveness, in line with the Construction Industry Transformation Programme (CITP), 2016-2020. Greater collaboration will be fostered between the industry and Institution of Higher Learning (IHL) to ensure talent produced by the

education system meet industry requirement. Regular manpower planning will be undertaken to reduce mismatch between labour demand and supply.

Demand for technical talent in this industry is estimated based on the number of projects that are expected to take place by 2020, i.e. the current MRT projects and upcoming High Speed Rail system connecting Kuala Lumpur to Singapore. Based on these projects, demand for skilled and semi-skilled fresh graduates in the technical segment is predicted to grow at a CAGR of 29% between 2014 and 2020. The supply of skilled engineering fresh graduates is projected to be able to meet industry demand up to 2020 at a surplus of approximately 18,000 people, however, supply of semi-skilled fresh graduates from Community Colleges and Vocational Training Institutions, which is projected to grow at an average rate of 2% per annum, may not be able to keep up with demand by 2020.

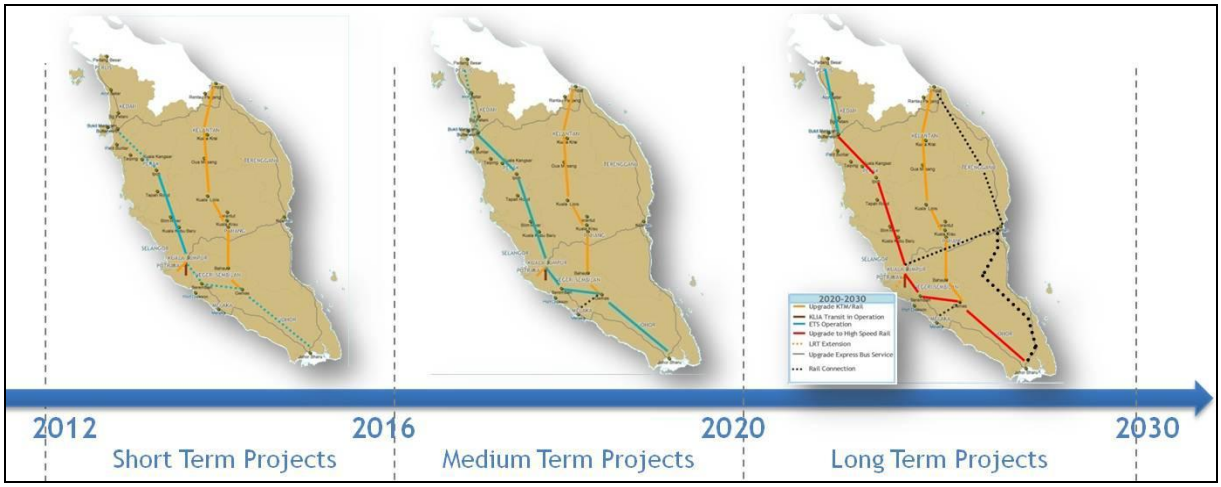


Figure 2 : Expansion Projects of National Railway Network

Referring to Figure 2, demand for M & E Service Maintenance growth in the future in this areas will be high due to expansion of national railway network beyond 2020 and connecting to local network "Conurbation" namely, National Growth Conurbation encompasses Kuala Lumpur, Putrajaya, Shah Alam, Klang, Nilai and Seremban; Regional Growth Conurbations which includes Georgetown, Johor Bahru, Kuantan (with similar profile for Kuching and Kota Kinabalu); Sub-Regional Growth Conurbations, Ipoh and

Melaka; State Growth Conurbations includes remaining state capitals such as Kota Bharu, Alor Setar, Kuala Terengganu and Kangar; District Growth Conurbations which are Manufacturing and service centres such as the Muar-Batu Pahat-Kluang conurbation and emerging centres of the Temerloh conurbation and the Lumut-Setiawan-Manjung conurbation; Major and Minor Settlement Areas with a township population between 10,000 and 100,000; and Rural Growth Centres with a settlements population of less than 10,000 people.

1.3 Objectives

The objectives of this Occupational Analysis are as below:

i) To identify the Occupational Structure and Occupational Area Structure of the M&E Service Maintenance Industry; and

ii) To identify critical and non-critical occupations within the employment structure of the M&E Service Maintenance industry based on supply and demand data in which to be obtained from secondary database.

1.4 Scopes

The scope of this occupational analysis is relevant to the objectives above are as follows:

i. Objective 1: To identify the Occupational Structure (OS) and Occupational Area Structure (OAS) of the M & E Service Maintenance Industry.
ii. Objective 2: To identify critical and non-critical occupations within the employment structure of the M & E Service Maintenance industry based on supply and demand data in which to be obtained from secondary database.

The scope of this particular OA is focused on the M & E Service Maintenance industry and all sub-sectors that are defined to be under the M & E Service Maintenance industry in

terms of manufacturing with the use of M & E Service Maintenance and the manufacturing of M & E Service Maintenance based products.

Regarding this objective, corresponding scope is built around identifying critical and non-critical job titles within areas of subsectors. This initiative is expected to assist government authorities to formulate appropriate corresponding job training programs to create optimum employment environment where supply matches demand in accordance to its priority hierarchy.

1.5 Problem Statement

There were only **twenty-three (23)** National Occupational Skills Standard (NOSS) documents developed for the M & E Service Maintenance Industry as at 31 March 2015. The current NOSS register covering areas of Refrigeration & Air Conditioning, Machine & Equipment Maintenance, Fire & Protection and Building Operation Maintenance. (Details of the existing NOSS relevant to the M & E Service Maintenance Industry are included in Chapter 2). The challenge of this Occupational Analysis is to continue updating the previously done similar exercise on M & E Service Maintenance Industry and bring it up to current status. This continuous initiative is expected to crystalize better career paths in the industry. The latest development of this document also will cover the rest of other related industries that actually required the M & E Service Maintenance such as Facility Maintenance, People Mover and Plumbing just to name a few.

1.6 Conclusion

In the light of continuous economic development in the M & E Service Maintenance Industry, the demand for skilled personnel has increased thus the development programs for skilled manpower is timely. By going through the mechanism provided by the Skills Training system in Malaysia, one of the important steps is to identify the Occupational Structure of the M & E Service Maintenance Industry. With the Occupational Structure

clearly defined, the industry stakeholders will be able to identify areas that will require more intensive efforts in human capital development. Although there have been past efforts in National Standards Development for the industry, the need for an Occupational Analysis is required to determine the overall areas that may not yet have been focused on. Occupational Analysis is expected to serve as the 'blueprint' of the manpower planning for the M & E Service Maintenance Industry.

2. LITERATURE REVIEW

2.1 Introduction

This chapter will explain the objectives, scope and problem statement of the Occupational Analysis for the Mechanical & Electrical Service and Maintenance.

An Occupational Analysis (OA) is the process of identifying the sub-sectors, areas, sub-areas and job titles for a particular industry in the form of Occupational Structure (OS). The Occupational Analysis (OA) will also look at other elements such as common job titles and levels of competency for skilled personnel in the industry, job functions and industry overview. Every job title will be identified according to its level defined in the Malaysian Occupational Skills Qualification Framework (MOSQF) level descriptor (refer to Annex 1). It must be highlighted that the occupational structure should not reflect the organisational chart but rather the competency levels and possible career path for personnel under a particular sub-sector in the industry.

The OA requires input from all parties especially industry players, statutory bodies, training institutions among others. The identified job titles obtained during the OA will be used as reference during National Occupational Skills Standard (NOSS) development. By developing the NOSS, personnel in the industry can be deemed certified by undergoing three methods of skills training certification.

The first of the three methods are certification through full time training where the candidate will undergo training from a minimum of 6 months for entry level certificates (Malaysia Skills Certificate 1, 2 and 3) or up until over a year for Malaysian Skills Diploma or Advanced Diploma. The second method is via the apprenticeship scheme which is called the National Dual Training System (NDTS) where the candidate can undergo training for a certain block of time then be attached to a company in the related industry as approved by the Department of Skills Development, Ministry of Human Resources. The third method is via Accreditation of Prior Experience where the candidate that possesses working experience may be able to be certified based on duration of experience and proof of work.

Therefore, it can be said that with the development of the OA and subsequently the relevant NOSS will provide wider opportunities for personnel to be trained and certified.

2.2 Current NOSS

During the process of brainstorming session, more information about the Mechanical & Electrical Service and Maintenance sector, the researcher analysed existing National Occupational Skills Standard (NOSS) that have been developed for the Mechanical & Electrical Service and Maintenance sector. Therefore in order to identify the latest overall structure, other related industries that dependable to this sector and career paths in the industry, the Occupational Analysis (OA) of the Mechanical & Electrical Service and Maintenance for this development have been updated to reflect the current needs. With regards to analysing the sector of Mechanical & Electrical Service and Maintenance industry, brainstorming, discussion and question & answer session takes place between the panels, facilitators and researcher. In the DSD's NOSS Registry as of March 2015, the latest OA sub-sectors of Mechanical & Electrical Service and Maintenance developed NOSS has only a total of **twenty-three (23)** from Level 1 until Level 5 and the sub discipline are outlined in the following sequence:

2.2.1 Refrigeration & Air Conditioning

Refrigeration and air conditioning have steadily become part of everyday life. Refrigeration is a key component of many industrial processes such as pharmaceutical, chemical and natural gas production. Even cars, offices, shops and public buildings are kept cool by air conditioning. As per to date, numbers of NOSS developed according to the job title for this sub sector is only **seven (7)** in total.

- Level 1 – Not Available
- Level 2 – 3
- Level 3 – 2
- Level 4 – 1
- Level 5 – 1

2.2.2 Machine & Equipment Maintenance

This sub sector comprises establishments primarily engaged in repairing and maintaining commercial and industrial machinery and equipment. In order to ensure work machinery and equipment does not deteriorate to the extent that it may put people at risk, employers, the self-employed and others in control of work machinery and equipment are required to keep it 'maintained in an efficient state, in efficient order and in good repair'. Such effective maintenance can not only help in meeting safety requirements but can also serve other business objectives, such as improved productivity and reduced environmental impact. The job area of NOSS developed for this Machine & Equipment Maintenance sub sector as at March 2015 are **four (4)** in total. The break down as follow:-

- Level 1 & 2 – Not Available
- Level 3 – 2
- Level 4 – 1
- Level 5 – 1

2.2.3 Fire Protection

Fire protection is the study and practice of mitigating the unwanted effects of potentially destructive fires. It involves the study of the behavior, compartmentalization, suppression and investigation of fire and its related emergencies, as well as the research and development, production, testing and application of mitigating systems. In structures, be they land-based, offshore or even ships, the owners and operators are responsible to maintain their facilities in accordance with a design-basis that is rooted in laws, including the local building code and fire code, which are enforced by local authority. Buildings must be constructed in accordance with the version of the building code that is in effect when an application for a building permit is made. Building inspectors check on compliance of a building under construction with the building code. Once construction is complete, a building must be maintained in accordance with the current fire code, which is enforced by the fire prevention officers of a local fire department. The job areas of NOSS developed for this Fire Protection sub sector to date **eleven (11)** in total:

- Level 1 – 4 NOSS
- Level 2 – 4 NOSS
- Level 3 – 3 NOSS
- Level 4 & 5 – Not Available

2.2.4 Building Operation Maintenance

Building Operation Maintenance is the routine recurring work required to keep a facility such as: plant, building, structure, ground facility, utility system or other real property) in such condition that it may be continuously used, at its original or designed capacity and efficiency for its intended purpose maintenance. The Building Operation Maintenance is also the combination of technical and administrative actions to ensure the items and elements of a building in an acceptable standard to perform its required function.

Numbers of NOSS developed according to the job title for this sub sector is only **one (1)** in total.

- Level 1 & 2 – Not Available
- Level 3 – 1 NOSS
- Level 4 & 5 – Not Available

2.3 Main Stakeholders/ Key Player/ Training Provider

Main Stakeholder/Key Player

Some of the main stakeholders are identified below:

No	Stakeholders
1	Ministry of Works Malaysia
2	Public Works Department Malaysia
3	Construction Industry Development Board (CIDB)
4	Ministry of Urban Wellbeing, Housing and Local Government
5	Board of Engineers Malaysia
6	Board of Architects Malaysia
7	Department of Occupational Safety and Health (DOSH)
8	Fire And Rescue Department of Malaysia
9	Ministry of Transport

Training Provider

Some of the main training providers are identified below:

No	Training Providers
1	Construction Industry Development Board (CIDB)
2	National Institute for Occupational Safety and Health(NIOSH)
3	Public and Private Universities and Colleges
4	Skills Training Centres

2.4 Current Analysis, Industrial Demand & Statistic

The demand side data referred in the supply and demand analysis was secondary data obtained from the Department of Statistics, Malaysia where the three digit group for the statistics was cross referenced with the 3 digit groups of industrial classification obtained from the Malaysian Standard Industrial Classification (MSIC) which were relevant to the industry.

Whereas, supply side data includes data from the Department of Skills Development, Community College department and Public Higher Learning Institutions. Data from the Polytechnic Department and Private Higher Learning Institutions which were obtained from various sources had to be omitted due to inconsistency as data was not available for all the 3 years analysed in this research. Therefore to ensure consistency and fairness to the sampling group, the available data for certain years for graduates from Polytechnics and Private Higher Learning Institutes had to be omitted from the data statistics.

2.5 Supply and Demand of Skill Worker

The ETP will result in Malaysia becoming a high-income nation with GNI per capita of RM48, 000 or USD15, 000 by 2020. As well as achieving its GNI target, by 2020 Malaysia will develop many of the characteristics of a high-income economy: services will account for over 65 percent of Gross Domestic Product (GDP); private consumption will account for almost 60 percent of GDP; and Malaysia's dependency on oil will be reduced from 21 percent of GDP in 2008 to 14 percent. This initiatives will be a private sector-led transformation with 92 percent of the over RM1.4 trillion of investment required coming from the private sector. Finally, the ETP will raise income levels across Malaysia by creating an additional 3.3 million jobs, over 60 percent of which will be in medium-income or high-income salary brackets.

In the Eleventh Malaysia Plan (RMK11), 2016-2020, the Government has identified six game changers, which are innovative approaches to accelerate Malaysia's development

that once successfully applied, will fundamentally change the trajectory of the country's growth.

i. **Unlocking the potential of productivity**
ii. **Uplifting B40 households towards a middle-class society**
iii. **Enabling industry-led Technical and Vocational Education and Training (TVET)**
iv. **Embarking on green growth**
v. **Translating innovation to wealth**
vi. **Investing in Competitive Cities**

Four of these game changers are critical to the development of an advanced economy, aiming to unlock productivity for accelerated sectoral growth; unleash innovation to generate new sources of revenue; harness TVET for the transition to a higher-skilled workforce; and develop cities as a source of competitiveness.

During the Eleventh Malaysia Plan (2016-2020), real GDP is targeted to expand between 5%-6% per annum. The GNI per capita is expected to reach US$15,690 (RM54, 100) and therefore exceed the estimated US$15,000 minimum threshold of a high-income economy. The Plan is expected to create 1.5 million jobs by 2020, with targeted improvements in labour productivity through the continuous shift from labor-intensive to knowledge-based and innovation-based economic activities. Growth will be driven by the private sector with private investment expanding at 9.4% per annum. All economic sectors will witness strong growth with the manufacturing and services sectors contributing more than 75% of GDP.

Under the Eleventh Malaysia Plan (2016-2020), 60% of the 1.5 million jobs that will be created will require TVET-related skills. Meeting this demand will require Malaysia to increase its annual intake gradually from 164,000 in 2013 to 225,000 in 2020. Industry feedback consistently reveals a disconnection between the knowledge, skills, and

attitudes these graduates possess, and what is required in the workplace. To address these issues, an effective and efficient TVET sector needs to be implemented:

- Supply matches demand, and there are robust quality control mechanisms which ensure that all public and private institutions meet quality standards;
- Industry and TVET providers collaborate across the entire value chain from student recruitment, through to curriculum design, delivery, and job placement; and
- Students are well-informed of the opportunities that TVET can offer and view TVET as an attractive pathway. Students also have access to a variety of innovative, industry-led programmes that better prepares them for the workplace.

A summary of the major shifts that will be undertaken are set out as follows:

Table 2 : TVET Transformation Strategy

	FROM →	TO
Governance	2 Accreditation Agencies (MQA and DSD) with different sets of qualifications	Single qualification system adopted by both MQA and DSD
	Different quality rating systems for public and private TVET institutions, depending on which Ministry the institution is registered with	Single rating system for both public and private TVET institutions
Programme Delivery	Design and delivery of curriculum led by individual TVET institutions or Government	Design and delivery of curriculum led by industry, in partnership with TVET institutions and Government
	No specialization among TVET institutions	Institutions to specialize in and create Centres of Excellence in niche areas of expertise
Capacity	164,000 intake in 2013	225,000 intake per annum in 2020, by maximizing use of existing institutions
Profile	Limited recognition and low premium	Career of choice for students

Source: Ministry of Finance (MOF), Eleventh Malaysia Plan (RMK11)

During the Tenth Malaysia Plan (2011-2015), the services sector remained the largest contributor to the Gross Domestic Product (GDP) at 53% and grew 6.3% annually. The services sector benefitted from rising household income, higher tourists arrivals, rapid expansion in telecommunications and buoyant financial market. The Government embarked on autonomous liberalization of 18 subsectors and improved the ease of doing business to further boost investment and productivity.

In the Eleventh Malaysia Plan (2016-2020), the services sector will continue to be the primary driver of the economic growth. The strategies are formulated to enhance the competitiveness and resilience of the services sector and promote the migration into high-value and knowledge-intensive services activities. Greater focus will be given to the modern and knowledge-intensive industries, including halal, ecotourism and information, communications and technology (ICT). The construction sector is expected to benefit from sustained demand for infrastructure and housing.

In 2014, the services sector contributed 53.5% to the GDP, as shown in Figure 3. The sector remained as the main source of employment with 8.4 million jobs representing 60.9% of total employment. In terms of establishment, small and medium enterprises (SMEs) in the services sector constituted 90% of total SMEs and contributed 20% to overall GDP.

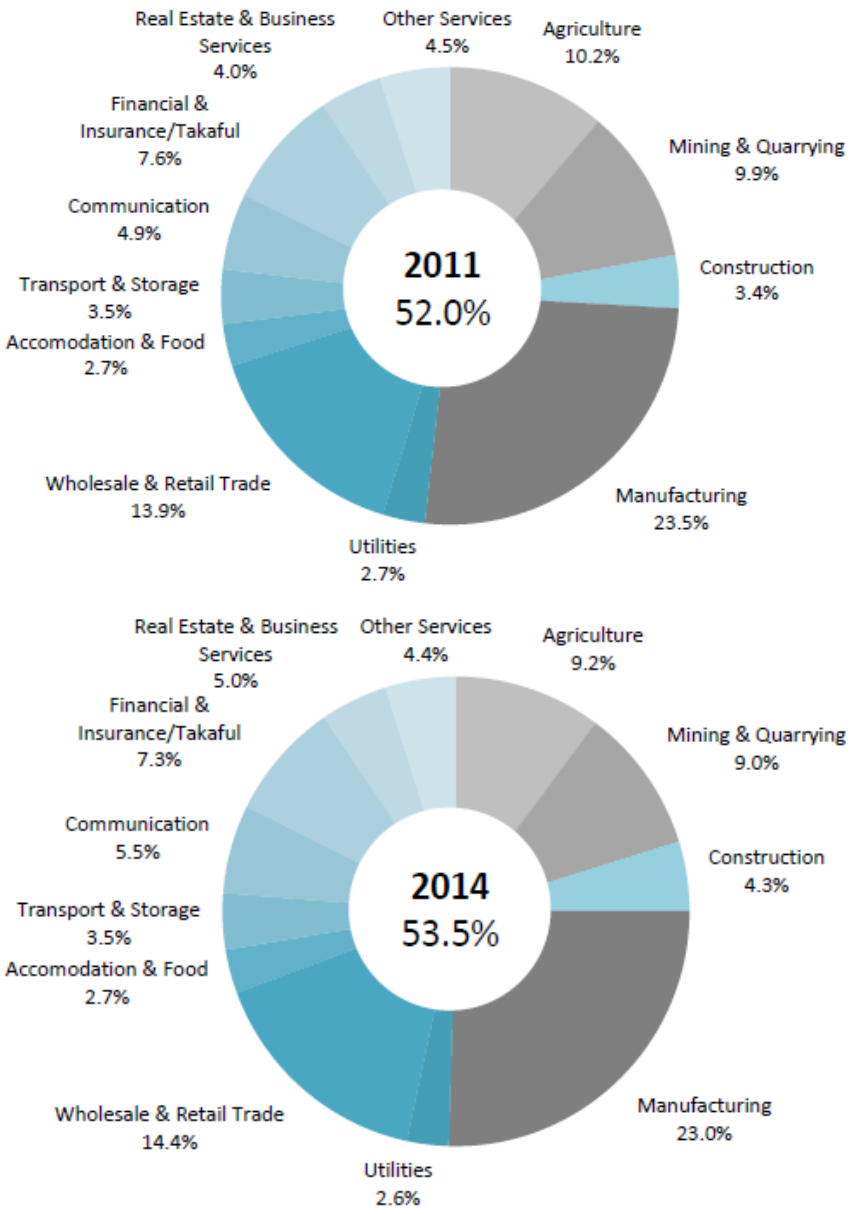


Figure 3 : Service Sector Share to GDP

Source: Economic Planning Unit, and Department of Statistics Malaysia

Growth in the service sector was driven largely by strong domestic demand during 2011 to 2014 period. The communications subsector expanded 8.8% annually, mainly driven by strong demand for data communications services. The transportation and storage subsector sustained growth at 5% attributed to higher growth in passenger travel and land transport activities.

In the Eleventh Malaysia Plan (2016-2020), the development of the services sector will be guided by the Services Sector Blueprint, launched in 2015. The Blueprint aims to unlock the potential of the sector and transform it to become more knowledge-intensive and innovation-led. The services sector is expected to grow at 6.8% per annum and contribute 56.5% to the GDP in 2020, and provide 9.3 million jobs.

During the Plan period, the transformation of the services sector requires three strategic shifts to be undertaken. The strategic shifts emphasize on the need to steer the development of the services sector towards quality growth. This can be achieved by focusing on changing the composition of the sector, leveraging the linkages between sectors, improving external competitiveness and generating high-income jobs.

2.6 International Benchmarking

Benchmarking is a standard, or a set of standards, used as a point of reference for evaluating performance or level of quality. Benchmarks may be drawn from an industry's own experience, from the experience of other similar industries, or from legal requirements such as environmental and safety regulations.

Companies that provide mechanical and electrical (M&E) services usually have the necessary skills required through a combination of in-house resources (usually a team of qualified engineers) and specialist 'service partners' that are contracted to provide assistance across the work spectrum.

The report is split into electrical work and mechanical work, though it is difficult to split the above list in to the two categories as many services fall into both. However, a general list for each of the categories is compiled below.

Electrical work: Ventilating and air conditioning, acoustic control, electrical and lighting systems, emergency lighting, control systems and building management systems,

uninterruptible power supplies, fire alarms, access control, lifts, energy supply and management, security systems.

Mechanical work: Heating and hot water installations, domestic water services including infrastructure and storage systems, public health services including water treatment, cooling towers, plumbing and drainage systems, lighting protection, hosereel and sprinkler systems, lifts/escalators..

M&E repair and maintenance services refer to the regular maintenance of building/plant and machinery/equipment that is essential to keep it in an efficient working order.

Most countries has set its benchmarking standard and related to the building or facilities codes such as APEC. The Apec standard was developed for the purpose of understanding how APEC member economies utilized building codes to increase building performance, aligning with the "green" goals of resource conservation and waste reduction. Building codes historically have been important policy tools for managing the safety, security, health, environment, and economy of the building sector. They also are regulatory tools for improving the performance of buildings and building professionals. Because buildings are responsible for a high percentage of materials consumption; greenhouse gas; and other emissions, regulation of the building sector offers a prime opportunity for economies to pursue resource conservation and waste reduction objectives. Building codes also provide policymakers with an important tool to encourage economic growth and conduct risk management.

Methodology

The comparative assessment is based on a APEC committee report 2013 and the comparison overview is only between 2 countries among others which is Brunei, Malaysia, United States of America and Canada.

This study is organized with a chapter devoted to each APEC member economy, which seeks to detail on the approach to developing, adopting, administering and enforcing building codes. This includes, for non-residential buildings, the existing minimum building

codes, including the types of buildings covered, adoption and evolution, key actors and processes, points of accountability, enforcement mechanisms, and main expression of criteria.

Terminology related to building regulation differs among the APEC member economies. For the purposes of this study, “building code” refers a set of rules that specify a minimum level of requirements for non-residential building construction and occupancy/operation and which meet the following criteria:

(i) Requirements are adopted and/or enforced by, or on behalf of, a government entity;

(ii) Criteria are written in mandatory language;

(iii) The minimum criteria are mandatory, while requirements above the minimum may be voluntary, mandatory for certain recognitions, or mandatory for a specific population of buildings; and

(iv) There is use of referenced standards.

Existing codes establish minimums of four key elements. Such elements include electrical, energy, water, sanitation, structural, mechanical, indoor air quality, security, safety, siting, and others.

- Common building elements targeted for performance improvement through building codes include energy efficiency, water efficiency, indoor air quality, light pollution, land use, environmental protection, and storm water management.
- Relevant international reference standards exist, supporting all code approaches.
- Embracing established best practices in building codes becomes increasingly important.
- As economies move to make codes greener, new and rapidly changing technologies and processes present new complexities and challenges.

APPROACHES TO BUILDING CODES

APEC member economies rely on three fundamental approaches to developing, adopting, administering and enforcing building codes.

Approach	Details
Model Code Developed Separate from Building Regulations	This approach utilizes model codes developed and administered by private organizations and quasi-governmental agencies. Jurisdictions have independent responsibility for developing and adopting building codes, and model codes offer an efficient way of doing so. The jurisdictions also manage building code enforcement, including inspection and permit issuance. In such a system, code enforcement officials, building sector professionals affected by the codes, academics and others participate in code development. Model codes are updated every three to five years. Reference standards are developed by separate organizations. Australia, Canada, and the United States follow this system.
Model Code Developed Alongside Building Regulations by the Government.	A national regulatory system is the most common among APEC economies, with variations coming in the degree of freedom regional (local) governments have in modifying, adopting, and enforcing regulations. In China and Indonesia, the central government develops regulations and codes and local governments may freely adopt or reject the codes and regulations. In Chile, Chinese Taipei, Japan, Korea, Peru, and Vietnam, local governments have little to no authority to modify codes and regulations.
Regulations Specify Use of Best Practices and Standards But Allow Equivalents.	Under this approach, building regulations are developed and enforced by the government. This approach is utilized in Brunei Darussalam, Hong Kong, China, and Singapore. The regulations allow the use of nonlocal codes, standards, and best practices in place of local ones. In Malaysia, local jurisdictions may develop and enforce their own standards.

Figure 4 : Approaches to Building Codes

APEC Economies' Minimum and/or Mandatory Codes: Electric, Energy, Water/sanitation, Mechanical, Indoor air, Lighting.

1. BRUNEI

Brunei Darussalam	Electrical Act 1973, Electricity Act (2011) (mandatory), and DES Guidelines on Proper Installation and Use of Electrical Wirings (minimum)	None	WHO Water Quality Guidelines (minimum)	None	None	None

2. CANADA

Canada	CSA C22 (mandatory)	NEC (mandatory)	Legislations from Environment Canada (mandatory)	CAN/CSA-C260-M90, CAN/CSA-B602-05, B52-05 and other Canadian Standards (mandatory)	ASHRAE 62.1 (minimum)	Canadian Federal Energy Efficiency Act 1992, MOL Act on Lighting for workplace (mandatory)

3. MALAYSIA

Malaysia	MS 1979, Electrical Installations of Buildings – Code of Practice (minimum)	MS 1525, Code of Practice on Energy Efficiency for non-residential Buildings, UNDP Malaysia Building Sector Energy Efficiency Project, National Energy	Water Services Industry Act 2006, National Water Services Commission Act for Peninsula Malaysia (not affecting East Malaysia), Sewerage Act 1994 (Affects both), and Water Forum,	MS 1460, MS 1918, MS IEC 60335 (minimum)	Code of Practice on IAQ, Department of Occupational Safety and Health (minimum)	MS 1038, MS IEC 60364, MS 603, MS ISO 8995, MS 825, MS IEC 60335, MS 947 (minimum)

4. UNITED STATES OF AMERICA

United States	NFPA 70, NEIS (mandatory if implemented)	ASHRAE 90.1, IECC (mandatory if implemented)	USEPA, NPDES, Clean Water Act (mandatory: Federal Law), Guidelines on Water Reuse, SDWA (minimum)	IMCC (mandatory if implemented), ASHRAE Standard 15, various ASTM standards (minimum)	OSHA IAQ Standards, ASHRAE 62.1 (minimum)	Requirements included in ASHRAE 90.1, 189.1, IEC, IBC, IDA, and thus mandatory if implemented IESNA Handbook (minimum) IDA-IES Model Lighting Zone Ordinance (mandatory if implemented)

Figure 5 : APEC Economies' Minimum and/or Mandatory Codes

2.7 Mechanical & Electrical Service And Maintenance Statutory, Regulatory Bodies, Associations And Relevant Organisations

i) Construction Industrial Development Board ACT 1994 (CIDB) (ACT 520) (ACT A1407) (Amendment) 2011

CIDB is a statutory body established under the parliament Act 520 on December 16, 1994. An Act to establish "Lembaga" and to provide for its functions relating to the construction industry and for matters connected therewith. The construction industry plays an instrumental role in a country's development. It acted as the catalysts to growth of others sectors in the nation's economy and as such, the industry has often been referred to as the 'engine of growth'. The Government has set up the CIDB to provide the effective of leadership and coordination among the players in the construction industry and enable them to move towards global competitiveness. The main objective that the Government set up CIDB is to develop the construction industry is to be the one of the major contributing sectors to the national economy, capable of producing and delivering high quality of works and human resources, value for money and able to response the nation's need.

ii) Department of Safety & Health (DOSH)

The Department of Occupational Safety and Health (DOSH) is a department under the Ministry of Human Resources. This department is responsible for ensuring the safety, health and welfare of people at work as well as protecting other people from the safety and health hazards arising from the activities sectors which include:

- Manufacturing
- Mining and Quarrying
- Construction
- Hotels and Restaurant

- Agriculture, Forestry and Fishing
- Transport, Storage and Communication
- Public Services and Statutory Authorities
- Utilities - Gas, Electricity, Water and Sanitary Services
- Finance, Insurance, Real Estate and Business Services
- Wholesale and Retail Trades

As a government agency, the department is responsible for the administration and enforcement of legislations related to occupational safety and health of the country, with a vision of becoming an organisation which leads the nation in creating a safe and healthy work culture that contributes towards enhancing the quality of working life.

iii) **Public Works Department**

Also known as the Public Works Department (PWD) in English term. It was established in 1872 to build infrastructure for socio-economic development and political systems of the English government in the Straits Settlement comprising of Singapore, Malacca, Perak, Seberang Perai and Penang. Today, Public Works Department (PWD) known as Jabatan Kerja Raya (JKR), is the foremost technical department in national infrastructure development. JKR provides multidisciplinary expertise that ensures best practice in technical consultancy, project management and asset/facilities maintenance management.

iv) **Ministry of Works**

This ministry is commonly known as the Kementerian Kerja Raya (KKR) Malaysia in Malay term. Established in 1956 as the Post and Telecom. In 1975, the Ministry was restructured and renamed the Ministry of Works and Transportation. The rapid growth and socio-economic development of the country in the 1970s has

added to the responsibilities of the Ministry. Thus, the Ministry was again renamed the Ministry of Works and Public in 1978. In accordance with its specialized responsibilities in the 1980s, the Government renamed the Ministry to the Ministry of Works. The Ministry's objective is to develop and enhance a high quality infrastructure system, the construction industry and services.

v) **National Institute of Occupational Safety and Health (NIOSH)**

The National Institute of Occupational Safety and Health (NIOSH) were launched on 1st December, 1992, after careful preparation and commitment from all parties to improve the safety and health of workers at the workplace in Malaysia. In the words of the Minister of Human Resource, Malaysia, NIOSH would be a "critical catalyst" in the promotion of occupational safety and health that would also serve as the 'backbone" to create a "self-regulating occupational safety and health culture" in Malaysia

2.8 Related Policies, Act, Regulation And Standard For Industry

i) **Building and Common Property (Maintenance and Management) Act 2007.**

This Act approved in Parliament is to provide for the proper maintenance and management of buildings and common property, and for matters incidental thereto. The purpose of this act is to ensure uniformity of law and policy with respect to local government to make laws relating to the maintenance and management of buildings and common property within Peninsular Malaysia and the Federal Territory of Labuan. This act acknowledges that developer is not relieved of his responsibility from damages in the post construction phase of a residential building like condominium and apartments.

ii) **Occupational Safety and Health (OSHA) Act 1994 (Act 514)**

The Occupational Safety and Health Act 1994 (Act 514) is Malaysian legislation which has been gazetted on the 25 February 1994 by the Malaysian Parliament. The principal of the Act is "To make further provision for securing that safety, health and welfare of persons at work, to protecting others against risks to safety or health in connection with the activities of persons at work, to establish the National Institute for Occupational Safety and Health and for matters connected therewith".

The Act applies throughout Malaysia to the industries specified mentioned as below:

- Manufacturing;
- Mining and Quarrying;
- Construction;
- Agriculture, Forestry and Fishing;
- Utilities:
- Transport, Storage and communication;
- Wholesale and Retail Trades;
- Hotel and Restaurants;
- Finance, Insurance, Real Estate and Business services; and
- Public Services and Statutory Authorities.

iii) **National Green Technology Policy (NGTP) 2009**

The launch of the National Green Technology Policy (NGTP) in 2009 is a manifesto of the government's seriousness in implementing "green" initiatives for the country. These include among others intensification of green technology research and innovation towards commercialization, promotion and public awareness of

green technology. Specifically for buildings, the government promotes the application of renewable energy (RE) and energy efficiency (EE) in buildings such as solar photovoltaic (PV), rainwater harvesting, phasing out of incandescent lights, and the application of green building index.

iv) **National Policy on Climate Change (2009)**

The National Policy on Climate Change (2009) through the Strategic Thrust for RE and EE champions the energy efficiency through promotion of green buildings in commercial / institutional, industrial and residential sector. This is achievable through application of low or zero energy concepts in the design and construction of new buildings; retrofitting of efficient ventilation and cooling systems as well as lighting systems; energy conservation practice in buildings; retrofitting existing buildings to include EE features and generate RE; and development of a green building index. The government of Malaysia has taken several pro-active actions in promoting energy efficiency through demonstration buildings including the Energy Commission's Diamond Building that could encourage private sector to also construct and design low energy buildings.

v) **Construction Industry Master Plan Malaysia (2006-2015)**

On 24 June 2003, the Construction Industry Development Board (CIDB) and the Building Industry President Council (BIPC) jointly organized the Presidents and Chief Executive Officers (CEOs) Roundtable on establishing priorities to improve the Malaysian construction industry for the future. The Roundtable was participated by CEOs of major construction and property development companies, presidents of professional institutes and building industry associations as well as officers from various Government departments. The Roundtable identified and recommended measures to improve the Malaysian construction industry. CIDB was then entrusted with the role of coordinating the various measures

recommended and establishing the 10 Working Groups (WGs), which included the CIMP.

The CIMP, Construction Industry Master Plan is Malaysia's strategic move to transform its construction industry to be among the best in the world. Malaysia's construction industry in 2015 aspired to be characterized in the following manner:

- Efficient and productive industry –industry is progressive by employing highly skilled workers equipped with modern techniques and technology, delivering high quality product and services with an outstanding achievement in global construction arena.
- Consolidated industry – One that is customer and service-focused delivering integrated services through strategic partnership between the clients, contractors, consultants, sub-contractors and suppliers.
- Innovative industry – that benefits from structured application of R&D initiatives. The industry continuously seeks to improve itself to meet the demand of sophisticated and highly knowledgeable customers.
- Environmentally responsible industry – industry is committed to environmentally sustainable development.

vi) **The Third Industrial Master Plan (IMP3) 2006 – 2020**

The Construction Industry Development Board (CIDB) Act 1994 (Act 520) and regulations refer to the Plan (IMP3), 2006–2007 that outlines the industrial strategies and policies which form part of the country's continuing efforts towards realizing Malaysian's objective of becoming a fully developed nation by 2020, as stated in vision 2020. The plan leverages upon the strengths and capabilities of existing industries and; the country's resources to enhance competitiveness and resilience. It also builds upon the experience and success of the previous two

plans, with adjustments to reflect development and opportunities in the global, regional and domestic environments.

The overriding objective of the IMP3 is to achieve global competitiveness through innovation and transformation of the manufacturing and services sector, while contributing to the other development thrusts of the National Mission of the Malaysia Plan (RMK-9) 2006-2010.

To contribute towards the objectives of Malaysia to be a developed nation by 2020, it is envisaged that Malaysia will develop a construction industry that is internationally competitive. The industry will be seamless and all stakeholders will work in collaboration with each other. To make sure the objective is successful, it needs to follow the vision of Malaysian construction, “be the Malaysia construction industry shall be a world-class, innovative, and knowledge global solution provider”. Another important thing is mission, set out as follows, “to be a dynamic, productive, and resilient enabling sector, supporting sustainable wealth generation and value creation, driven by a technologically-pervasive, creative, and cohesive construction community”. The Malaysian construction industry is planned to be world–class in terms of excellence throughout the construction industry value chain (from inception to facility management) as well as integrated to contribute to the economic development of Malaysia.

2.9 Conclusion

The growth of Mechanical & Electrical Service and Maintenance industry in the market is equal to as much as the growth of construction and other related industries. Since the construction market is booming as the government is trying to bring it on par with other emerging and developed countries in terms of infrastructure, it is as much as important to focus on the growth of the M & E Service and Maintenance industry. The Government has launched the ETP, which is focusing on improving the overall scenario of entire Malaysia's economy. The Mechanical & Electrical Service and Maintenance is progressively evolving especially in the 21st century where technological advancement changes the way buildings are Constructed, Aviation Industry, and Maritime, Transportation, Green Technology, Automation and others in expending progress in the country. In order to stay competitive, the Mechanical & Electrical Service and Maintenance Industry must respond appropriately in timely manner to meet the demand of populations with slowly changing lifestyles and priorities. It is only through this just regulatory supervision that the industry can help to maintain and improve Malaysians' standard of living and do so in a sustainable way. It can be summarised in this chapter that the Mechanical & Electrical Service and Maintenance Industry has great potential. Malaysia has many advantages and features that can be leveraged upon to make it internationally competitive. The Malaysian Government's significant investments and support in providing the platform for the Mechanical & Electrical Service and Maintenance Industry to be recognised globally.

3. METHODOLOGY

3.1 Introduction

This chapter describes the methodology of the overall Occupational Analysis process that was conducted throughout the M & E Services And Maintenance Industry Occupational Analysis.

3.2 Research Design

The research design that consists of the research method, data analysis methods and output required is as shown in the table below:

Table 3 : Research Design

Objectives	Research Method	Data Analysis	Output
Objective 1: To identify the Occupational Structure and Occupational Area Structure of the M & E Services And Maintenance industry. **Objective 2:** To identify critical and non-critical occupations within the employment structure of the M & E Services and Maintenance industry based on supply and demand data in which to be obtained from secondary database.	**Qualitative:** • Literature review • Focus Groups that consist of members representing different areas in the industry	• Thematic analysis • Mapping of industry job areas	• Scope of the Industry and its sub-sectors; • Occupational groups of the sub-sector; • Job title; • Critical job title; and • Competency Levels (Level 1 – 8).

Research initially consists of analysing available information on the M & E Services and Maintenance Industry, followed by direct contact with those in the industry to obtain a general idea of the industry sub-sectors. A supply and demand analysis is then conducted to identify current and projected supply & demand including supply & demand gap analysis. Qualitative analysis was chose to analyse data obtained from this study.

3.3 Research Methodology

This section describes on the different research methods used throughout the project and in the engagement of participating respondents. Several methods were employed namely focus group discussions and mapping. Below is description of each activity conducted with respondents.

3.3.1 Qualitative

Literature review

- A literature review on the M & E Services and Maintenance industry was carried out to get some insight of this industry in the context of the Malaysian scenario. The scope covered under this search includes definitions, the current analysis of the industry sub-sectors/areas and international examples of industry segmentation of its sub-sectors.
- Focus Groups with industry members

  The literature review findings were used as a guide to identify the scope of study and analysis. Experts from the M & E Services and Maintenance Industry were identified for further communication and contact. The lists of experts are included in the list of development panel members in Annex 2: List of Development Panel Members. However, there were also several references made by expert panels to industry experts that were not in the workshop.

The Focus Groups consisted of industry members, two (2) methods were adopted, namely; brainstorming and Development of Standard & Curriculum (DESCUM) session. The focus group workshop sessions are described in the following table.

Table 4 : Focus Group Session

Date	Location	Activity	Respondents	Organisation	Method Used
30th - 31st May 2015	Ibis Styles Hotel, Cheras	Occupational Structure Development Workshop	10	9	Focus Group Discussion
1st - 2nd Aug 2015	Ibis Styles Hotel, Cheras	Occupational Structure Development Workshop	10	9	Focus Group Discussion
22nd - 23rd Aug 2015	MACRA Secretariat, KL	Occupational Structure Development Workshop	10	9	Focus Group Discussion

Facts obtained during the literature review were also discussed and presented to the development panel members.The presence of the key persons or experts ensured that the development of the Occupational Analysis is current and relevant. The M & E Services And Maintenance Industry was analysed using the above methodology to identify the following:

(a) Scope of the Industry and its sub-sectors;

(b) Main areas;

(c) Occupational groups of the sub-sector;

(d) Job title;

(e) Critical job title; and

(f) Competency levels (Level 1 – 8).

3.4 Data Analysis

In meeting both objectives set forth in this study, the data was analysed through mapping, synthesis of discussion group findings and comparison of benchmarking samples.

3.4.1 Qualitative Analysis: Occupational Structure and Occupational Area Structure Development

Thematic analysis was used in qualitative research and focused on examining themes within data. This method emphasizes organization and rich description of the data set. Thematic analysis goes beyond simply counting phrases or words in a text and moves on to identifying implicit and explicit ideas within the data. Coding is the primary process for developing themes within the raw data by recognizing important moments in the data and encoding it prior to interpretation. The interpretation of these codes can include comparing theme frequencies, identifying theme co-occurrence, and graphically displaying relationships between different themes. Most researchers consider thematic analysis to be a very useful method in capturing the intricacies of meaning within a data set.

The thematic approach was applied throughout the process of analysing the Occupational Structure of the industry.

The Occupational Structure was analysed and defined based on the following processes:

a. Identification of industry scope and boundaries with other relevant industries

   The identification of the industry scope is important so that when identifying the relevant sub-sectors and areas under the industry, it will define the segmentation of the particular industry to other relevant industries. This will eliminate the possibility of duplication between common areas.

b. Identification of sub-sector/area/sub-area

The coverage of a sub-sector should be able to accommodate a number of areas and sub-areas where applicable. Sub-sectors are identified as being components of an industry and can be clustered in terms of classification, segmentation or process driven.

c. Identification of job titles

In order to identify job titles, it is important to obtain consensus from expert panel members so that the job title is common between organizations: Small, Medium Enterprise (SME) or Multi-National Corporations and is easily accepted by practitioners in the industry.

d. Identification of Levelling

Levelling of a job title is done based on the level of competency required as competent at a specific designation. The level descriptors in Annex 1 is used a reference when determining the different levels relevant to a specific job title.

e. Occupational Area Analysis

The Occupational Structure can be further analysed to produce its Occupational Area Structure (OAS) through Occupational Area Analysis (OAA). The occupational area analysis is a process of analysing the job scope of a particular area. This will help to ensure that the job titles are described not only based on common use in the industry but also by their job scope. These OAS will be taken into consideration to be developed into NOSS sub-areas. Therefore the process of merging and shrinking must be done with keeping in mind of the mechanisms of training and certification based on the NOSS. Ultimately, we are able to produce multi-skilling and multi-tasking workers required by the industry in line with the high-income economy policy. Nevertheless, in certain cases, due to the requirement of industry or regulations, merging is not necessarily required.

3.5 Limitations

i. Data and information

Given the broad-base nature of M & E Services and Maintenance industry, which are broadly divided into more than 5 sub diciplines sector, having list of panellists proficient in all areas, were a challenge. Even with participation of such eminent persons still doesn't steer the discussion clear from biased views and opinions. Those from different standpoints might have different view on the same subject typically influences by their own practice orientation. In other hand, some of the regulatory bodies have not release their new circular which is not only related but crucial reference to the research for the development of the above said industry.

ii. International Benchmarking

International benchmarking was done thoroughly through desktop research. Interpretation on data and information presented in either website or PDF documents lack the detail explanation based on the background story such as culture and economic level origins of related sources to the referred topics. Hence possible skewed understanding of related topics, which could potentially lead to inaccurate inferences of, related benchmarking.

3.6 Conclusion

This chapter has elaborated on the methodology used in the study which is through literature review, focus group discussion sessions, DESCUM (Development of Standard and Curriculum) and focus groups. The development of the Occupational Structure obtained via brainstorming sessions and supply and demand findings will be presented in the next chapter, Chapter 4, Findings.

4. FINDING AND DISCUSSION

4.1 Introduction

Findings in this chapter were obtained via literature review, observation, interviews with industry practitioners and discussions during workshops with development panel members. This literature review is also discussed with panel members to obtain insight on the matters at hand from a practitioner's perspective.

The identified sectors for the Mechanical & Electrical Services and Maintenance were obtained through literature research and discussions with industry experts during the development workshop sessions and interviews. Based on the discussions held during development workshops and approval sessions, the development and approval panel members had identified that the main sectors under the Mechanical & Electrical Services and Maintenance in Malaysia were to be segregated into **six (6)** different Occupational Structures which are:

- Facility Management
- People Mover
- Fire Protection
- Heating, Ventilation and Air Conditioning (HVAC)
- Machinery and Equipment
- Plumbing

4.2 Mechanical & Electrical Services And Maintenance Overview

Upon consultation and with the approval of industrial panels and based on literatures, Mechanical & Electrical Services and Maintenance products in this OA is classified as follows:

i. Facility Management – is the integration of processes within an organization to maintain and develop the agreed services which support and improve the effectiveness of its primary activities. A profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology.

ii. People Mover is a transportation system, typically one travelling from one point to another, in which cabins are suspended on a continuous moving cable driven by a motor at one end of the route.

i. Fire Protections is the study and practice of mitigating the unwanted effects of potentially destructive fires. It encompasses the review of behaviour, compartmentalisation, suppression and investigation of fire and its related emergencies, as well as the research and development, production, testing and application of mitigating systems.

ii. HVAC is an acronym for heating, ventilation and air conditioning. It refers to the various & different systems, machinery and technologies used in indoor settings such as homes, offices and hallways, and transportation systems that need environmental regulation to improve comfort.

iii. Machinery & Equipment any work equipment for lifting and lowering loads, and includes any accessories used in doing such as attachments to support, fix or anchor the equipment.

iv. Plumbing is the system of pipes, tanks, fittings, and other apparatus required for the water supply, heating, and sanitation in a building.

Figure 6 shows the breakdown of the Mechanical & Electrical Services and Maintenance Industry that will be the basis for discussion in this OA.

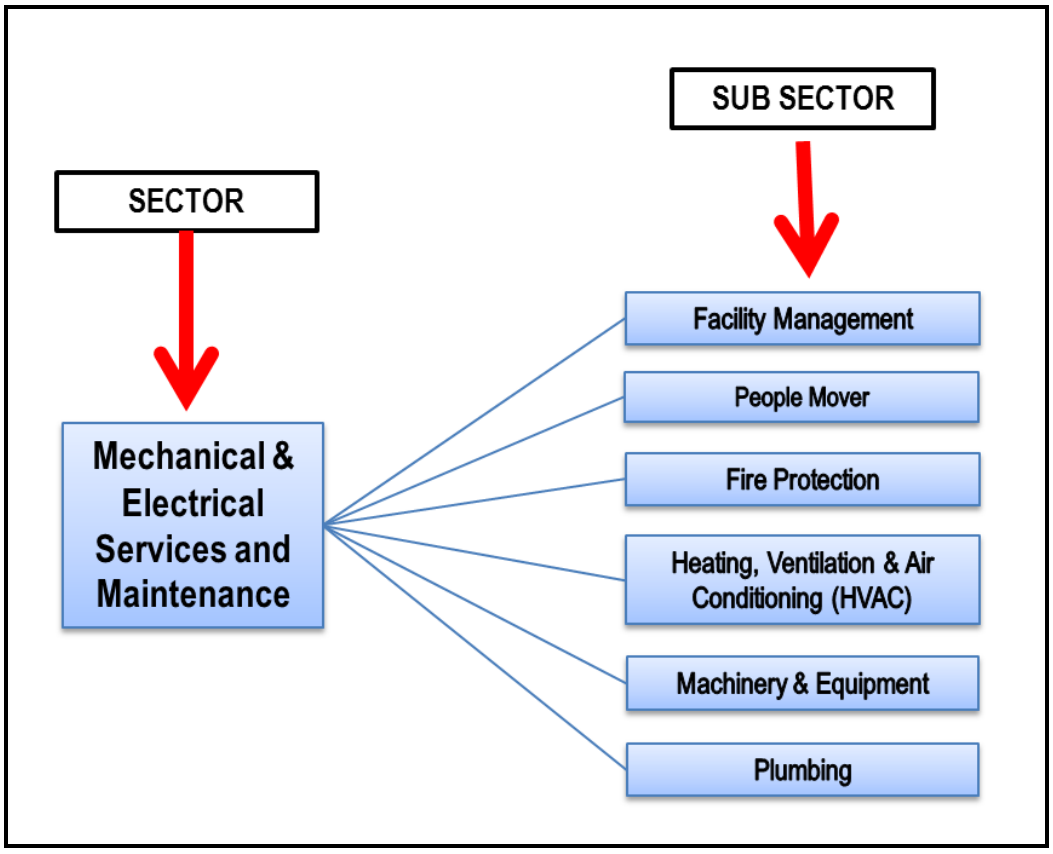


Figure 6 : Breakdown of the Mechanical & Electrical Services and Maintenance

Below are brief descriptions of the Sub-sectors, Areas and Sub-Areas:

i. Facilities Maintenance

The Facilities Maintenance sub sector in this OA is divided into several areas, as indicated in Figure 7 below:

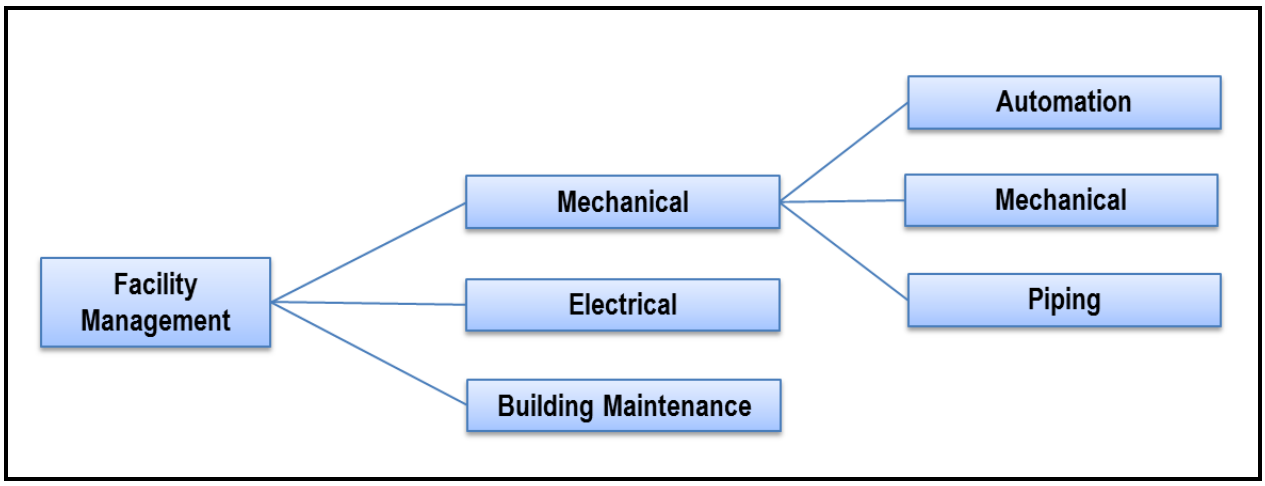


Figure 7 : Breakdown for subsector of Facilities Maintenance

ii. People Mover

A people mover is any of a variety of transportation systems relying on cables to pull vehicles along or lower them at a steady rate. The terminology also refers to the vehicles on these systems. The cable car vehicles are motor-less and engine-less and they are pulled by a cable that is rotated by a motor off-board. People mover sub sector in this OA is divided into several areas as indicated in Figure 8.

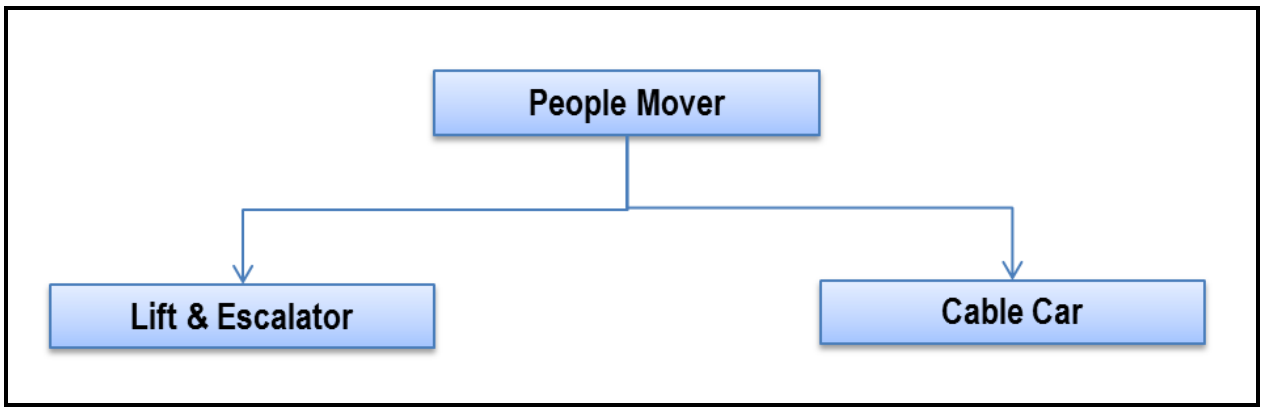


Figure 8 : Breakdown for subsector of People Mover

iii. Fire Protection

The Fire Protection sub sector in this OA is divided into several areas, as indicated in Figure 9 below:

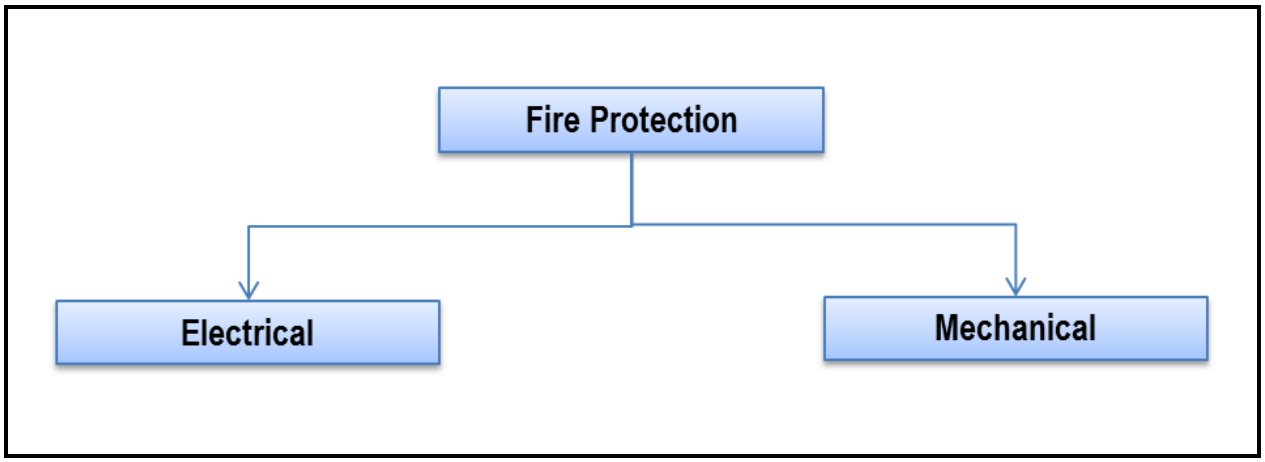


Figure 9 : Breakdown for subsector Fire Protection

iv. Heating, Ventilation & Air Conditioning (HVAC)

The HVAC sub sector in this OA is divided into several areas, as indicated in Figure 10 below:

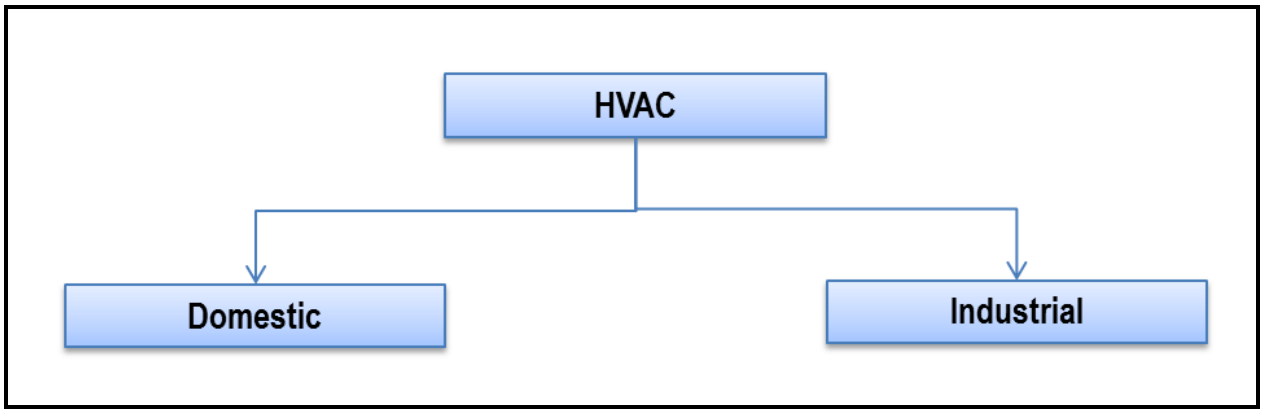


Figure 10 : Breakdown for subsector HVAC

v. Machinery and Equipment

The Machinery and Equipment sub sector in this OA is divided into several areas, as indicated in Figure 11 below:

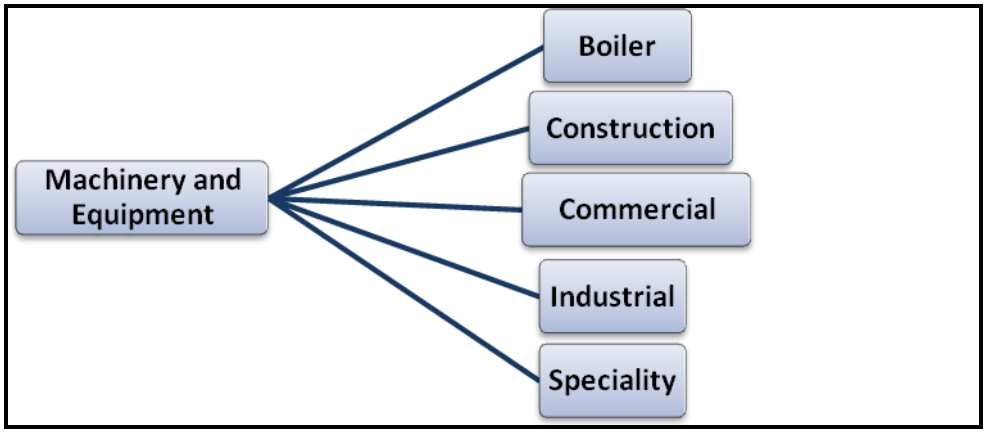


Figure 11 : Breakdown for sub sector of Machinery and Equipment.

vi. Plumbing

Plumbing sub sector in this OA is divided into several areas, as indicated in Figure 12 below:

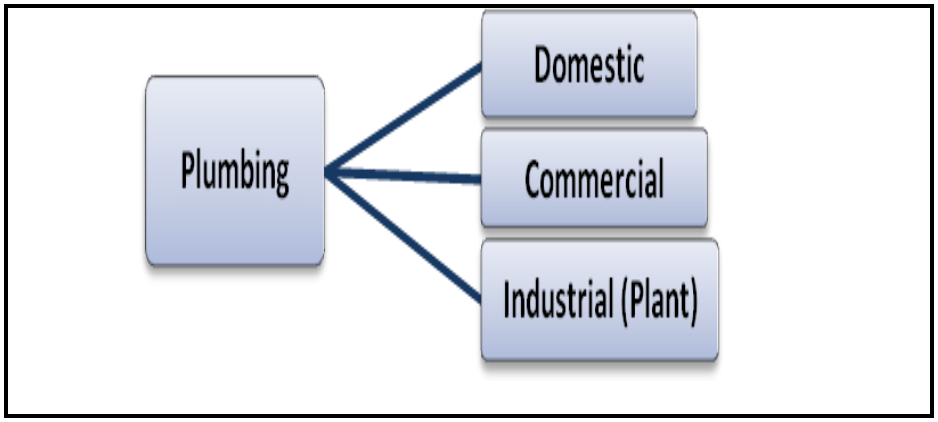


Figure 12 : Breakdown for sub sector of Plumbing

4.3 Mechanical & Electrical Service And Maintenance Occupational Structure

– *Please refer to the next page for Occupational Structure Sub Sector Details*

Table 5: Mechanical & Electrical Services and Maintenance– Facility Maintenance Sub Sector Occupational Structure

Sector	**Mechanical & Electrical Services and Maintenance**				
Sub Sector	**Facility Maintenance**				
Area	**Automation**	**Mechanical**	**Piping**	**Electrical**	**Building Maintenance**
Level 5	Facility Manager **				
Level 4	Facility Assistant Manager *				
Level 3	Facility Mechanical Supervisor *			Facility Electrical Supervisor	Building Maintenance Supervisor
Level 2	Senior Automatic Facility Maintenance Serviceman	Senior Mechanical Facility Maintenance Serviceman	Pipefitter	Electrical Facility Maintenance Serviceman	Building Maintenance Technician
Level 1	Junior Automation Facility Maintenance Serviceman	Junior Mechanical Facility Maintenance Serviceman	No level	No Level	Building Maintenance Junior Technician

* Critical Job Title

Table 6 : Mechanical & Electrical Services and Maintenance– People Mover Sub Sector Occupational Structure

Sector	**Mechanical & Electrical Services and Maintenance**			
Sub Sector	**People Mover**			
Area	**Lift & Escalator**		**Cable Car**	
			Mechanical	**Power Distribution Signal & Communication**
Level 5	Infrastructure Maintenance Manager **		Cable Car M&E Maintenance Manager **	
Level 4	Infrastructure Assistant Manager **		Cable Car M&E Maintenance Executive **	
Level 3	Testing Specialist **	Maintenance Supervisor	Cable Car M&E Supervisor **	
Level 2	Assistant Technician	Maintenance Technician	Senior Mechanical Cable Car Maintenance Serviceman *	Senior Serviceman – Power Distribution *
Level 1	No Level	No Level	Junior Mechanical Cable Car Maintenance Serviceman *	Power Distribution Fitter *

*Critical Job Title

Table 7 : Mechanical & Electrical Services and Maintenance– Fire Protection Sub Sector Occupational Structure

Sector	**Mechanical & Electrical Services and Maintenance**	
Sub Sector	**Fire Protection**	
Area	**Electrical**	**Mechanical**
Level 5	Facility Fire Protection Maintenance Manager *	
Level 4	Facility Fire Protection Maintenance Assistant Manager *	
Level 3	Fire Protection Electrical Supervisor	Fire Protection Mechanical Supervisor
Level 2	Fire Protection Technician (Electrical)	Fire Protection Technician (Mechanical)
Level 1	Fire Protection Technician Assistant (Electrical)	Fire Protection Technician Assistant (Mechanical)

* Critical Job Title

Table 8 : Mechanical & Electrical Services and Maintenance – Heating, Ventilating & Air Conditioning Sub Sector Occupational Structure

Sector	**Mechanical & Electrical Services and Maintenance**	
Sub Sector	**Heating, Ventilating & Air Conditioning**	
Area	**Domestic**	**Industrial**
Level 5	Domestic & Industrial HVAC Project Technical Manager *	
Level 4	Domestic & Industrial HVAC Project Coordinator **	
Level 3	Domestic & Industrial HVAC Project Specialist Technician **	
Level 2	Domestic HVAC Technician ***	Industrial HVAC Technician ***
Level 1	Domestic HVAC Handyman ***	Industrial HVAC Assistant Technician ***

* Critical Job Title

Table 9 : Mechanical & Electrical Services and Maintenance – Machinery and Equipment Sub Sector Occupational Structure

Sector	Mechanical & Electrical Services and Maintenance				
Sub Sector	**Machinery and Equipment**				
Area	**Boiler**	**Machinery Equipment**	**Commercial**	**Industrial (Plant)**	**Speciality**
Level 5	Maintenance Manager	Workshop Manager **	Maintenance Manager	Maintenance Manager	Service Manager **
Level 4	Boilerman	Assistant Workshop Manager *	Assistant Manager	Assistant Maintenance Manager	Assistant Manager *
Level 3	Assistant Boilerman	Supervisor	Supervisor	Equipment Specialist Technician *	Equipment Specialist Technician *
Level 2	Boiler Technician	Technician	Technician	Technician	Technician
Level 1	No Level	Handyman	Handyman	No Level	No Level

* Critical Job Title

Table 10 : Mechanical & Electrical Services and Maintenance – Plumbing Sub Sector Occupational Structure

Sector	**Mechanical & Electrical Services and Maintenance**		
Sub Sector	**Plumbing**		
Area	**Domestic**	**Commercial**	**Industrial (Plant)**
Level 5	Project Manager	Project Manager *	
Level 4	Specialist Plumbing	Specialist Plumbing **	
Level 3	Plumbing Supervisor	Plumbing Supervisor **	
Level 2	Plumber	Plumber *	
Level 1	Assistant Plumber	Assistant Plumber *	

*Critical Job

4.4 Occupational Definition

Definition Of The Mechanical & Electrical Service And Maintenance

Mechanical & Electrical Service and Maintenance may be described as the industry that involve in fixing any sort of mechanical, electrical, instrument and plumbing due to malfunctioning of the systems. It also includes performing of routine action which keeps the device in working condition or prevents trouble from arising, although this definition is not altogether satisfactory.

The Mechanical & Electrical Service and Maintenance may also be defined as actions which the term *maintenance* also has the following meanings:

- Any activity - such as tests, measurements, replacements, adjustments and repairs-intended to retain or restore a functional unit in or to a specified state
- For material - all actions taken to retain material in a serviceable condition or to restore it to serviceability. It includes inspection, testing, servicing, classification as to serviceability, repair, rebuilding, and reclamation
- Corrective maintenance - can be defined as a maintenance task performed to identify, isolate, and rectify a fault so that the failed equipment, machine, or asset can be restored to an operational condition within the tolerances or limits established for in-service operations. Corrective maintenance is maintenance which is carried out after failure detection and is aimed at restoring an asset to a condition in which it can perform its intended function.
- Preventive maintenance - is predetermined work performed to a schedule with the aim of preventing the wear and tear or sudden failure of equipment components. The routine recurring work required to keep a facility (plant, building, structure, ground facility, utility system or equipment) in such condition that it may be continuously used, at its original or designed capacity and efficiency for its intended purpose

The actions include the combination of all technical and corresponding operation, administrative, managerial, and supervision actions, which have the objective of retaining or restoring an item in or to a state in which it can perform its required function.

The Mechanical & Electrical Service and Maintenance can be broadly classified in three types of maintenance in use:

- Preventive maintenance, where equipment is maintained before break down occurs
- Operational maintenance, where equipment is maintained while in usage
- Corrective maintenance, where equipment is maintained after break down. This maintenance is often most expensive because worn equipment can damage other parts and cause multiple damages.

SECTOR : MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE
SUB-SECTOR : FACILITIES MAINTENANCE

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 1

JUNIOR MECHANICAL FACILITY MAINTENANCE SERVICEMAN

Job Definition:

The Junior Mechanical Facility Maintenance Serviceman is a person responsible to install, repair/replacing and maintain production and facility equipment according to safety, predictive and preventive maintenance systems and processes to support the achievement of the site's business goals and objectives.

Job Description:

1. Carry out removal,repair and re-installation of facility equipment.
2. Replace, maintain, or repair parts, test and make adjustments.
3. Perform regular maintenance on machines, production,plant and facilities according to safety, predictive and preventive maintenance system.
4. Report common faulty operations, defective material and report those and any unusual situations to immediate superior
5. Comply with safety regulations and maintain clean and orderly work areas.
6. Follow the standard operation procedure during performing duties.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 1

JUNIOR AUTOMATION FACILITY MAINTENANCE SERVICEMAN

Job Definitions:

The Junior Automation Facility Maintenance Serviceman is a person responsible to install, repair, replace and maintain facility electrical and automation equipment according to safety, manufacture requirement and procedure.

Job Description:

1. Install and maintain electrical equipment and automation equipment of facilities
2. Perform routine emergency/unscheduled repairs of electrical and automation component
3. Perform routine scheduled electrical and automation maintenance inspection on premises.
4. Perform routine corrective and preventive maintenance on machines, equipment and plant facilities related to electrical.
5. Perform general inspection of faulty operations, defective material and report any unusual situations to immediate superior.
6. Comply with safety regulations, maintain clean and orderly work areas.
7. Follow the standard operation procedure during performing duties.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 1

BUIDLING MAINTENANCE JUNIOR TECHNICIAN

Job Definitions:

The Building Maintenance Junior Technician is a person responsible to install, repair, replacing and maintain facility Building Automation System (BAS) equipment according to safety, manufacturer's requirement and procedure.

Job Description:

1. Perform routine maintenance of building system.
2. Perform routine Preventive Maintenance of the building equipment.
3. Perform minor troubleshooting.
4. Prepare record of all work performed.
5. Comply to safety regulation, maintain equipment and workplace cleanliness.
6. Follow the standard operation procedure during performing duties.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

PIPEFITTER

Job Definition:

A Pipefitter is the person who is responsible to maintain, assemble, and adjust piping, pipe support, hydraulic, vacuum and pneumatic equipment system which covers related packages such as heat recovery, gaseous system hot water, cooling, lubricating and firefighting in the industrial and processing sector.

Job Description:

1. Maintain, assemble, adjust and install pipe systems, pipe supports,hydraulic, vacuum system and pneumatic equipment according to specification.
2. Install pipe for steam, hot water, heating, cooling, lubricating, sprinkling & industrial production and processing system.
3. Perform preventive, corrective repair, maintainance pipe systems and components.
4. Test piping system for leaks by pressure test pipes and observe gauges attached to pipes for indication of leaks.
5. Perform any other matters in pursuance of the general care of the business premise during operating hours.
6. Comply with related regulations, maintain clean and orderly work areas.
7. Follow the standard operation procedure during performing duties.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

SENIOR MECHANICAL FACILITY MAINTENANCE SERVICEMAN

Job Definition:

The Senior Mechanical Facility Maintenance Serviceman is the person who is responsible to start-up, commission, tune, repairs; possibly corrective and preventive maintenance on a wide variety of building and facilities mechanical systems, equipment, and fixtures. The person is also assigned to install, troubleshoots, repairs and maintains a wide variety of facility plumbing, mechanical, heating, and cooling systems.

Job Description:

1. Install, troubleshoots, repairs and maintains a wide variety of facility plumbing, mechanical, heating, and cooling systems.
2. Perform the corrective and preventive maintenance duties.
3. Receive general instructions and review of job plans for all work.
4. Operates, maintains, and performs minor upgrade projects on mechanical systems.
5. Carry out start-up, commission, tune on a wide variety of building and facility equipment, fixtures and systems.
6. Comply with related regulations and maintain clean and orderly work areas.
7. Perform any other matters in pursuance of the general care of the business premise.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

SENIOR ELECTRICAL FACILITY MAINTENANCE SERVICEMAN

Job Definition:

A Senior Electrical Facility Maintenance Serviceman is a person who is responsible for maintenance duties; to install, repair, recondition of electrical equipment in facilities or business premises.

Job Description:

1. Perform corrective and preventive maintenance on electrical equipment in the facilities or business premises.
2. Install, repair and recondition of facilities electrical equipment.
3. Check all maintenance activities are executed in line with standard adherence to minimize or prevent system breakdowns.
4. Coordinate the work of other personnel such as carpenters, painters, and telecommunications staff.
5. Follow the standard operation procedure during performing duties.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

SENIOR AUTOMATION FACILITY MAINTENANCE SERVICEMAN

Job Definition:

Senior Automation Facility Maintenance Serviceman is a person who is responsible of routine technical duties in troubleshooting and repairing building-automation-systems field cabinets, sensors, CCTV, and controls.

Job Description:

1. Perform troubleshoot and repair building-automation-system field cabinets, including communications equipment, printed circuit boards, power supplies, electrical/electronic controls, sensors, and transducers.
2. Perform general check and repairs of control system's malfunctions.
3. Perform internal facilities technicians & external service providers with day to day operational troubleshooting and repairs including preventative and corrective maintenance.
4. Follow the standard operation procedure during performing duties.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

BUILDING MAINTENANCE TECHNICIAN

Job Definitions:

The Building Maintenance Technician is a person responsible to perform Preventive Maintenance, troubleshooting, implementation of work order and assist the Building Maintenance Supervisor in all building maintenance works.

Job Description:

1. Perform building maintenance inspection.
2. Perform routine Preventive Maintenance of the building equipment.
3. Perform building facility maintenance troubleshooting.
4. Prepare record of all works performed.
5. Implement technical change in procedure and technology.
6. Follow the standard operation procedure during performing duties.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 3

FACILITY MECHANICAL SUPERVISOR

Job Definition:

Facility Mechanical Supervisors are responsible to perform supervisory activities such as create work assignment, human resource, motivate employees and administrative. He / she also responsible to perform technical tasks of the work unit, if necessary.

Job Description:

1. Schedule, prioritize, assign, supervise, review, and participate in the work of staff responsible for facility maintenance.
2. Establish schedules and methods for providing facility maintenance services; identify resource needs; review needs with appropriate management staff; allocate resources accordingly.
3. Monitor and control supplies and equipment; order supplies and tools as necessary; prepare documents for equipment procurement; prepare specifications and contracts for contract services.
4. Train or coordinate training in facility maintenance and safety methods, procedures, and techniques.
5. Organize preventive maintenance and safety inspection programs for all facilities and equipment.
6. Perform the technical and tasks of the work unit.
7. Coordinate with other departments regarding related work issues.
8. Coordinate with contractors in providing contract services.
9. Verify completion of work done according to contract.
10. Provide reports to the immediate superior; investigate complaints and recommend solution.
11. Follow the standard operation procedure during performing duties.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 3

FACILITY ELECTRICAL SUPERVISOR

Job Definition:

Facility Electrical Supervisors are responsible to perform supervisory activities such as create work assignment, human resource, motivate employees and administrative. He / she also responsible to perform technical tasks of the work unit, if necessary.

Job Description:

1. Coordinate and supervise electrical related projects to ensure minimum disruption to core activities.
2. Monitor electrical systems maintenance including Standby Supplies.
3. Prepare working schedule and assigning work and train electrical personnel.
4. Check maintenance equipment, compliance with electrical codes and adherences to safety regulation.
5. Perform administrative duty, record keeping, control of rising and issuing of safety documentation.
6. Coordinate with other departments regarding related work issues.
7. Coordinate with contractors in providing contract services.
8. Follow the standard operation procedure during performing duties.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 3

BUILDING MAINTENANCE SUPERVISOR

Job Definition:

Building Maintenance supervisor are responsible to perform supervisory activities such as create work assignment, human resource, motivate employees and administrative. He / she also responsible to perform technical tasks of the work unit, if necessary.

Job Description:

1. Maintain building facilities in safe condition.
2. Carry out total Preventives Maintenance related projects to ensure minimum disruption to core activities.
3. Monitor maintenance of and installation of site Building environmental Systems.
4. Prepare working schedule and assigning work and train building Maintenance personal.
5. Check maintenance equipment, compliance with building safety codes and adherence to related regulation such as safety regulations.
6. Coordinate with other departments regarding related work issues.
7. Coordinate with contractors in providing contract services.
8. Verify completion of work done according to contract.
9. Perform administrative duty, record keeping, and control of rising and issuing of safety documentation.
10. Follow the standard operation procedure during performing duties

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 4

FACILITY ASSISTANT MANAGER

Job Definition:

Facility assistant manager is a person who is responsible to administer and supervise the work of employees in the general maintenance and upkeep of buildings, grounds, and equipment. Responsible to maintain electrical, piping, mechanical and building maintenance systems. Performs the work of employees and other duties as required.

Job Description:

1. Verify completion of work.
2. Mobilisation planning & allocation of equipment and personnel from one project to another as necessary.
3. Administer , inspect and verify repairs and maintains the electrical, piping, HVAC, mechanical and other related systems in buildings/ premise locations.
4. Assign task to the workers for general repairs such as painting, patching walls, security hardware, hanging shelves and landscaping accordingly .
5. Coordinate renovations of existing and the construction of new facilities.
6. Coordinate and inspects major contract work on the electrical, piping, mechanical and other related systems in buildings/premise locations
7. Approve the assignment and inspects the work of other maintenance technician.
8. Issue Permit To Work (PTW) for all work activities to respective section.
9. Preparation and administration of the facility maintenance budget; submit budget recommendations; monitor expenditures; prepare cost estimates; submit justifications for equipment; monitor budget expenditures.

10. Monitor and control supplies and equipment; order supplies and tools as necessary; prepare documents for equipment procurement; prepare specifications and contracts for contract services.
11. Conduct training in facility maintenance and safety methods, procedures, and techniques.
12. Organize preventive maintenance and safety inspection programs for all facilities and equipment.
13. Follow the standard operation procedure during performing duties.
14. Keep time cards and other routine records.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 5

FACILITY MAINTENANCE MANAGER

Job Definition:

Facility Maintenance Manager is responsible for the management of services and processes that support the core business of an organization. They ensure that an organization has the most suitable working environment for its employees and their activities. Facility Manager is involved in both strategic planning and day-to-day operations, particularly in relation to buildings and premises.

Job Description :

1. Prepare project documentations such as Letter of Offer, Letter of Award, tender and contracts.
2. Project management and supervising and coordinating work.
3. Investigating availability and suitability of options for new premises.
4. Calculate and compare costs for required goods or services to achieve maximum value for money. Perform cost control for maintenance activities.
5. Plan for future development in line with strategic business objectives.
6. Manage and lead change to ensure minimum disruption to core activities.
7. Direct, coordinate and plan essential central services such as reception, security, maintenance, mail, archiving, cleaning, catering, waste disposal and recycling.
8. Perform of various contracts, requests for proposals, and reports.
9. Attend and participate in professional group meetings; maintain awareness of new trends and developments in the field of facility maintenance; incorporate new developments as appropriate into programs.
10. Coordinate with contractors in providing contract services.

11. Provide information to the management; investigate complaints and recommend solution.
12. Perform building upkeep report to the facility owner such as upgrading and renovations.
13. Participate in the development of goals and objectives as well as policies and procedures; make recommendations for changes and improvements to existing standards, policies, and procedures; participate in the implementation of approved policies and procedures; monitor work activities to ensure compliance with established policies and procedures
14. Follow the standard operation procedure during performing duties.

SECTOR : MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

SUB-SECTOR : PEOPLE MOVER

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 1

JUNIOR MECHANICAL CABLE CAR MAINTENANCE SERVICEMAN

Job Definition:

Junior Mechanical Cable Car Maintenance Serviceman is a person who is responsible to assists his/her immediate superior/supervisor in various activities at the Cable Car division. Essential functions includes the routine inspection, assist, install new cables, adjust, maintain cable tension carriages install sheaves, pulleys and the components and any other related duties in addition to the ones listed.

Job Description:

1. Perform routine inspection of cable defect and damage.
2. Carry out the minor repair, splice and lubricating cables.
3. Assist in splice fiber and wire rope, slings for rigging.
4. Assist to install new cables, adjust and maintain cable tension carriages for proper alignment.
5. Inspect, assist repair and install sheaves, pulleys and the components
6. Check and report cable car system status, compartment, components and equipment according to checklist.
7. Ensure tools and machinery is in good condition.
8. Ensure all Personal Protective Equipment (PPE) is ready for use.
9. Practice safety standards in accordance with Standard Operating Procedure (SOP).

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

SENIOR MECHANICAL CABLE CAR MAINTENANCE SERVICEMAN

Job Definition:

Senior Mechanical Cable Car Maintenance Serviceman is a person who responsible to perform various activities at the Cable Car division. His/her range of duties assigned to this level are include Inspect, repairs, installs, adjust and maintain anything related to cable cars and its components.He/she also oversees the activities of crews assigned to assist on cable repair and performs related duties and responsibilities accordingly.

Job Description:

1. Inspect cables for defect, repairs, splices and lubricates traction cables.
2. Splices fiber, wire rope slings and rigging.
3. Perform installation of new cables, adjust and maintain cable tension carriages in proper alignment.
4. Inspects repairs and installs sheaves, lagging and component parts.
5. Oversees the activities of crews assigned to assist on cable repair.
6. Operates overhead crane and machinery and motor vehicles.
7. Completes daily reports and record other related documentation submitted by junior crews.
8. Performs related duties and responsibilities as assigned.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 1

JUNIOR POWER DISTRIBUTION SIGNAL & COMMUNICATION CABLE CAR MAINTENANCE SERVICEMAN

Job Definition:

Junior Power Distribution Signal & Communication Cable Car Maintenance Serviceman is responsible to assist to maintain the cable car in good and safe operating condition in relation to the Power Distribution Signal and Communication System**.** Maintain the day-to-day operations and to assume responsibility for maintaining the physical asset of the property under the direction of the Property/Operations Manager.

Job Description:

1. Perform corrective maintenance as per detail in job order.
2. Perform routine preventive maintenance as per schedule.
3. Check and report to superior on work progress.
4. Check and report cable car system status, compartment, components and equipment according to checklist.
5. Ensure tools and machinery is in good condition.
6. Ensure all Personal Protective Equipment (PPE) is ready for use.
7. Check inventory in accordance to checklist requirements.
8. Record document storage inventory.
9. Practice safety standards in accordance with Standard Operating Procedure (SOP).

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

SENIOR POWER DISTRIBUTION SIGNAL & COMMUNICATION CABLE CAR SERVICEMAN

Job Definition:

Senior Power Distribution Signal & Communication Cable Car Service man is responsible to maintain the cable car in good and safe operating condition. Maintain production and quality by ensuring operation of machinery and mechanical equipment in accordance with the standard operating procedures.

Job Description:

1. Assign the job order in accordance with the maintenance work schedule.
2. Verify inventory controls for cost effective operations.
3. Update and confirm work progress report to superior.
4. Update and confirm cable car system status, compartment, components and equipment carried out according to checklist.
5. Inspect tools, machinery and Personal Protective Equipment (PPE) is in good condition.
6. Confirm inventory in accordance to checklist requirements.
7. Verify recorded document storage inventory.
8. Practice and ensure safety standards in accordance with standard operating procedure (SOP).
9. Identify sources of problems by observing mechanical devices in operation, abnormal noise using precision measuring and testing instruments.
10. Adjusts functional parts of devices and control instruments by using hand tools and specific equipment levels.
11. Removes defective or replacement parts by dismantling; using hoists, roping, hand, power and special tools.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 3

CABLE CAR M&E MAINTENANCE SUPERVISOR

Job definition:

Cable Car Mechanical Supervisor is a person who are responsible for supervisory activities such as create work assignment, some administrative task and inspection. He/she also responsible to perform technical tasks of the division such as diagnose, replace, repair and troubleshoot anything related to his filed of expertise.

Job Description:

1. Perform mechanical/electrical maintenance and repair of electrically powered transit equipment and vehicles such as lift, escalator, cable cars and light rail vehicles
2. Diagnoses, replaces and/or repairs worn or defective electrical, pneumatic, mechanical.
3. Carry out tests, troubleshoots and maintains AC/DC electrical and electronic parts and circuits.
4. Inspects electrical, mechanical, hydraulic or pneumatic equipment and parts on electrically powered vehicles and cable cars to ensure the vehicle is in safe operating condition.
5. Assigns electrical transit equipment to operations, including preparing vehicles assignment sheet, obtaining maintenance or repair information from operations.
6. Maintains shop work area by properly storing equipment and tools.
7. Generates and maintains appropriate records of road call and vehicle maintenance data.

8. Notifies the management division either in writing or verbally of additional needed repairs, parts needed to complete work, unexpected delays/challenges and work completed.
9. Correctly refer parts manuals to correctly identify and order replacement parts.
10. Performs related duties and responsibilities as assigned.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 4

CABLE CAR MECHANICAL MAINTENANCE EXECUTIVE

Job Definition:

Cable Car Mechanical Maintenance Executives is the person who is responsible for the continuous running of equipment and machinery. His /her duty includes maintenance, strategies, procedures and methods. The person also responsible to carry out quality inspections on jobs, arrange procurement and any other related duties assigned under his/her level of experstise in the division.

Job Description:

1. Design maintenance strategies, procedures and methods.
2. Carry out routine scheduled maintenance work and responding to equipment faults.
3. Diagnose breakdown problem and assigned duties to respective division crews.
4. Inspect the new parts fitted by crews/worker and making sure equipment is working correctly.
5. Carry out quality inspections on jobs.
6. Liaise with client departments, customers and other engineering and production colleagues.
7. Review and verify reports received via writing or verbally of additional needed repairs, parts needed to complete work, unexpected delays/challenges and work completed.
8. Arrange procurement of specialize fixtures, fittings or components.
9. Control maintenance tools, stores and equipment.
10. Monitoring and controlling maintenance costs.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 5

CABLE CAR M&E MAINTENANCE MANAGER

Job Definition:

Cable Car M&E Maintenance Manager manages the technical activities on assigned projects and ensures that the technical staff understands and adheres to the discipline technical policies and procedures. Ensure that all cable cars are in good and safe working conditions.

Job Description:

1. Prepare the development of technical documentation, proposals, and presentations to clients. Produce written specifications for project equipment and construction methods.
2. Coordinate project designs with other disciplines to determine equipment needs, implement operating procedures, resolve system malfunctions, and provide technical information.
3. Coordinate with suppliers, contractors, clients, and client representatives to determine project scope.
4. Perform specific engineering studies, engineering calculations, and other design analyses using industry software.
5. Evaluate the work of technical staff and provides feedback and/or corrections based on client needs.
6. Take the lead in developing design approaches and concepts on assigned projects and requests assistance from the technical staff when needed.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

ASSISTANT TECHNICIAN

Job Definition:

Assistant Technician is a person who is responsible for all routinely corrective and preventive maintenance, repair work on lift/escalator and similar people-moving machinery. His/her duty include install, repair and maintain the equipment and its components. The technicians respond to calls about malfunctioning equipment, troubleshoot, check wiring, replace parts as needed, test electrical systems to make sure the elevator unit is running efficiently.

Job Description:

1. Perform routinely corrective and preventive maintenance
2. Carry out repair work on lift/escalator and similar people-moving machinery
3. Install various components of the lift/escalator system, such as the railings on which the lift/escalator travels, its supporting motors and cables and the electrical wiring and microprocessors that power the equipment.
4. Respond to calls about malfunctioning equipment, often troubleshoot the machinery until the problem can be diagnosed and solved.
5. Check wiring and parts for signs of wear, replace parts as needed, oil gears and test electrical systems to make sure the elevator unit is running efficiently.
6. Performs related duties and responsibilities as assigned.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 3

TESTING SPECIALIST

Job Definition:

Testing Specialist is a person who responsible to supervise mechanics/technician or trades helperswork performance on the repair, maintenance and installation of the systems. He/she arrange schedules, assigns, plans and monitors the work of his/her subordinates. He/she may carry out certain management activities and assist the engineers of his division if necessary.

Job Description:

1. Supervises and test the crews/technician work performance in the respective division on a regular basis.
2. Arrange schedules, assigns, plans and monitors the work of elevator shop personnel performing a variety of elevator projects.
3. Plans and develops work schedules, equipment usage schedules, priority of elevator expenditures and procedures for elevator equipment maintenance.
4. Reviews plans for future buildings and inspects new buildings to ensure compatibility with existing elevator codes and maintenance standards.
5. Prepares material and labour estimates.
6. Monitors the acquisition and use of materials.
7. Maintains time, payroll, work order, material, equipment and other elevator shop records and submits reports.
8. Assists engineers in design requirements.
9. Performs related duties and responsibilities as assigned

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

MAINTENANCE TECHNICIAN

Job Definition:

Maintenance Technician is a person who is responsible for all routinely corrective and preventive maintenance, repair work on lift/escalator and similar people-moving machinery. His/her duty include assisting the Maintenance Supervisor to check and replace various mechanical & electrical components of the lift/escalator system.

Job Description:

1. Perform routinely corrective and preventive maintenance
2. Carry out repair work on lift/escalator and similar people-moving machinery
3. Assist to install various components of the lift/escalator system, such as the various mechanical & electrical components of the lift/escalator system such as faulty rope brakes, pit stop switch, light switch & ladder or machine & controller.
4. Respond to calls about malfunctioning equipment, often troubleshoot the machinery until the problem can be diagnosed and solved.
5. Check wiring and parts for signs of wear, replace parts as needed, oil gears and test electrical systems to make sure the elevator unit is running efficiently.
6. Performs related duties and responsibilities as assigned.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 3

MAINTENANCE SUPERVISOR

Job Definition:

Maintenance Supervisor is the person who is responsible to to supervise mechanics/technician or trades helperswork performance on the repair, maintenance and installation of the systems. He/she arrange schedules, assigns, plans and monitors the work of his/her subordinates. He/she may carry out certain management activities and assist the inter- division if necessary.

Job Description:

1. Inspect buildings/facilities lift; escalator or elevator services and equipment .
2. Identify major maintenance issues involve mechanical & electrical components such as faulty rope brake, machine motor brake, pit stop switch, light switch & ladders or machine & controller.
3. Report the issues of faulty door mechanisms including debris fouling the track, problems with seismic devices, electronic control systems and sensors, hydraulic pumps and piston glands for hydraulic units, vandalism and emergency telephones (it must be working at all times).
4. Check maintenance equipment, compliance with building safety codes and adherence to related regulation such as safety regulations.
5. Coordinate with other departments regarding related work issues.
6. Create work assignments for the subordinates
7. Performs related duties and responsibilities as assigned.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 4

INFRASTRUCTURE ASSISTANT MANAGER

Job Definition:

Infrastructure Assistant Manager is a person who responsible to works closely with Infrastructure Maintenance Manager . His /her duty includes support, maintenance, strategies, procedures and methods. The person also responsible to carry out quality inspections on jobs, arrange procurement and any other related duties assigned under his/her level of experstise in the division.

Job Description :

1. Perform support enabling works for infrastructure.
2. Carry out design process to achieve compliance with regulation and standard operation procedure as per assign.
3. Assist in developing handover arrangements with infrastructure partner and internal maintenance division.
4. Work cooperatively as part of wider team delivering similar works.
5. Produce periodic reports for cost and schedule within the project governance framework.
6. Actively identify and manage and report risk.
7. Analyse performance, implementation, and commercial data; make decisions where appropriate or provide recommendations.
8. Implement and maintain an appropriate reporting structure for performance, implementation, and commercial issues.
9. Identify and implement best practice, including value management and risk management techniques.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 5

INFRASTRUCTURE MAINTENANCE MANAGER

Job Definition:

Infrastructure Maintenance Manager is the person who are responsible for managing all operations relating to the infrastructure maintenance equipment in the building/premise/facilities. His/Her duty includes plan, test, maintain and schedule the work of subordinate staff. The incumbent is accountable to accomplish section goals and objectives as well as further overall departmental goals and objectives.

Job Description :

1. Manage all operations relating to the infarsructure maintenance of all lift/escalators or elevator and subsidiary equipment in the building/premise/facilities.
2. Plan, test and schedule the work of subordinate staff and efficiently ensure the safe operating condition of elevators/escalators to minimize service down time.
3. Accomplish section goals and objectives as well as further overall departmental goals and objectives.
4. Manages, supervises and coordinates lift/escalator/elevator maintenance ,test and repair program activities and operations on an assigned shift within the Testing and Mechanical Maintenance Division;
5. Co-ordinates assigned activities with other shifts, divisions, outside agencies and the general public; ensures adherence to safety policies, procedures and work standards.
6. Provides highly responsible and complex staff assistance to the management.

7. Maintains maintenance records of time and materials; prepares a variety of statistical reports.
8. Selects, trains, motivates and evaluates assigned personnel; provides or coordinates staff training; works with employees to correct deficiencies; implements discipline and termination procedures.
9. Attends and participates in professional group meetings; stays abreast of new trends and innovations in the field of lift/escalator or elevator maintenance and repair.
10. Planning and directing the work of a group of individuals, monitoring their work, and taking corrective action when necessary.

SECTOR : MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

SUB-SECTOR: FIRE PROTECTION

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 1

FIRE PROTECTION TECHNICIAN ASSISTANT

Job Definition:

Fire Protection Technician Assistant is a person who is responsible to handle routinely inspection, maintain fire protection systems and equipment in buildings and other facilities related to electrical. Assists with guidance of his/her superior in the execution to replace, repair the damage of components. The person carry out prepare schedule, document and complete assigned tasks.

Job Description:

1. Handle routine inspection and maintenance of fire detection & alarm systems, fire suppression systems and firefighting equipment in in buildings/facilities.
2. Assists with guidance of his/her superior to execute the replacement and repair the damage or loose electrical cord in the facility.
3. Check there are no overload outlets, blowing fuses and tripping circuits that is potentially lead to fire explosion.
4. Report electrical hazards and faulty wiring and malfunction electrical equipment.
5. Help schedule,document and complete assigned tasks.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

FIRE PROTECTION TECHNICIAN

Job Definition:

Fire Protection Technician is a person who is responsible to maintain, install fire protection systems and equipment in buildings and other facilities related to electrical. Replace, repair the damage or loose electrical cord, in the facility. Record all reports submitted by subordinates and perform duties as required on an “on call” basis outside of regular working hours and help schedule and complete assigned tasks.

Job Description:

1. To maintain and install fire protection systems and equipment in buildings and other facilities related to electrical.
2. Replace, repair the damage or loose electrical cord, in the facility.
3. Monitor that there are no overload outlets, blowing fuses, tripping circuits and ensure that high-wattage appliance plug into only one receptacle outlet each at a time in accordance with the manufacturer's instructions.
4. Monitor if outlet or switches feel warm, flicker or lights dim.
5. Record electrical hazards and faulty wiring and malfunction electrical equipment’s.
6. Perform duties as required on an “on call” basis outside of regular working hours
7. Help schedule and complete assigned tasks.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 3

FIRE PROTECTION ELECTRICAL SUPERVISOR

Job Definition:

Fire Protection Supervisor is a person who is responsible for supervisory activities such as inspection, conduct compliance, test and perform corrective action related to fire protection department. He/she also responsible to identify corrective action, meet the compliance, laws and regulation and prepare report on matters related to his field of expertise.

Job Description:

1. Inspect the whole buildings/facilities to locate hazardous conditions and fire code violations, such as accumulations of combustible material, electrical wiring problems, and inadequate or non-functional fire exits.
2. Assists with implementation of fire prevention programs initiated by the management office to improve fire safety aspects in the premises.
3. Present and explain fire code requirements and fire prevention information to architects, engineers, developers, fire service personnel and the occupants.
4. Conduct fire code compliance follow-ups to ensure that corrective actions have been taken in cases where violations were found.
5. Attend training classes to maintain current knowledge of fire prevention, safety, and fire fighting procedures.
6. Write detailed reports of fire inspections performed, fire code violations observed, and corrective recommendations offered.

7. Identify corrective actions necessary to bring properties into compliance with applicable fire codes, laws, regulations, and standards, and explain these measures to property owners or their representatives
8. Recommend changes to fire prevention, inspection, and fire code endorsement procedures.
9. Conduct inspections and acceptance test of newly installed fire protection systems.
10. Inspect and test fire protection or fire detection systems to verify that such systems are installed in accordance with appropriate laws, codes, ordinances, regulations, and standards.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 1

FIRE PROTECTION TECHNICIAN ASSISTANT

Job Definition:

Fire Protection Technician Assistant is a person who is responsible to routinely assist on installation, inspect, and maintain fire protection systems and equipment in buildings and other facilities. The person may assist on inspection, report and update all activities related to his/her division to superior for further action.

Job Description:

1. Routinely assist on installation, inspect, and maintain fire protection systems and equipment in buildings and other facilities such as sprinkler system combine with fire alarm system.
2. Determine the fire pump can provide adequate and uninterrupted water supply to an entire fire sprinkler system, even on the top floors of a high-rise building/facilities.
3. Keep the standpipes and fire hoses work.
4. Protect the supply conductors, generators and power sources from fire.
5. Prepare the components of the type of water supply available, including a pump driver, controller, gear drive, water relief valve and storage or pump suction tank.
6. Assist on inspection of the alarms signal, fire pump power failure or failure to start, pump controller not in automatic mode, diesel engine/battery trouble, pump house temperature, and suction tank low water levels.
7. Assist report preparation and update all the above to superior for further action.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

FIRE PROTECTION TECHNICIAN

Job Definition:

Fire Protection Technician Assistant is a person who is responsible to perform installation, check, inspect, monitor and maintain fire protection systems and equipment in buildings and other facilities. He/she may carry out certain duties such as record, report and update all the above to supervisor for further action.

Job Description:

1. Perform installation, inspect, and maintain fire protection systems and equipment in buildings and other facilities such as sprinkler system combine with fire alarm system.
2. Check and confirm the fire pump can provide adequate and uninterrupted water supply to an entire fire sprinkler system, even on the top floors of a high-rise building/facilities.
3. Monitor and record if the standpipes and fire hoses work.
4. Monitor and ensure the supply conductors, generators and power sources protected from fire.
5. Prepare the components of the type of water supply available, including a pump driver, controller, gear drive, water relief valve and storage or pump suction tank.
6. Carry out inspection of the alarms signal, fire pump power failure or failure to start, pump controller not in automatic mode, diesel engine/battery trouble, pump house temperature, and suction tank low water levels.
7. Record, report and update all the above to supervisor for further action.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 3

FIRE PROTECTION MECHANICAL SUPERVISOR

Job Definition:

Fire Protection Supervisor is a person who is responsible to inspect the whole buildings/facilities to locate hazardous conditions and fire code violations. The person is designated to perform supervisory activities and carry out certain function to ensure the smooth operation of his/her division.

Job Description:

1. Inspect the whole buildings/facilities to locate hazardous conditions and fire code violations, such as accumulations of combustible material, mechanical system problems, and inadequate or non-functional fire exits.
2. Assists with implementation of fire prevention programs initiated by the management office to improve fire safety aspects in the premises.
3. Present and explain fire code requirements and fire prevention information to architects, engineers, developers, fire service personnel and the occupants.
4. Conduct fire code compliance follow-ups to ensure that corrective actions have been taken in cases where violations were found.
5. Attend training classes to maintain current knowledge of fire prevention, safety, and firefighting procedures.
6. Write detailed reports of fire inspections performed, fire code violations observed, and corrective recommendations offered.
7. Identify corrective actions necessary to bring properties into compliance with applicable fire codes, laws, regulations, and standards, and explain these measures to property owners or their representatives

8. Recommend changes to fire prevention, inspection, and fire code endorsement procedures.
9. Conduct inspections and acceptance test of newly installed fire protection systems.
10. Inspect and test fire protection or fire detection systems to verify that such systems are installed in accordance with appropriate laws, codes, ordinances, regulations, and standards.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 4

FACILITY FIRE PROTECTION MAINTENANCE ASSISTANT MANAGER

Job Definition:

Facility Fire Protection Maintenance Assistant Manager is a person who responsible for creating methods to prevent or extinguish fires. Develop or review fire exit plans and advise on minimize the dangers. Inspect building, homes or facilities for dangerous fire hazards and insurance purposes to determine causes of fire. Develop and coordinate fire prevention programs, such as false alarm billing, fire inspection reporting, and hazardous materials management. Teach workers and managers how to handle fires and best ways to escape,train staff on the use of basic fire-fighting equipment according to the training schedule, coordinate record and conduct fire drills as required. Devises best ways to escape from fires in homes and buildings and identify potential fire hazards in buildings, such as water supplies, exit locations, and construction materials.

Job Description:

1. Create methods dealing with fire prevention.
2. Develop or review fire exit plans and advise on minimize the dangers.
3. Inspect buildings and homes or facilities for dangerous fire hazards and for insurance purposes to determine causes of fire.Develop and coordinate training sessions on fire protection and prevention.
4. Teach workers and managers how to handle fires and best ways to escape and suggest ways to minimize dangers . Train staff on the use of basic fire-fighting equipment according to the training schedule, coordinate record and conduct fire drills as required.
5. Study dangerous processes or materials and create safety measures for handling them.

6. Identify potential fire hazards in buildings, such as water supplies, exit locations, and construction materials.
7. Research methods to extinguish fires and ignition sources.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 5

FACILITY FIRE PROTECTION MAINTENANCE MANAGER

Job Definition:

Facility Fire Protection Maintenance Manager is a person responsible for all fire prevention and fire safety education activities in the building, premises or facilities. The person holds overall management responsibility for all aspects of fire protection construction projects from conception through systems function as intended. He/she will oversee or conduct schedule, plan, actual construction, expedite, inspection, quality control, and total delivery of the project according to established criteria. He/she is responsible to tracking, forecast, and communicate all costs, profits, and financial measures of the project.

Job Description:

1. Design and supervise staff assigned to, enforce fire prevention training, regulations of the divisional administrative support. Ensure enforcement of fire prevention are by-laws, and other applicable codes and standards by assigning staff to carry out these duties.
2. Review and approved fire exit plans submitted and determine the solution on how to minimize the dangers.
3. Co-ordinate the inspections of premises that require a license from the municipality, provincial or federal government in order to ensure fire safety. Responsible for the supervision of plan examination activities for building permit applications, inspections of premises.
4. Conduct fire prevention inspection and enforce compliance with applicable fire regulations.
5. Prepares a yearly budget of operational expenditure for the department.

6. Monitor and manage usage of the designated budget.
7. Review policies and procedures relevant to Fire Prevention and Life Safety, recommending additions, changes or revisions where necessary.
8. Prepare reports as required for dealing with fire protection issues.
9. Responsible for the initial planning of a project to schedule time, create material stock list, analyze changes, and solve problems. Holds overall management responsibility for all aspects of fire protection construction projects from conception through systems function as intended.
10. Oversee or conduct schedule, plan, actual construction, expedite, inspection, quality control, and total delivery of the project according to established criteria.
11. Responsible to tracking, forecast, and communicate all costs, profits, and financial measures of the project.

SECTOR : MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

SUB-SECTOR : HEATING, VENTILATION AND AIR CONDITIONING (HVAC)

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 1

DOMESTIC HVAC HANDYMAN

Job Definition:

Domestic HVAC Handyman is a person who responsible for the day to day servicing, repairs and maintenance of the HVAC (Domestic) system.He/she will be tasked to assist in corrective and preventive maintainance works as well as to respond to emergency issues.

Job Description:

1. Assist the Domestic HVAC Technician in the completion of daily repairs, emergency and preventive maintenance items.
2. Carry out work orders and repair as instructed.
3. Carry out the assinged task and duties within the stipulated time.
4. Assist in the preparation of materials, equipments and tools required.
5. Maintain cleaniness and houskeeping of work site.
6. Arrange, control and storage of tools and equipments.
7. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

DOMESTIC HVAC TECHNICIAN

Job Definition:

Domestic HVAC Assistant Technician is a person who is responsible to assist the Domestic & Industrial HVAC Project Specialist Technician with the day to day servicing, repairs and maintenance of th HVAC (Domestic) system. He/she will be asssited by the Domestic HVAC Handyman to carry out these task as per the corrective and preventive maintenance schedule.

Domestic HVAC Assistant Technician repondsibility to prepare the necessary materials, tools and equipment to carry out all repairs and maintenance work as well as preparation of the work site.

Job Description:

1. Perform and carry out the schedule preventive and corrective maintenance works.
2. Prepare the necessary materials, tools and equipments required to carry out the servicing, maintenance and repairs works.
3. Carry out work and repair in accordance to work instruction as well as monitor all work activities delegated.
4. Locate, identify and prepare work site location.
5. Prepare list of materials, tools and equipments required and submission of the necessary requisition form.
6. Identify and secure storage site area.
7. Monitor the cleaniness and ensure housekeeping of work site.
8. Update and report work progress to superior.
9. Carry out the assigned task and duties within the stipulated time.
10. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 3

DOMESTIC HVAC TECHNICIAN SUPERVISOR

Job Definition:

Domestic & Industrial HVAC Project Specialist Technician will be responsible to carry out the day to day servicing, repairs and maintenance of th HVAC (Domestic) system. He/she is required to troubleshoot problems and recommend corrective solutions as well as follow-up on the recommendations.

Domestic & Industrial HVAC Project Specialist Technician is required to supervised and delegate all servicing and maintenance works in accordance to the work schedule. He/she will have the necessary people skills both with the staffs and customers to ensure continuos and established communications on the update and ongoing works.

Domestic & Industrial HVAC Project Specialist Technician is respondsible to prepare work flow and documentation to ensure that the serviving and maintenance of the HVAC (Domestic) System are in accorgance to the contract or service document.

Job Description:

1. Responsible to prepare duty roaster, work order and schedule of work for all servicing and maintenance of the system.
2. Liase with respective stakeholders of the project and carry out coordination of works.
3. Prepare corrective and preventive maintenance schedule works based on service contract.
4. Supervise and monitor the preventive and corrective maintenance work schedule in accordance to contract/service documentation.

5. Verify and approve material list, tools and equipment requisition.
6. Carry out service and maintenance site inspection follow with submission of reports and recommendations
7. Carry out periodic or schedule testing and commissioning of the system in accordance to specifications.
8. Propose and provide recommendations of defective parts and components.
9. Prepare reports, recommendations and proposal to superior.
10. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 4

DOMESTIC HVAC PROJECT COORDINATOR

Job Definition:

Domestic & Industrial HVAC Project Coordinator will be responsible for the overall perfomance index repair, servicing and maintenance of the HVAC (Domestic) system in accordance with the contract / service document requirements. He/she is responsible to lead a team of specialist and service technician to carry out the servicing, repairs and maintenance of th HVAC (Domestic) system s well as to troubleshoot identified problems and implement recommended corrective solutions effectively.

Domestic & Industrial HVAC Project Coordinator duty include the supervision and monitoring of all projects servicing and maintenance works assigned under his care is caariied out in accordance to the work schedule. His/her primary task is to ensure a continuos communication network between the client and his team to ensure that all servicing and maintenance works are carried out within the secified downtime.

Domestic & Industrial HVAC Project Coordinator is respondsible to design, estimate and prepare project work flow and installation schedule as well as the necessary documentation for the servicing and maintenance of the HVAC (Domestic) System.

Job Description:

1. Provide technical and customer support in relation to the servicing and maintenance of the HVAC (Domestic) System.
2. Assist customers with order status, damage claims, credits, warranties, product selection, and placing orders.
3. Prepares cost estimated, pricing, and proposals for HVAC equipment projects.

4. To prepare, keep and file all documentations in relation to the servicing and maintenance of the system
5. Read and understand contracts, blue prints, and plan specifications to determine design builds and special pricing.
6. Must have an idea of product specifications and suitability of use and recommendations of the product to project specific.
7. To generates quotes and submit comprehensive proposals.
8. Loads quotes into the database.
9. Accurately create and document proper information.
10. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 5

DOMESTIC HVAC PROJECT TECHNICAL MANAGER

Job Definition:

Domestic & Industrial HVAC Project Technical Manager reports directly to the Chief Operating Officer, and is accountable for liaising with the client, external engineering disciplines and providing guidance to the team.

Domestic & Industrial HVAC Project Technical Manager is responsible to maintain existing servicing and maintenance contract by ensuring excellence of service. He/she is responsible to source for new projects and opportunies in order to expand the companies service and maintenance portfolio.

Domestic & Industrial HVAC Project Technical Manager is tasked to spearhead a team of skilled specialist and technicians under his care, to carry out the work of servicing and maintenance of the HVAC (Domestic) system within a certain Key Performance Index. He/she is to ensure that the company policies and procedures are complied within the administration and management of the company especially his technical team in the servicing and maintenance division.

Job Description:

1. Ability to utilize manpower resources to achieve maximum revenue returns for the company.
2. To ensure high revenue (income vs cost) yield per project or service contract.
3. Require to manage project controls and deliverables on multiple projects.
4. To liaise with all the stakeholders of company and clients to ensure an established network of communications

5. Initial estimation of all projects.
6. Scheduling / planning.
7. Cost control of all projects.
8. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 1

DOMESTIC HVAC HANDYMAN

Job Definition:

Domestic HVAC Handyman is the person who is responsible for will be responsible for day to day servicing, repairs and maintenance of the hvac (domestic) system.he/she will be tasked to assist in corrective and preventive maintainance works as well as to respond to emergency issues.

Job Description:

1. Assist the Domestic HVAC Technician in the completion of daily repairs, emergency and preventative maintenance items.
2. Carry out work orders and repair as instructed.
3. Carry out the assinged task and duties within the stipulated time.
4. Assist in the preparation of materials, equipments and tools required.
5. Maintain cleaniness and houskeeping of work site.
6. Arrange, control and storage of tools and equipments.
7. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

DOMESTIC HVAC ASSISTANT TECHNICIAN

Job Definition:

Domestic HVAC Assistant Technician is a person who is responsible to assist the Domestic & Industrial HVAC Project Specialist Technician with the day to day servicing, repairs and maintenance of th HVAC (Domestic) system. He/she will be asssited by the Domestic HVAC Handyman in carrying out these task as per the corrective and preventive maintenance schedule.

Domestic HVAC Assistant Technician repondsibility to prepare the necessary materials, tools and equipment to carry out all repairs and maintenance work as well as preparation of the work site.

Job Description:

1. Perform and carry out the schedule preventive and corrective maintenance works.
2. Prepare the necessary materials, tools and equipments required to carry out the servicing, maintenance and repairs works.
3. Carry out work and repair in accordance to work instruction as well as monitor all work activities delegated.
4. Locate, identify and prepare work site location.
5. Prepare list of materials, tools and equipments required and submission of the necessary requisition form.
6. Identify and secure storage site area.
7. Monitor the cleaniness and ensure housekeeping of work site.
8. Update and report work progress to superior.
9. Carry out the assigned task and duties within the stipulated time.
10. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 3

DOMESTIC & INDUSTRIAL HVAC PROJECT SPECIALIST TECHNICIAN

Job Definition:

Domestic & Industrial HVAC Project Specialist Technician will be responsible to carry out the day to day servicing, repairs and maintenance of th HVAC (Domestic) system. He/she is required to troubleshoot problems and recommend corrective solutions as well as follow-up on the recommendations.

Domestic & Industrial HVAC Project Specialist Technician is required to supervised and delegate all servicing and maintenance works in accordance to the work schedule. He/she will have the necessary people skills both with the staffs and customers to ensure continuos and established communications on the update and ongoing works.

Domestic & Industrial HVAC Project Specialist Technician is respondsible to prepare work flow and documentation to ensure that the serviving and maintenance of the HVAC (Domestic) System are in accorgance to the contract or service document.

Job Description:

1. Responsible to prepare duty roaster, work order and schedule of work for all servicing and maintenance of the system.
2. Liase with respective stakeholders of the project and carry out coordination of works.
3. Prepare corrective and preventive maintenance schedule works based on service contract.
4. Supervise and monitor the preventive and corrective maintenance work schedule in accordance to contract/service documentation.
5. Verify and approve material list, tools and equipment requisition.

6. Carry out service and maintenance site inspection follow with submission of reports and recommendations
7. Carry out periodic or schedule testing and commissioning of the system in accordance to specifications.
8. Propose and provide recommendations of defective parts and components.
9. Prepare reports, recommendations and proposal to superior.
10. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 4

DOMESTIC & INDUSTRIAL HVAC PROJECT COORDINATOR

Job Definition:

Domestic & Industrial HVAC Project Coordinator will be responsible for the overall perfomance index repair, servicing and maintenance of the HVAC (Domestic) system in accordance with the contract / service document requirements. He/she is responsible to lead a team of specialist and service technician to carry out the servicing, repairs and maintenance of th HVAC (Domestic) system s well as to troubleshoot identified problems and implement recommended corrective solutions effectively.

Domestic & Industrial HVAC Project Coordinator duty include the supervision and monitoring of all projects servicing and maintenance works assigned under his care is caariied out in accordance to the work schedule. His/her primary task is to ensure a continuos communication network between the client and his team to ensure that all servicing and maintenance works are carried out within the secified downtime.

Domestic & Industrial HVAC Project Coordinator is respondsible to design, estimate and prepare project work flow and installation schedule as well as the necessary documentation for the servicing and maintenance of the HVAC (Domestic) System.

Job Description:

1. Provide technical and customer support in relation to the servicing and maintenance of the HVAC (Domestic) System.
2. Assist customers with order status, damage claims, credits, warranties, product selection, and placing orders.
3. Prepares cost estimated, pricing, and proposals for HVAC equipment projects.

4. Prepare, keep and file all documentations in relation to the servicing and maintenance of the system
5. Read and understand contracts, blue prints, and plan specifications to determine design builds and special pricing.
6. Must have an idea of product specifications and suitability of use and recommendations of the product to project specific.
7. Generates quotes and submit comprehensive proposals.
8. Loads quotes into the database.
9. Accurately create and document proper information.
10. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 5

DOMESTIC & INDUSTRIAL HVAC PROJECT TECHNICAL MANAGER

Job Definition:

Domestic & Industrial HVAC Project Technical Manager reports directly to the Chief Operating Officer, and is accountable for liaising with the client, external engineering disciplines and providing guidance to the team.

Domestic & Industrial HVAC Project Technical Manager is responsible to maintain existing servicing and maintenance contract by ensuring excellence of service. He/she is responsible to source for new projects and opportunies in order to expand the companies service and maintenance portfolio.

Domestic & Industrial HVAC Project Technical Manager is tasked to spearhead a team of skilled specialist and technicians under his care, to carry out the work of servicing and maintenance of the HVAC (Domestic) system within a certain Key Performance Index. He/she is to ensure that the company policies and procedures are complied within the administration and management of the company especially his technical team in the servicing and maintenance division.

Job Description:

1. Ability to utilize manpower resources to achieve maximum revenue returns for the company.
2. To ensure high revenue (income vs cost) yield per project or service contract.
3. Require to manage project controls and deliverables on multiple projects.
4. To liaise with all the stakeholders of company and clients to ensure an established network of communications
5. Initial estimation of all projects.

6. Scheduling / planning.
7. Cost control of all projects.
8. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 1

INDUSTRIAL HVAC ASSISTANT TECHNICIAN

Job Definition:

Industrial HVAC Handyman will be responsible for the day to day servicing, repairs and maintenance of the HVAC (Industrial) system.He/she will be tasked to assist in corrective and preventive maintainance works as well as to respond to emergency issues.

Job Description:

1. Assist the Domestic HVAC Technician in the completion of daily repairs, emergency and preventative maintenance items.
2. Carry out work orders and repair as instructed.
3. Carry out the assinged task and duties within the stipulated time.
4. Assist in the preparation of materials, equipments and tools required.
5. Maintain cleaniness and houskeeping of work site.
6. Arrange, control and storage of tools and equipments.
7. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

INDUSTRIAL HVAC TECHNICIAN

Job Definition:

Industrial HVAC Technician will be responsible to assist the Domestic & Industrial HVAC Project Specialist Technician with the day to day servicing, repairs and maintenance of th HVAC (Industrial) system. Industrial HVAC Technician reponsibility to prepare the necessary materials, tools and equipment to carry out all repairs and maintenance work as well as preparation of the work site.

Job Description:

1. Perform and carry out the schedule preventive and corrective maintenance works.
2. Prepare the necessary materials, tools and equipments required to carry out the servicing, maintenance and repairs works.
3. Locate, identify and prepare work site location.
4. Identify and secure storage site area.
5. Monitor the cleaniness and ensure housekeeping of work site.
6. Update and report work progress to superior.
7. Reviews daily work order priorities with the superior.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 3

DOMESTIC & INDUSTRIAL HVAC PROJECT SPECIALIST TECHNICIAN

Job Definition:

Industrial HVAC Assistant Technician will be responsible to assist the Domestic & Industrial HVAC Project Specialist Technician with the day to day servicing, repairs and maintenance of th HVAC (Industrial) system. He/she will be asssited by the Domestic HVAC Handyman in carrying out these task as per the corrective and preventive maintenance schedule.

Industrial HVAC Assistant Technician repondsibility to prepare the necessary materials, tools and equipment to carry out all repairs and maintenance work as well as preparation of the work site.

Job Description:

1. Perform and carry out the schedule preventive and corrective maintenance works.
2. Prepare the necessary materials, tools and equipments required to carry out the servicing, maintenance and repairs works.
3. Carry out work and repair in accordance to work instruction as well as monitor all work activities delegated.
4. Locate, identify and prepare work site location.
5. Prepare list of materials, tools and equipments required and submission of the necessary requisition form.
6. Identify and secure storage site area.
7. Monitor the cleaniness and ensure housekeeping of work site.
8. Update and report work progress to superior.
9. Carry out the assigned task and duties within the stipulated time.

10. Reviews daily work order priorities with the superior.
11. Identify and repairs HVAC related issues.
12. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 4

DOMESTIC & INDUSTRIAL HVAC SERVICE COORDINATOR

Job Definition:

Domestic & Industrial HVAC Project Coordinator will be responsible for the overall perfomance index repair, servicing and maintenance of the HVAC (Domestic & Industrial) system in accordance with the contract / service document requirements. He/she is responsible to lead a team of specialist and service technician to carry out the servicing, repairs and maintenance of th HVAC (Domestic & Industrial) system as well as to troubleshoot identified problems and implement recommended corrective solutions effectively.

Domestic & Industrial HVAC Service Coordinator duty include the supervision and monitoring of all projects servicing and maintenance works assigned under his care is carried out in accordance with the work schedule. His/her primary task is to ensure a continuos communication network between the client and his team to ensure that all servicing and maintenance works are carried out within the specified downtime.

Job Description:

1. Provide technical and customer support in relation to the servicing and maintenance of the HVAC (Domestic & Industrial) System.
2. Assist customers with order status, damage claims, credits, warranties, product selection, and placing orders.
3. Prepare cost estimate, pricing, and proposals for HVAC equipment service.
4. Prepare, keep and file all documentations in relation to the servicing and maintenance of the system

5. Read and understand contracts, blue prints, and plan specifications to determine design builds and special pricing.
6. Knowledge of product specifications and suitability of use and recommendations of the product to project specific.
7. Generates quotes and submit comprehensive proposals.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 5

DOMESTIC & INDUSTRIAL HVAC SERVICE MANAGER

Job Definition:

Domestic & Industrial HVAC Service Manager reports directly to the Chief Operating Officer, and is accountable for liaising with the client, external engineering disciplines and providing guidance to the team.

Domestic & Industrial HVAC Project Technical Manager is responsible to maintain existing servicing and maintenance contract by ensuring excellence of service. He/she is responsible to source for new projects and opportunies in order to expand the companies service and maintenance portfolio.

Domestic & Industrial HVAC Project Technical Manager is tasked to spearhead a team of skilled specialist and technicians under his care, to carry out the work of servicing and maintenance of the HVAC (Industral) system within a certain Key Performance Index. He/she is to ensure that the company policies and procedures are complied within the administration and management of the company especially his technical team in the servicing and maintenance division.

Job Description:

1. Ability to utilize manpower resources to achieve maximum revenue returns for the company.
2. ensure high revenue (income vs cost) yield per project or service contract.
3. Manage project controls and deliverables on multiple projects.
4. Liaise with all the stakeholders of company and clients to ensure an established network of communications
5. Initial estimation of all projects.

6. Scheduling / planning.
7. Cost control of all projects.
8. Perform any other matters in pursuance of the general care of the business premise during operating hours.
9. Perform any other matters in pursuance of the general care of the business premise during operating hours.

SECTOR : MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

SUB-SECTOR : MACHINERY AND EQUIPMENT

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

BOILER TECHNICIAN

Job Definition:

Boiler Technician is the person who is responsible to perform routine maintenance on the equipment and systems in a facility as part of their job. Forefront, boiler operators will watch the system during operation and attend to any additional problems. Record work order service data in logs. Perform any other matters in pursuance of the general care of the business premise during operating hours.

Job Description:

1. Maintain heating systems in large buildings in the boiler, engine, and mechanical rooms.
2. Handles equipment such as low-pressure boilers, high-pressure boilers, power boilers, steam boilers, and hot water heating systems.
3. Maintain all of the systems that generate heat or electricity in a facility. The equipment includes, low-pressure boilers, high-pressure boiler, power boilers, steam boilers, hot water heating systems.
4. Perform routine maintenance on the equipment and systems in a facility as part of their job.
5. Perform tasks to replace defective valves, filters, or steam gauges on a heating system using hand and power tools.
6. Identify the visibility of corrosive deposits by testing the boiler water and balance it with chemicals, if needed to avoid damage in the boiler system.

7. Keep safety at the forefront and monitor the system during operation and attend to any additional problems.
8. Record work order service data in logs.
9. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 3

ASSISTANT BOILERMAN

Job Definition:

Assistant Boilerman is the person who is responsible for the efficient operation of the steam generation plant by assisting the Boiler Technician in controlling the operations of the Boiler station and by closely monitoring boilers and associated plant, undertaking duties which will ensure that the plant is both safe and reliable and maintain good housekeeping in the boiler area. Complete log and provide advice on quality and performance matters as well as maintenance and machinery defects as required. Monitor and check all boiler station auxiliary equipment including fans and feedwater pumps;ash handling plant; bagasse handling system; boiler submerged belts.Maintain the operation of the cooling water, sluicing water systems at the boiler station.

Job Description:

1. Perform efficient operation of the steam generation plant by assisting the Boiler Technician in controlling the operations of the Boiler station
2. Closely monitor boilers and associated plant, undertaking duties which will ensure that the plant is both safe and reliable.
3. Maintain good housekeeping in the boiler area.
4. Safely carry out operations following procedures.
5. Complete log and provide advice on quality and performance matters as well as maintenance and machinery defects as required.
6. Regularly monitor the state of operations in the field to optimise product quality, station.

7. Monitor and check all boiler station auxiliary equipment including fans and feed water pumps; ash handling plant; bagasse handling system; boiler submerged belts.
8. Maintain the operation of the cooling water, sluicing water systems at the boiler station

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 4

BOILERMAN

Job Definition:

Boiler man is the person who is responsible for the daily maintenance and efficient running of the machines and to conduct routine inspection on all designated machines to ensure the machinery is in good running order. Manage to operate boiler system and control on safety requirement and perform duties with minimum supervision. Handle the machine, carry out the major repairs, maintain and install machinery, plumbing and complex mechanical structures.

Job Description:

1. Manage, monitor the operation of daily maintenance and efficient running of the machines.
2. Conduct routine inspection on all designated machines to ensure the machinery is in good running order.
3. Manage to operate boiler system and control on safety requirement.
4. Perform duties with minimum supervision.
5. Handle machine, turn job and weld.
6. Carry out the major repairs, maintain and install machinery, plumbing and complex mechanical structures.
7. Organise and plan corrective and preventive maintainance according to schedule.
8. Manage machine break down and service the mechanical/electrical equipment if necessary.
9. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 5

MAINTENANCE MANAGER

Job Definition:

Maintenance Manager is the person who is responsible to provide a critical utility component of Machinery & Equipment division. The incumbent will manage the subordinates under his division. He is fully responsible for all aspects of the Boiler Plant operations, including the general condition and operation/maintenance of the physical plant personnel management, compilation of reports and journals, and insuring strict adherences to all applicable division or department in building/facilities/ plant safety standards.

Job Description:

1. Provide a critical utility component of Machinery & Equipment division.
2. Manage the subordinates under his division and fully responsible for all aspects of the Boiler Plant operations
3. Monitor the general condition and operation/maintenance of the physical plant personnel management.
4. Compile reports and journals, and insuring strict adherences to all applicable division or department in building/facilities/ plant safety standards.
5. Manage the operation and maintenance of the Boiler Plant steam distribution system, and all subsystems related to the Plant.
6. Maintain continuous operation of the Boiler Plant year round without disruption of services (24hours/7days/52weeks) to produce steam to meet the demands of the building/facilities/plant.

7. Manage, supervise and prioritize Boiler Technician/Assistant Boilerman/Boilerman job assignments.
8. Ensure his subordinates keep the building/plants/facility's infrastructure and utility systems remain operational at all times.
9. Routinely inspect, monitor, and respond to maintenance issues related to domestic water systems, chiller plant, emergency power generators, electrical substations, medical gas supply and distribution system, fire alarm systems, HVAC systems, elevators, exterior lighting, and to all other work order requests.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 1

HANDYMAN (LIGHT/HEAVY MACHINERY)

Job Definition:

Handyman is the person who is responsible to perform a wide range of simple to complex odd jobs for individuals or groups at residential or commercial locations. Performs routine maintenance and repair activities on various pieces of from light to heavy machine & equipment.

Job Description:

1. Perform a wide range of simple to complex odd jobs for individuals or groups at residential or commercial locations.
2. Performs routine maintenance and repair activities on various pieces of from light to heavy machine & equipment.
3. Assist technician to diagnose, service and repair various systems that are found on pieces of light or heavy equipment such as mechanical and computer electronic controls.
4. Execute minor troubleshoots malfunctions in the equipment and repair under supervision.
5. Perform repairs and services track drive sprockets, rails, idler wheels, hard bars, track adjusters, hydraulic reversers, final drives, brake bands, steering clutches and hydrostatic transmissions.
6. Performs routine maintenance checks and adjustments on such things as fluid levels, hoses, belts, brakes, tires, and clutches; changes filters and oil, and lubricates vehicles and motor driven equipment.

7. Repairs or replaces fuses, batteries, lights, instruments, warning devices, controls and switches, computer controls, modules, alternators, starters, and defective cables and wire components.
8. Performs related work as assigned.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

TECHNICIAN (LIGHT/HEAVY MACHINERY)

Job Definition:

Technician under machine & equipment area is the person who is responsible to perform a wide range of complex odd jobs for individuals or groups at residential or commercial locations. Performs major maintenance and repair activities on various pieces of from light to heavy machine & equipment. May assist in training lower-level workers in mechanical repair techniques. Performs related work as assigned.

Job Description:

1. Perform a wide range of complex odd jobs for individuals or groups at residential or commercial locations.
2. Performs major maintenance and repair activities on various pieces of from light to heavy machine & equipment.
3. Diagnose, service and repair various systems that are found on pieces of light or heavy equipment such as mechanical and computer electronic controls.
4. Carry out troubleshoots malfunctions in the equipment and repair with assistance of the Handyman.
5. Monitor repairs and services perform by handyman on track drive sprockets, rails, idler wheels, hard bars, track adjusters, hydraulic reversers, final drives, brake bands, steering clutches and hydrostatic transmissions.
6. Maintain, checks and adjust vehicles and motor driven equipment.
7. Repairs or replaces fuses, batteries, lights, instruments, warning devices, controls and switches, computer controls, modules, alternators, starters, and defective cables and wiring.

8. Replace components related to exhaust and emissions control.
9. Repairs or replaces HVAC components and equipment
10. Overhauls engines, replaces engines, and rebuilds components.
11. Maintains service logs and records of maintenance on vehicles and motorized equipment.
12. Prepares work orders and cost materials estimates.
13. Keeps tools, equipment, and work area clean, organized, and in good working condition.
14. May assist in training lower-level workers in mechanical repair techniques.
15. Performs related work as assigned.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 3

SUPERVISOR (LIGHT/HEAVY MACHINERY)

Job Definition:

Supervisor is the person who is responsible to monitor the whole operation of day to day servicing, repairs and maintenance of machine & equipment system. He/she will be asssited by the Handyman/Technician in carrying out these task as per the corrective and preventive maintenance schedule.

Supervisor under this division reponsible to prepare the necessary materials, tools and equipment to carry out all repairs and maintenance work as well as preparation of the work site.

Job Description:

1. Perform and carry out the schedule preventive and corrective maintenance works.
2. Prepare the necessary materials, tools and equipments required to carry out the servicing, maintenance and repairs works.
3. Carry out work and repair in accordance to work instruction as well as monitor all work activities delegated.
4. Locate, identify and prepare work site location.
5. Prepare list of materials, tools and equipments required and submission of the necessary requisition form.
6. Identify and secure storage site area.
7. Monitor the cleaniness and ensure housekeeping of work site.
8. Update and report work progress to superior.
9. Carry out the assigned task and duties within the stipulated time.
10. Reviews daily work order priorities with the superior.

11. Identify and repairs HVAC related issues.
12. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 4

WORKSHOP EXECUTIVE (LIGHT/HEAVY MACHINERY)

Job Definition:

Workshop Executive is the person who is responsible to efficiently run the workshop and support its programmes that include workshop production. The post is primarily technical including workshop management and health and safety responsibility. Provide a well-run and maintained workshop including building maintenance and other issues in relation to the management of the workshop. Establish and implement effective housekeeping and workshop management systems such as stock control.

Job Description:

1. Run the workshop and support its programmes that include workshop production. The post is primarily technical including workshop management and health and safety responsibility.
2. Develop and establish clear systems to ensure the smooth and safe running of the workshop and operations.
3. Undertake a range of management duties associated with the running of the workshop and production activities.
4. Ensure a supportive environment and a workplace that challenges, inspires and creates the conditions conducive to learning.
5. Day to day management of workshop staff.
6. Assist in the planning, designing and delivering of new products and programmes.
7. Oversee production of orders and commissions, and ensure the accurate and timely completion of them in collaboration with subordinates.

8. Provide a well-run and maintained workshop including building maintenance and other issues in relation to the management of the workshop.
9. Establish and implement effective housekeeping and workshop management systems such as stock control.
10. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 5

WORKSHOP MANAGER (LIGHT/HEAVY MACHINERY)

Job Definition:

Workshop Manager is a person who is responsible for all the activity in the workshop, and activities and responsibilities will include manage workshop activity. The Workshop Manager plans, assigns and reviews the work of all mechanics and electricians in the division. Liaise with other division/inter-department workers and co-ordinate the need for maintenance and repair of operational equipment with other division and inter-department employees at managerial level for example the operations managers.

Job Description:

1. Manage the activity in the workshop.
2. Plans, assigns and reviews the work of all mechanics and electricians in the division.
3. Brief the Supervisors and Assistant Workshop Manager who then supervise the work of the mechanics/technician/handyman.
4. Manage safety in workshops and to ensure that the workshop is safely maintained, safe and that staff are fully trained to do their job efficiently and safely.
5. Administer staff and makes recommendations regarding the recruitment, discipline and promotion of employees,
6. Authorises leave and overtime, advises employees on work related problems,
7. Evaluates and assesses employee performance.

8. Liaise with other division/inter-department workers and co-ordinate the need for maintenance and repair of operational equipment with other division and inter-department employees at managerial level for example the operations managers.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 1

HANDYMAN (COMMERCIAL MACHINERY & EQUIPMENT)

Job Definition:

Handyman is the person who is responsible to perform a wide range of simple to complex odd jobs for individuals or groups at residential or commercial locations. Performs routine maintenance and repair activities on various pieces of commercial equipment.

Job Description:

1. Perform a wide range of simple to complex odd jobs for individuals or groups at residential or commercial locations.
2. Performs routine maintenance and repair activities on various pieces of commercial equipment.
3. Assist technician to diagnose, service and repair various systems that are found on pieces of commercial equipment such as photocopy, printer machine.
4. Install, maintain and repair commercial equipment, including photocopiers, digital multifunctional copiers, fax machines, scanners and printers.
5. Execute minor troubleshoots malfunctions in the equipment and repair under supervision.
6. Perform repairs and services and routine maintenance checks and adjustments.
7. Performs related work as assigned.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

TECHNICIAN (COMMERCIAL MACHINERY & EQUIPMENT)

Job Definition:

Technician is the person who is responsible to perform a wide range of complex odd jobs for individuals or groups at residential or commercial locations. Perform maintenance and repair activities on various pieces of commercial equipment. Perform repair, services, routine maintenance checks and adjustments as well as other related work assigned.

Job Description:

1. Perform a wide range of complex odd jobs for individuals or groups at residential or commercial locations.
2. Performs routine maintenance and repair activities on various pieces of commercial equipment.
3. Diagnose, service and repair various systems that are found on pieces of commercial equipment such as photocopy, printer machine with handyman assistance.
4. Install, maintain and repair commercial equipment, including photocopiers, digital multifunctional copiers, fax machines, scanners and printers.
5. Diagnoses problems, disassembles units, repairs or replaces parts, and reassembles units.
6. Execute minor troubleshoots malfunctions in the equipment and repair under supervision.
7. Perform repairs and services and routine maintenance checks and adjustments.
8. Maintains service logs and records of maintenance on the commercial equipment.
9. Performs related work as assigned.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 3

SUPERVISOR (COMMERCIAL MACHINERY & EQUIPMENT)

Job Definition:

Supervisor is the person who is responsible to monitor the whole operation of day to day servicing, repairs and maintenance of machine & equipment system in the commercial division. He/she will be asssited by the Handyman/Technician in carrying out these task as per the corrective and preventive maintenance schedule. Supervisor under this division reponsible to prepare the necessary materials, tools and equipment to carry out all repairs and maintenance work as well as preparation of the work site.

Job Description:

1. Perform and carry out the schedule preventive and corrective maintenance works.
2. Prepare the necessary materials, tools and equipments required to carry out the servicing, maintenance and repairs works.
3. Carry out work and repair in accordance to work instruction as well as monitor all work activities delegated.
4. Locate, identify and prepare work site location.
5. Prepare list of materials, tools and equipments required and submission of the necessary requisition form.
6. Identify and secure storage site area.
7. Monitor the cleaniness and ensure housekeeping of work site.
8. Update and report work progress to superior.
9. Carry out the assigned task and duties within the stipulated time.
10. Reviews daily work order priorities with the superior.
11. Identify and repairs HVAC related issues.
12. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 4

ASSISTANT MANAGER (COMMERCIAL MACHINERY & EQUIPMENT)

Job Definition:

Assistant Manager is the person who is responsible to efficiently run the management office and support its programs that include division production. The post is primarily technical including management and health and safety responsibility. The person works with both people and materials. Undertake a range of management duties associated with the running of the production activities. Day to day management of staff and assist in the planning, designing and delivering of new products and programs. Provide a well-run and maintained workplace including commercial machinery maintenance and other issues in relation to the management of the facility/premise.

Job Description:

1. Management office and support its programmes that include division production, primarily technical including management and health and safety responsibility.
2. Develop and establish clear systems to ensure the smooth and safe running of the management operations.
3. Undertake a range of management duties associated with the running of the production activities.
4. Ensure a supportive environment and a workplace that challenges, inspires and creates the conditions conducive to learning.
5. Day to day management of staff and assist in the planning, designing and delivering of new products and programmes.
6. Oversee production of orders and commissions, and ensure the accurate and timely completion in collaboration with subordinates.

7. Provide a well-run and maintained workplace including commercial machinery maintenance and other issues in relation to the management of the facility/premise.
8. Establish and implement effective housekeeping and premise/facility management systems such as stock control.
9. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 5

MANAGER (COMMERCIAL MACHINERY & EQUIPMENT)

Job Definition:

The Manager is a person who is responsible primarily for the overall smooth operation of his/her division. The Manager duties include plans, administer, assigns and reviews the work of all his/her team.

Job Description:

1. Manage the activity in the workplace/premise.
2. Plans, assigns and reviews the work of all mechanics and electricians in the division.
3. Brief the Supervisors and Assistant Manager who then supervise the work of the mechanics/technician/handyman.
4. Manage safety in workplace and to ensure that it is safely maintained, safe and that staff are fully trained to do their job efficiently and safely.
5. Administer staff and makes recommendations regarding the recruitment, discipline and promotion of employees,
6. Authorises leave and overtime, advises employees on work related problems,
7. Evaluates and assesses employee performance.
8. Liaise with other division/inter-department workers and co-ordinate the need for maintenance and repair of operational equipment with other division and inter-department employees at managerial level for example the operations managers.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

TECHNICIAN (INDUSTRIAL PLANT)

Job Definition:

Technician is the person who is responsible to perform test or modify developmental or operational electrical/mechanical machinery or control equipment and circuitry in industrial division. Provide technical assistance and resolution when electrical/mechanical problems Review existing electrical/mechanical engineering criteria to identify necessary revisions, deletions, or amendments to outdated material. Assist electrical/mechanical engineers or other personnel to identify, define, or solve developmental problems.

Job Description:

1. Set up and operate test equipment to evaluate performance of developmental parts, assemblies, or systems under simulated operating conditions, and record results.
2. Assemble electrical and electronic systems and prototypes according to engineering data and knowledge of electrical principles, using hand tools and measuring instruments.
3. Provide technical assistance and resolution when electrical/mechanical problems are encountered before, during, and after construction.
4. Build, calibrate, maintain, troubleshoot, or repair electrical/mechanical instruments or testing equipment.
5. Review existing electrical/mechanical engineering criteria to identify necessary revisions, deletions, or amendments to outdated material.
6. Collaborate with electrical/mechanical engineers or other personnel to identify, define, or solve developmental problems.

7. Conduct inspections for quality control and assurance programs, reporting findings and recommendations.
8. Install or maintain electrical/mechanical control systems or solid state equipment.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 3

EQUIPMENT SPECIALIST TECHNICIAN (INDUSTRIAL PLANT)

Job Definition:

Equipment Specialist Technician coordinates special projects and performs specialized tasks involved in the installation, maintenance, servicing, troubleshooting and calibration of complex integrated systems of equipments. Interpret engineering and vendor information, schematic diagrams, graphic illustrations utilizing manufacturing/chemical and electronic principles. Provide a systematic preventive maintenance program for complex integrated manufacturing/chemical equipment to insure compliance with state and federal guidelines. Maintain preventive maintenance records in an electronic data base system and prepare reports as required per industrial plant policies.

Job Description:

1. Coordinate special projects and perform specialized technical tasks involved in the installation, maintenance, servicing, troubleshooting, preventative maintenance, and calibration of complex integrated systems of equipments.
2. Interpret engineering and vendor information, schematic diagrams, graphic illustrations utilizing manufacturing/chemical and electronic principles.
3. Provide a systematic preventive maintenance program for complex integrated manufacturing/chemical equipment to insure compliance with state and federal guidelines.
4. Maintain preventive maintenance records in an electronic data base system and prepare reports as required per hospital policies.
5. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 4

ASSISTANT MAINTENANCE MANAGER (INDUSTRIAL PLANT)

Job Definition:

Assistant Maintenance Manager is the person who is responsible to efficiently run the management office and support its programmes that include division production. The post is primarily technical including management and health and safety responsibility. The person works with both people and materials. Undertake a range of management duties associated with the running of the production activities. Day to day management of staff and assist in the planning, designing and delivering of new products and programmes. Provide a well-run and maintained workplace including commercial machinery maintenance and other issues in relation to the management of the facility/premise.

Job Description:

1. Management office and support its programmes that include division production, primarily technical including management and health and safety responsibility.
2. Develop and establish clear systems to ensure the smooth and safe running of the management operations.
3. Undertake a range of management duties associated with the running of the production activities.
4. Ensure a supportive environment and a workplace that challenges, inspires and creates the conditions conducive to learning.
5. Day to day management of staff and assist in the planning, designing and delivering of new products and programmes.
6. Oversee production of orders and commissions, and ensure the accurate and timely completion in collaboration with subordinates.

7. Provide a well-run and maintained workplace including commercial machinery maintenance and other issues in relation to the management of the facility/premise.
8. Establish and implement effective housekeeping and premise/facility management systems such as stock control.
9. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 5

MAINTENANCE MANAGER (INDUSTRIAL PLANT)

Job Definition:

The Maintenance Manager is a person who is responsible primarily for the overall smooth operation of his/her division. The Manager duties include plans, administer, assigns and reviews the work of all his/her team.

Job Description:

1. Manage the activity in the workplace/premise.
2. Plans, assigns and reviews the work of all mechanics and electricians in the division.
3. Brief the Supervisors and Assistant Manager who then supervise the work of the mechanics/technician/handyman.
4. Manage safety in workplace and to ensure that it is safely maintained, safe and that staff are fully trained to do their job efficiently and safely.
5. Administer staff and makes recommendations regarding the recruitment, discipline and promotion of employees,
6. Authorises leave and overtime, advises employees on work related problems,
7. Evaluates and assesses employee performance.
8. Liaise with other division/inter-department workers and co-ordinate the need for maintenance and repair of operational equipment with other division and inter-department employees at managerial level for example the operations managers.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

TECHNICIAN (SPECIALITY)

Job Definition:

Test or modify developmental or operational electrical/mechanical machinery or control equipment and circuitry in food industry/medical. Provide technical assistance and resolution when electrical/mechanical problems Review existing electrical/mechanical engineering criteria to identify necessary revisions, deletions, or amendments to outdated material. Assist electrical/mechanical engineers or other personnel to identify, define, or solve developmental problems.

Job Description:

1. Operate test equipment to evaluate performance of developmental parts, assemblies, or systems under simulated operating conditions, and record results.
2. Assemble simple electrical and electronic systems and prototypes according to engineering data and knowledge of electrical principles, using hand tools and measuring instruments.
3. Provide technical assistance and resolution when electrical/mechanical problems are encountered before, during, and after.
4. Assist to build, calibrate, maintain, troubleshoot, or repair electrical/mechanical instruments or testing equipment.
5. Review existing electrical/mechanical engineering criteria to identify necessary revisions, deletions, or amendments to outdated material.
6. Assist with electrical/mechanical engineers or other personnel to identify, define, or solve developmental problems.

7. Carry out inspections for quality control and assurance programs, reporting findings and recommendations.
8. Install or maintain electrical/mechanical control systems or solid state equipment.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 3

EQUIPMENT SPECIALIST TECHNICIAN (SPECIALITY)

Job Definition:

Equipment Specialist Technician coordinates special projects and performs specialized tasks involved in the installation, maintenance, servicing, troubleshooting and calibration of complex integrated food indusrty equipment or medical support systems. Equipment Interpret engineering and vendor information, schematic diagrams, graphic illustrations utilizing food industry/medical and electronic principles. Provide a systematic preventive maintenance program for complex integrated food industry/medical equipment to insure compliance with state and federal guidelines. Maintain preventive maintenance records in an electronic data base system and prepare reports as required per speciality division policies.

Job Description:

1. Coordinate special projects and perform specialized technical tasks involved in the installation, maintenance, servicing, troubleshooting, preventative maintenance, and calibration of complex integrated systems of equipments.
2. Interpret engineering and vendor information, schematic diagrams, graphic illustrations utilizing food industry/medical and electronic principles.
3. Provide a systematic preventive maintenance program for complex integrated food industry/medical equipment to insure compliance with state and federal guidelines.
4. Maintain preventive maintenance records in an electronic data base system and prepare reports as required by speciality division policies.
5. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 4

ASSISTANT MANAGER (SPECIALITY)

Job Definition:

Assistant Manager is the person who is responsible to efficiently run the management office and support its programmes that include division production. The post is primarily technical including management and health and safety responsibility. The person works with both people and materials. Undertake a range of management duties associated with the running of the production activities. Day to day management of staff and assist in the planning, designing and delivering of new products and programs. Provide a well-run and maintained workplace including commercial machinery maintenance and other issues in relation to the management of the facility/premise.

Job Description:

1. Management office and support its programmes that include division production, primarily technical including management and health and safety responsibility.
2. Develop and establish clear systems to ensure the smooth and safe running of the management operations.
3. Undertake a range of management duties associated with the running of the production activities.
4. Ensure a supportive environment and a workplace that challenges, inspires and creates the conditions conducive to learning.
5. Day to day management of staff and assist in the planning, designing and delivering of new products and programmes.
6. Oversee production of orders and commissions, and ensure the accurate and timely completion in collaboration with subordinates.

7. Provide a well-run and maintained workplace including commercial machinery maintenance and other issues in relation to the management of the facility/premise.
8. Establish and implement effective housekeeping and premise/facility management systems such as stock control.
9. Perform any other matters in pursuance of the general care of the business premise during operating hours.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 5

SERVICE MANAGER (SPECIALITY)

Job Definition:

The Manager is a person who is responsible primarily for the overall smooth operation of his/her division. The Manager duties include plans, administer, assigns and reviews the work of all his/her team.

Job Description:

1. Manage the activity in the workplace/premise.
2. Plans, assigns and reviews the work of all mechanics and electricians in the division.
3. Brief the Supervisors and Assistant Manager who then supervise the work of the mechanics/technician/handyman.
4. Manage safety in workplace and to ensure that it is safely maintained, safe and that staff are fully trained to do their job efficiently and safely.
5. Administer staff and makes recommendations regarding the recruitment, discipline and promotion of employees,
6. Authorises leave and overtime, advises employees on work related problems,
7. Evaluates and assesses employee performance.
8. Liaise with other division/inter-department workers and co-ordinate the need for maintenance and repair of operational equipment with other division and inter-department employees at managerial level for example the operations managers.

SECTOR : MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

SUB-SECTOR : PLUMBING

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 1

ASSISTANT PLUMBER (DOMESTIC)

Job Definition:

Assistant Plumber is the person who is responsible for assisting plumber at homes/ residences/ facilitiesand plants. Helps install, repair, and maintain pipes used for water distribution and wastewater disposal.

Job Description:

1. Assist in installing and maintaining plumbing systems.
2. Perform the cut openings in structures in preparation for pipes.
3. Select all materials needed for installation, including type and size of pipe.
4. Perform minor installation supports and hangers for pipe, fixtures and equipment.
5. Assist to measure, cut, thread, and bend pipe to required angle
6. Observe pressure gauges to fix leaks and reports to superior.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

PLUMBER (DOMESTIC)

Job Definition:

Plumber is the person who is responsible to handle major install, repair, and maintain pipes used for water distribution and wastewater disposal.

Job Description:

1. Assist in installing and maintaining plumbing systems.
2. Perform the cut openings in structures in preparation for pipes.
3. Select all materials needed for installation, including type and size of pipe.
4. Install supports and hangers for pipe, fixtures and equipment.
5. Measure, cut, thread, and bend pipe to required angle
6. Determine pressure gauges to fix leaks.
7. Install supports and hangers for pipe, fixtures and equipment.
8. Assemble and install valves and fittings, pipe sections, tubing and fittings, using couplings, clamps, screws, bolts, cement, plastic solvent, caulking, or soldering, brazing and welding equipment.
9. Install other plumbing equipment, such as sinks, tubs, toilets, water heaters, air conditioners, appliances, and trim.
10. Determine the pressure gauges and test pipe systems and fix leaks.
11. Repair and maintain water treatment equipment.
12. Perform scheduled maintenance.
13. Ensure all installations, repairs and maintenance are properly sized, aligned, supported and grade.
14. Perform other related duties as assigned

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 3

PLUMBING SUPERVISOR (DOMESTIC)

Job Definition:

Plumbing Supervisor is the person who is primarily carry out supervisory activities which include execution of various task. He/She also required to perform complex installation apart from other supervisory responsibility.

Job Description:

1. Read blueprints and drawings to determine exact specifications and where plumbing system will be installed.
2. Determine water supply networks and waste drainage systems.
3. Coordinate with subordinates on installation and report the work progress to the superior.
4. Install systems used to transport water, waste, gases, or liquids.
5. Ensure legislation and policies are met and that systems are up to code.
6. Ensure systems meet all standards of building codes and safety.
7. Participate in institutional professional development and training.
8. Perform other related duties as assigned.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 4

SPECIALIST PLUMBING (DOMESTIC)

Job Definition:

The Specialist Plumber is the person who is responsible to carry out duties with considerable independence. He or She is designated to perform specialized skilled in accordance with the standard set by the division.

Job Description:

1. Perform skilled plumbing work such as repair, assemble, and installation of pipes, fittings, and heating fixtures, gas/water fixtures and drainage systems.
2. Schedule their work, do preliminary layout work and receive little or no assistance with diagnosis of problems.
3. Assembles, installs and repairs pipes, fittings, and fixtures for gas, water and sanitary lines, storm drains, toilets, sinks, boilers, heat exchangers valves, pumps, drinking fountains, water stills and hot water heaters.
4. Perform cuts and threads pipe, bends pipe to required angle, joins pipe by use of flanges, fittings, solder, caulking, welding, epoxy cement and diversified materials
5. Performs maintenance on plumbing by replacing washers on leaky faucets, mending burst pipes, opening clogged drains
6. Detects malfunctions in plumbing systems, shuts systems down, and makes repairs
7. May do minor plumbing-related welding, and brazing.
8. Carry out the duties listed for the Maintenance Plumber classification with far less supervision or direction from lead person..
9. May operate a one-map shop; performs all work independently.
10. Perform other related duties as assigned

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 5

PROJECT MANAGER (DOMESTIC)

Job Definition:

The Project Manager is the person who is responsible for the overall smooth operation in his/ her division. He/she also manages all project matters including prepare, review, support, negotiate and coordinate related activities in his/her division.

Job Description:

1. Review contract documents and prepare an outline of complete scope of work prior to executing project management duties.
2. Support General Manager to generate detailed lists from engineering sketches for purchasing.
3. Negotiate and issue purchase orders in accordance to the project's requirements.
4. Set up and manage construction schedules as well as prepare summary equipment tables which include delivery schedules.
5. Coordinate project details with clients, architects, engineers, and other trades.
6. Manage project installation within budgets and maintain up-to-date project cost monitoring reports.
7. Manage contract change order process including pricing work, presenting values, follow up and execution of change order work.
8. Prepare billing breakdown for monthly approval by professionals/general contractors and issue progressive billing.
9. Prepare a detailed list of scope of work and testing procedures to be followed during start-up of equipment, commissioning, control, balancing, insulation, and other sub trades.

10. Maintain and ensure quality control and minimize project deficiencies.
11. Manage project's warrantee issues, maintenance and servicing of projects.
12. Perform office administration functions (filing, purchase orders, invoicing, etc.).
13. Prepare letters or memos to various departments, sub-contractors and suppliers as required to execute the work.
14. All other related tasks.

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 1

ASSISTANT PLUMBER (COMMERCIAL / INDUSTRIAL)

Job Definition:

Assistant Plumber is the person who is responsible for assisting plumber at commercial and industrial plants. Helps install, repair, and maintain pipes used for water distribution and wastewater disposal.

Job Description:

1. Assist in installing and maintaining plumbing systems.
2. Perform the cut openings in structures in preparation for pipes.
3. Select all materials needed for installation, including type and size of pipe.
4. Perform minor installation supports and hangers for pipe, fixtures and equipment.
5. Assist to measure, cut, thread, and bend pipe to required angle
6. Observe pressure gauges to fix leaks and reports to superior.
7. Perform other related duties as assigned

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 2

PLUMBER (COMMERCIAL / INDUSTRIAL)

Job Definition:

Plumber is the person who is responsible to handle major install, repair, and maintain pipes used for water distribution and wastewater disposal.

Job Description:

1. Assist in installing and maintaining plumbing systems.
2. Perform the cut openings in structures in preparation for pipes.
3. Select all materials needed for installation, including type and size of pipe.
4. Install supports and hangers for pipe, fixtures and equipment.
5. Measure, cut, thread, and bend pipe to required angle
6. Determine pressure gauges to fix leaks.
7. Install supports and hangers for pipe, fixtures and equipment.
8. Assemble and install valves and fittings, pipe sections, tubing and fittings, using couplings, clamps, screws, bolts, cement, plastic solvent, caulking, or soldering, brazing and welding equipment.
9. Install other plumbing equipment, such as sinks, tubs, toilets, water heaters, air conditioners, appliances, and trim.
10. Determine the pressure gauges and test pipe systems and fix leaks.
11. Repair and maintain water treatment equipment.
12. Perform scheduled maintenance.
13. Ensure all installations, repairs and maintenance are properly sized, aligned, supported and grade.
14. Perform other related duties as assigned

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 3

PLUMBING SUPERVISOR (COMMERCIAL / INDUSTRIAL)

Job Definition:

Plumbing Supervisor is the person who is primarily carry out supervisory activities which include execution of various task. He/She also required to perform complex installation apart from other supervisory responsibility.

Job Description:

1. Read blueprints and drawings to determine exact specifications and where plumbing system will be installed.
2. Determine water supply networks and waste drainage systems.
3. Coordinate with subordinates on installation and report the work progress to the superior.
4. Install systems used to transport water, waste, gases, or liquids.
5. Ensure legislation and policies are met and that systems are up to code.
6. Ensure systems meet all standards of building codes and safety.
7. Participate in institutional professional development and training.
8. Perform other related duties as assigned

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 4

SPECIALIST PLUMBER (COMMERCIAL / INDUSTRIAL)

Job Definition:

The Specialist Plumber is the person who is responsible to carry out duties with considerable independence. He or She is designated to perform specialized skilled in accordance with the standard set by the division.

Job Description:

1. Perform skilled plumbing work such as repair, assemble, and installation of pipes, fittings, and heating fixtures, gas/water fixtures and drainage systems.
2. Schedule their work, do preliminary layout work and receive little or no assistance with diagnosis of problems.
3. Assembles, installs and repairs pipes, fittings, and fixtures for gas, water and sanitary lines, storm drains, toilets, sinks, boilers, heat exchangers valves, pumps, drinking fountains, water stills and hot water heaters.
4. Perform cuts and threads pipe, bends pipe to required angle, joins pipe by use of flanges, fittings, solder, caulking, welding, epoxy cement and diversified materials
5. Performs maintenance on plumbing by replacing washers on leaky faucets, mending burst pipes, opening clogged drains
6. Detects malfunctions in plumbing systems, shuts systems down, and makes repairs
7. May do minor plumbing-related welding, and brazing.
8. Carry out the duties listed for the Maintenance Plumber classification with far less supervision or direction from lead person..
9. May operate a one-map shop; performs all work independently.
10. Perform other related duties as assigned

MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE

LEVEL 5

PROJECT MANAGER (COMMERCIAL / INDUSTRIAL)

Job Definition:

The Project Manager is the person who is responsible to prepare, review, support, negotiate, manage and coordinate activities involved in his/her division.

Job Description:

1. Review contract documents and prepare an outline of complete scope of work prior to executing project management duties.
2. Support General Manager to generate detailed lists from engineering sketches for purchasing.
3. Negotiate and issue purchase orders in accordance to the project's requirements.
4. Set up and manage construction schedules as well as prepare summary equipment tables which include delivery schedules.
5. Coordinate project details with clients, architects, engineers, and other trades.
6. Manage project installation within budgets and maintain up-to-date project cost monitoring reports.
7. Manage contract change order process including pricing work, presenting values, follow up and execution of change order work.
8. Prepare billing breakdown for monthly approval by professionals/general contractors and issue progressive billing.
9. Prepare a detailed list of scope of work and testing procedures to be followed during start-up of equipment, commissioning, control, balancing, insulation, and other sub trades.
10. Maintain and ensure quality control and minimize project deficiencies.

11. Manage project's warrantee issues, maintenance and servicing of projects.
12. Perform office administration functions (filing, purchase orders, invoicing, etc.).
13. Prepare letters or memos to various departments, sub-contractors and suppliers as required to execute the work.
14. All other related tasks.

4.5 Mechanical & Electrical Services And Maintenance Occupational Area Analysis

The Occupational Area Analysis is done so that the current job titles in the industry are translated into the job scope required of the personnel. In doing so, candidates will have better employment prospects as there will be no mismatch of job titles to expected job competencies. This is because different organisations use different job titles. Certification will also be able to reflect the job competencies correctly and avoid confusion of job scope based on job titles.

It can be seen that for each of the Occupational Structures, an Occupational Area Structure is defined.

For most of the areas, during the Occupational Area Analysis, the Level 1 job areas could be merged and embedded into Level 2 competencies. In terms of merging between job areas vertically, the panel members had gone over each job area and agreed that only job areas that had the similar process, material and end product could be merged. There are areas that cannot be merged due to different chemical nature and production process.

Please refer Table 13 – Table 18 for the Occupational Area Structure details.

Table 11 : Mechanical & Electrical Services and Maintenance –Fire Protection Sub Sector Occupational Area Structure

Sector	Mechanical & Electrical Services and Maintenance				
Sub Sector	**Facility Maintenance**				
Area	**Automation**	**Mechanical**	**Piping**	**Electrical**	**Building Maintenance**
Level 5	Facility Management**				
Level 4	Facility Assistance Management *				
Level 3	Facility Mechanical Supervision *			Facility Electrical Supervision	Building Maintenance Supervision
Level 2	Senior Automatic Facility Maintenance Service	Senior Mechanical Facility Maintenance Service	Pipefitting	Electrical Facility Maintenance Service	Building Maintenance Technical
Level 1	Junior Automation Facility Maintenance Service	Junior Mechanical Facility Maintenance Service	No level	No Level	Building Maintenance Junior Technical

*Critical Job Title

Table 12 : Mechanical & Electrical Services and Maintenance –People Mover Sub Sector Occupational Area Structure

Sector	**Mechanical & Electrical Services and Maintenance**	
Sub Sector	**People Mover**	
Area	**Testing**	**Maintenance**
Level 5	Lift / Escalator Technical Testing& Maintenance Management	
Level 4	Lift / Escalator Technical Testing& Maintenance Coordination	
Level 3	Lift / Escalator Technical Testing Supervision	Lift / Escalator Technical Maintenance Supervisor
Level 2	Lift / Escalator Technical Testing Service	Lift / Escalator Technical Maintenance Service
Level 1	No Level	No Level

*Critical Job Title

Table 13 : Mechanical & Electrical Services and Maintenance –Fire Protection Sub Sector Occupational Area Structure

Sector	**Mechanical & Electrical Services and Maintenance**	
Sub Sector	**Fire Protection**	
Area	**Electrical**	**Mechanical**
Level 5	Facility Fire Protection Maintenance Management	
Level 4	Facility Fire Protection Maintenance Administration	
Level 3	Facility Fire Protection Maintenance Supervision	
Level 2	Fire Protection Technical Service (Electrical)	Fire Protection Installation Service (Mechanical)
Level 1	Fire Protection Technical Service (Electrical)	Fire Protection Installation Service (Mechanical)

* Critical Job Title

Table 14 : Mechanical & Electrical Services and Maintenance –HVAC Sub Sector Occupational Area Structure

Sector	Mechanical & Electrical Services and Maintenance	
Sub Sector	**HVAC**	
Area	**Domestic**	**Industrial**
Level 5	Domestic HVAC Maintenance Management	Industrial HVAC Maintenance Management
Level 4	Domestic HVAC Maintenance Administration	Industrial HVAC Maintenance Administration
Level 3	Domestic HVAC Maintenance Supervision	Industrial HVAC Maintenance Supervision
Level 2	HVAC Single Phase Air-Conditioning Equipment (Servicing, Troubleshooting & Repair)	HVAC Three Phase Air-Conditioning Equipment (Servicing, Troubleshooting & Repair)
Level 1	No Level	No Level

* Critical Job Title

Table 15 : Mechanical & Electrical Services and Maintenance –Machinery and Equipment Sub Sector Occupational Area Structure

Sector	Mechanical & Electrical Services and Maintenance						
Sub Sector	Machinery and Equipment						
Area	Boiler	Construction		Commercial	Industrial		Speciality	
		Light Machinery	Heavy Machinery		Manufacturing	Chemical	Food Industry	Medical
Level 5	Boiler Maintenance Management	Machinery & Equipment Maintenance Workshop Management		Commercial Machinery & Equipment Maintenance Management	Industrial Machinery & Equipment Maintenance Management		Speciality Machinery & Equipment Maintenance Management	
Level 4	Boiler Maintenance Coordination	Machinery & Equipment Maintenance Workshop Coordination		Commercial Machinery & Equipment Maintenance Coordination	Industrial Machinery & Equipment Maintenance Coordination		Speciality Machinery & Equipment Maintenance Coordination	
Level 3	Boiler Maintenance Operation	Machinery & Equipment Maintenance Workshop Operation		Commercial Machinery & Equipment Maintenance Operation	Industrial Machinery & Equipment Technical Service		Speciality Machinery & Equipment Technical Service	

Sector	Mechanical & Electrical Services and Maintenance							
Sub Sector	Machinery and Equipment							
Area	Boiler	Construction		Commercial	Industrial		Speciality	
		Light Machinery	Heavy Machinery		Manufacturing	Chemical	Food Industry	Medical
Level 2	Boiler Maintenance Operation	Machinery & Equipment Maintenance Workshop Technical Operation		Commercial Machinery & Equipment Maintenance Operation	Speciality Machinery & Equipment Technical Service		Speciality Machinery & Equipment Technical Service	
Level 1	No Level	Machinery & Equipment Maintenance Workshop Technical Operation		Commercial Machinery & Equipment Maintenance Operation	No Level		No Level	

* Critical Job Title

Table 16 : Mechanical & Electrical Services and Maintenance –Plumbing Sub Sector Occupational Area Structure

Sector	Mechanical & Electrical Services and Maintenance		
Sub Sector	Plumbing		
Area	Non Industrial		Industrial (Plant)
	Domestic	Commercial	
Level 5	Plumbing Maintenance Management		Industrial Plumbing Maintenance Management
Level 4	Domestic And Commercial Plumbing Administration		Industrial Plumbing Maintenance Administration
Level 3	Domestic And Commercial Plumbing Supervision		Industrial Plumbing Maintenance Supervision
Level 2	Plumbing Maintenance		
Level 1	No Level		

* Critical Job Title

4.6 List of Critical Job Titles & Summary of Job Titles

Table 17 : List of Critical Job Title for Mechanical & Electrical Services and Maintenance Industry

NO	JOB AREA	CRITICAL JOB TITLE	LEVEL	CRITICAL LEVEL
1	Automation/Mechanical/Piping/Electrical/Building Maintenance (Facility Maintenance)	Facility Manager	5	**
2	Automation/Mechanical/Piping/Electrical/Building Maintenance (Facility Maintenance)	Facility Assistant Manager	4	*
3	Automation/Mechanical/Piping (Facility Maintenance)	Facility Mechanical Supervisor	3	*
4	Lift & Escalator (People Mover)	Infrastructure Maintenance Manager	5	**
5	Lift & Escalator (People Mover)	Infrastructure Assistant Manager	4	**
6	Lift & Escalator (People Mover)	Testing Specialist	3	**
7	Mechanical/Power Distribution Signal & Communication (People Mover)	Cable Car M&E Maintenance Manager	5	**
8	Mechanical/Power Distribution Signal & Communication (People Mover)	Cable Car M&E Maintenance Executive	4	**
9	Mechanical/Power Distribution Signal & Communication (People Mover)	Cable Car M&E Maintenance Supervisor	3	**

NO	JOB AREA	CRITICAL JOB TITLE	LEVEL	CRITICAL LEVEL
10	Mechanical (People Mover)	Senior Mechanical Cable Car Maintenance Serviceman	2	*
11	Mechanical (People Mover)	Junior Mechanical Cable Car Maintenance Serviceman	1	*
12	Power Distribution Signal & Communication (People Mover)	Senior Power Distribution Signal & Communication Serviceman	2	*
13	Power Distribution Signal & Communication (People Mover)	Junior Power Distribution Signal & Communication Serviceman	1	*
14	Electrical/Mechanical (Fire Protection)	Facility Fire Protection Maintenance Manager	5	*
15	Electrical/Mechanical (Fire Protection)	Facility Fire Protection Maintenance Assistant Manager	4	*
16	Domestic/Industrial (HVAC)	Domestic & Industrial HVAC Project Technical Manager	5	*
17	Domestic/Industrial (HVAC)	Domestic & Industrial HVAC	4	**

NO	JOB AREA	CRITICAL JOB TITLE	LEVEL	CRITICAL LEVEL
		Project Coordinator		
18	Domestic/Industrial (HVAC)	Domestic & Industrial HVAC Project Specialist Technician	3	**
19	Domestic (HVAC)	Domestic HVAC Technician	2	***
20	Domestic (HVAC)	DOMESTIC HVAC Handyman	1	***
21	Industrial (HVAC)	Indusrial HVAC Technician	2	***
22	Industrial (HVAC)	Industrial HVAC Assistant Technician	1	***
23	Machinery Equipment (Machine & Equipment)	Workshop Manager	5	**
24	Machinery Equipment (Machine & Equipment)	Assistant Workshop Manager	4	*
25	Industrial (Machine & Equipment)	Equipment Specialist Technician	3	*
26	Specialty (Machine & Equipment)	Service Manager	5	**
27	Specialty (Machine & Equipment)	Assistant Manager	4	*
28	Specialty (Machine & Equipment)	Equipment Specialist	3	*

NO	JOB AREA	CRITICAL JOB TITLE	LEVEL	CRITICAL LEVEL
		Technician		
29	Commercial/Industrial (Plant)	Project Manager	5	*
30	Commercial/Industrial (Plant)	Specialist Plumbing	4	**
31	Commercial/Industrial (Plant)	Plumbing Supervisor	3	**
32	Commercial/Industrial (Plant)	Plumber/ Gas Pipe Installer	2	*
33	Commercial/Industrial (Plant)	Assistant Plumber	1	*

Legend ***** **Moderately Critical – (4-5)**
****** **Critical – (1-3)**
******* **Highly Critical – (ASAP)**

Table 18 : Summary of Critical Job Titles According to Sub-Sector

SECTOR	SUB-SECTOR	LEVEL								TOTAL OF CRITICAL JOB TITLES	TOTAL OF JOB TITLES IDENTIFIED
		L1	L2	L3	L4	L5	L6	L7	L8		
M & E SERVICE MAINTENANCE	Facility Maintenance	3	5	3	1	1	-	-	-	3	13
	People Mover	2	4	3	2	2	-	-	-	10	13
	Fire Protection	2	2	2	1	1	-	-	-	2	8
	HVAC	2	2	1	1	1	-	-	-	7	7
	Machinery & Equipment	2	5	5	5	5	-	-	-	6	22
	Plumbing	2	2	2	2	2	-	-	-	5	10
TOTAL OF CRITICAL JOB TITTLES		**5**	**5**	**7**	**8**	**8**				**33**	**-**
TOTAL OF JOB TITLES IDENTIFIED		**13**	**20**	**16**	**12**	**12**				**-**	**73**

4.7 Conclusion

In the light of recent economic development of the Mechanical & Electrical Services And Maintenance industry, the demand for sufficient skilled personnel has increased and the development of skilled manpower is timely. By going through the mechanism provided by the Skills Training system in Malaysia, one of the important steps is to identify the Occupational Structure and Occupational Analysis Structure of this sector. With the Occupational Structure and Occupational Analysis Structure clearly defined together with the most critical job titles, the industry stake holders will be able to identify areas that will require more intensive efforts in human capital development. Although there have been past efforts in National Standards Development for the industry, the need for an OA/OAS is required to determine the overall areas that may not yet have been focused on. We can assume that the OA/OAS to be a 'blueprint' of the manpower planning for the Building & Construction sector.

The list of critical job title data is to determine the supply of workers if they are immediately available for critical positions. Determining the supply is important because as the economy rebounds, companies whose growth depends on hiring additional critical-position workers will need a labor supply to source. If low unemployment levels exist for a critical position, then organizations may not have a reliable supply of workers to fuel growth.

To facilitate reporting, this study grouped similar critical positions into occupations for its analysis. Each critical-position occupation's unemployment rate was evaluated relative to full employment, which is a situation where every qualified worker who wants a job is employed. The findings reveal that of 6 critical-position sub sector selected for the study. Here are four scenarios that employers can expect to encounter for critical positions in a rebounding economy:

- **Higher turnover:** Business leaders can expect rising turnover in critical positions that are pivotal to growth.

- **Longer search periods:** Business leaders can expect longer search periods for critical positions that are pivotal to growth.

- **Lower workforce capabilities:** Business leaders can expect a gradual reduction in critical-position capabilities if managers respond to the prospects of longer search periods by relaxing employment standards to fill open critical positions.

- **Higher compensation:** Business leaders can expect higher compensation costs if managers respond to the prospects of longer search periods by increasing the offer's compensation package. This appears likely in sectors where the critical position requires a higher degree of technical skills and the sector has above-average profit potential.

5. CONCLUSION & RECOMMENDATION

5.1 Conclusion

M&E Service Maintenance is a vital element in the component of growth, but the significant of this career often ignored until recently, highlighted its important by Board of Engineer Malaysia (BEM) due new growth dimension under Tenth and Eleventh Malaysia Plan. The key issues in the services sector include insufficient skilled human capital and skills mismatch, complex regulatory framework, weak institutions, inadequate access to financing and low technology adoption.

Resolving these issues will be crucial to enable the sector to move up the value chain. The shift towards knowledge-intensive services activities requires a high number of skilled workers to enable modernization and greater adoption of new technologies. Insufficient skilled human capital and skill mismatches are widely acknowledged bottlenecks that restrain the shift towards knowledge-intensive sectors. Skills mismatch is reflected by the relatively high unemployment rate among graduates, which stood at 25% in 2013. In addition, access to training remains challenging for smaller firms due to cost issues or inability to retain personnel. Talent shortage is exacerbated by the outflow of local talents.

Table 19 represents highest certificate obtained within NKEA sectors from below SPM/SPMV level, SPM/SPMV, STPM, Diploma, Bachelors and Post Graduates for year 2005 and 2010. During the five years period, the NKEA sector for Communication Content and Infrastructure (CCI) show a significant improvement in employee level of Education being employed, by the industries. The data show employability of SPM/SPMV,Diploma and Bachelor holder from 24.68%,7.13% and 19.03% to a 31.81%, 20.9% and 24.68% respectively. On the contrary; Oil, Gas and Energy sector increased the number of staff for Non SPM/SPVM and SPM/SPMV which constitute about 65% of the workforces, whereas Electrical and Electronic main the same proportion throught the years.

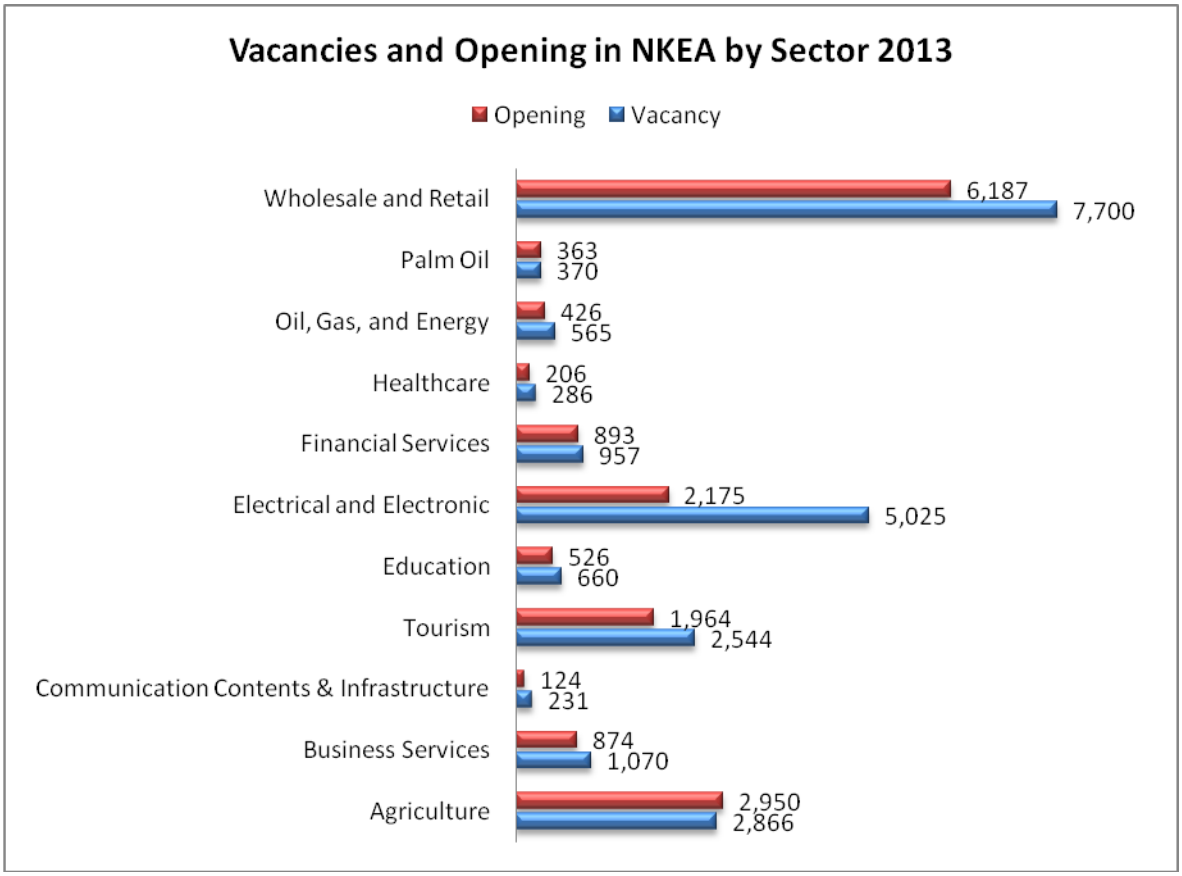
Table 19 : Education Structure by NKEA

	2005 (%)						2010 (%)					
	Non SPM/SPMV	SPM/SPMV	STPM	Diploma	Bachelors	Post-Grad	Non SPM/SPMV	SPM/SPMV	STPM	Diploma	Bachelors	Post-Grad
Agriculture	*61.43*	*28.93*	*2.77*	*3.51*	*3.05*	*0.31*	*44.56*	*38.7*	*7.17*	*5.39*	*3.78*	*0.4*
Business Service	*6.07*	*25.44*	*8.98*	*16.61*	*27.84*	*15.06*	*10.89*	*37.26*	*7.98*	*18.43*	*22.19*	*3.24*
CCI	*14.72*	*24.68*	*15.65*	*7.13*	*19.03*	*18.79*	*11.01*	*31.81*	*7.49*	*20.9*	*24.68*	*4.11*
E&E	*29.3*	*46.49*	*5.08*	*10.44*	*8.15*	*0.54*	*32.18*	*43.24*	*5.26*	*10*	*8.67*	*0.64*
Education	*9.24*	*37.89*	*9.89*	*16.19*	*22.76*	*4.03*	*5.96*	*27.33*	*8.72*	*19.96*	*29.4*	*8.63*
Financial Services	*7.53*	*31.03*	*9.67*	*18.16*	*30.41*	*3.2*	*4.33*	*17.81*	*20.78*	*14.75*	*39.97*	*2.35*
Healthcare	*12.01*	*44.31*	*6.21*	*18.11*	*14.76*	*4.6*	*9.65*	*38.16*	*8.44*	*22.5*	*16.06*	*5.2*
OGE	*17.29*	*35.5*	*11.17*	*15.72*	*18.92*	*1.41*	*33.32*	*31.01*	*6.84*	*12.05*	*15.89*	*0.89*
Palm Oil	*83.14*	*12.38*	*1.46*	*1.52*	*1.4*	*0.11*	*8.55*	*76.16*	*10.2*	*1.84*	*2.23*	*1.02*
Rubber	*59.24*	*27.48*	*3.42*	*4.76*	*4.6*	*0.49*	*36.64*	*44.64*	*7.15*	*6.24*	*4.78*	*0.55*
Tourism	*28.07*	*43.63*	*9.99*	*9.79*	*7.06*	*1.45*	*18.45*	*44.82*	*9.65*	*14.32*	*11.29*	*1.47*

***Source**: National Employment Returns (NER) 2011*

Table 20 shows the Vacancy and Opening for the year 2013. Vacancies are defined as the current position available in the companies to be filled by skill worker, while Openings means that there are new jobs available for the next year. Oil , Gas and Energy sector and Electrical and Electronic sector show a good demand of workforce for the year 2013 and 2014. The commodities crises; i.e petroleum price fall at a latter part of 2014 show a slightly reduction in Oil, Gas and Energy sector workforce demand.

Table 20 : Vacancy vs. Opening in NKEA Sector



* Vacancies are defined as the current position available in the companies to be filled by skill worker
* Openings means that there are new jobs available for the next year

Table 21, shows occupational structure within NKEA sectors from Managers/Professionals, Technical/ Supervisory, Clerical & Related and General Workers for year 2005 and 2010. The data revealed a slow percentage growth of Technical/Supervisory being employed by the industries during the period compared to other occupational structures.

Table 21 : Occupation Structure by NKEA

	2005 (%)				2010 (%)			
	Managers/ Professionals	Technical/ Supervisory	Clerical & Related	General Workers	Managers/ Professionals	Technical/ Supervisory	Clerical & Related	General Workers
Agriculture	6.72	8.61	7.22	77.45	6.74	7.74	6.63	78.89
Business Service	33.52	29.47	29.28	7.73	27.76	23.93	22	26.31
CCI	23.51	23.06	29.36	24.06	35.72	18.98	18.03	27.27
E&E	9	4.4	15.58	71.02	10.13	4.28	13.38	72.21
Education	76.95	11.58	3.46	8.01	69.78	14.51	6.43	9.29
Financial Services	54.52	29.01	8.36	8.12	55.01	33.49	6.06	5.44
Healthcare	42.46	32.53	6.64	18.37	41.54	33.7	7.06	17.69
OGE	21.85	10.45	26.15	41.55	18.23	6.86	19.42	55.49
Palm Oil	3.37	3.78	6.06	86.78	3.34	3.86	5.92	86.87
Rubber	6.81	7.23	8.98	76.99	7.24	6.06	9.04	77.66
Tourism	12.78	21.07	35.43	30.72	18.52	23.68	29.65	28.15

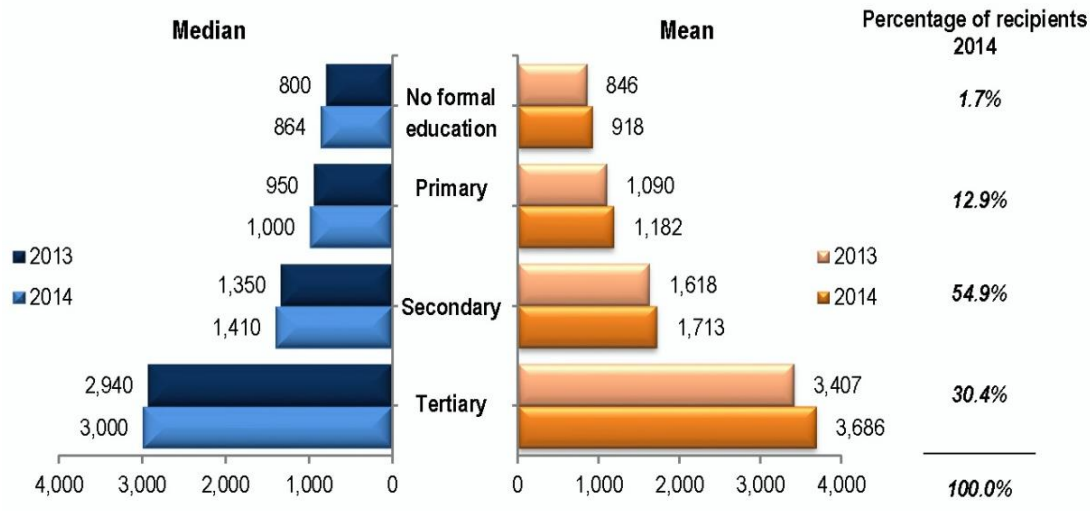
Source: *National Employment Returns (NER) 2011*

Table 22 : Median and Mean Monthly Salaries and Wages of Employees by Gender,

Year	Numbers of Receipients ('000)	Total		Male		Female		Gender Wage Gap (%)
		Median	Mean	Median	Mean	Median	Mean	
		(RM)						
2013	9,293.6	1,500	2,052	1,500	2,086	1,500	1,992	4.5
2014	9,840.9	1,575	2,231	1,600	2,280	1,500	2,148	5.8

Table 22, show that the median monthly salaries and wages received by paid employees increased to RM1,575 in 2014 compared with RM1,500 in 2013, recording the annual growth rate of 4.9 per cent. Meanwhile, the mean monthly salaries & wages increased by 8.4 per cent during the same period that is from RM2,052 to RM2,231.

Table 23 : Median and Mean monthly salaries and wages of employees by educational attainment, Malaysia, 2013-2014



Source: *Statistic Department Malaysia*

In 2014, employees with tertiary education received monthly salaries & wages two times higher than that of employees with secondary education. The median monthly salaries & wages of employees with tertiary education was RM3,000 as compared to employees with secondary education with RM1,410 (Refer to Table 23). Meanwhile, the mean monthly salaries & wages of employees with tertiary education was RM3,686 in

comparison to employees with secondary education that is RM1,713. Employees with primary education recorded the median salary & wages of RM950 and mean RM1,090. The category of employees with secondary education was the highest (54.9%) of the total paid employees.

Table 24 : Average Monthly Wages by Occupation

NKEA	Average Monthly Salary/Wages per Worker					
	Manager	Technical	Clerical	General Workers	Part-time (FTE)	All Employees
Agriculture	*6,572*	*2,822*	*1,773*	*1,098*	*1,135*	*1,628*
Palm Oil	*5,832*	*1,903*	*1,712*	*822*	*1,069*	*1,088*
E&E	*7,772*	*3,188*	*2,330*	*1,377*	*1,768*	*2,307*
CCI	*5,435*	*2,615*	*2,924*	*1,607*	*2,414*	*3,393*
Education	*3,137*	*2,805*	*1,700*	*1,642*	*1,640*	*2,729*
Healthcare	*3,474*	*1,915*	*1,295*	*1,092*	*1,535*	*2,163*
*Fin. Services (Brokers)**	*3,997*	*3,268*	*1,700*	*1,291*	*1,418*	*3,291*
Business Services	*4,745*	*2,696*	*1,620*	*1,076*	*1,292*	*2,504*
Tourism	*4,914*	*1,859*	*1,559*	*920*	*623*	*1,462*
WRT	*3,765*	*1,715*	*1,302*	*1,158*	*678*	*1,648*
OGE	*0*	*0*	*0*	*0*	*0*	*5,471*

Source: *Study On Wages Structure In The Major Economic Sector Particularly in NKEA's Industries And Its Impact Towards Labour Productivity And Capital Intensity, 2012, PE Research*

Table 24 show the average monthly salary of employees in NKEA's sector based on the position/occupation. The study revealed that the technical personnel are being compensated well in sector related to engineering industries as compared to other sector in NKEA's.

Table 25 : Principal Statistic of Engineering Services 1991-2010, Malaysia

Year	*Revenue*	*Expenditure*	*Number of Persons Engaged as at End of December*	*Salaries & Employees*	*Salaries & Wages Paid*
	RM (' 000)	**RM (' 000)**	***Total***	***Paid***	**RM (' 000)**
1991	644,723	557,358	11,309	11,041	256,969
1992	714,367	643,931	11,661	11,393	291,618
1993	..	..	..	..	..
1994	1,019,451	929,421	13,472	13,193	404,196
1995	..	..	..	..	..
1996	1,482,552	1,281,059	16,568	16,295	585,030
1997	..	..	..	..	..
1998	..	..	..	..	..
1999	1,310,335	1,016,784	12,531	12,311	463,968
2000	..	..	..	..	..
2001	..	..	..	..	..
2002	1,492,854	1,271,104	15,225	15,027	591,786
2003	1,991,565	1,795,342	15,903	15,617	762,668
2004	..	..	..	..	..
2005	3,548,362	3,193,178	19,984	19,451	1,024,778
2006	..	..	..	..	..
2007	4,955,723	4,426,663	27,402	26,816	1,179,099
2008	..	..	..	..	..
2009	4,893,967	4,123,083	18,207	18,108	991,125
2010	5,082,186	3,895,240	29,940	28,911	964,316

Table 25, witnessing the demand growth of Engineering industries for the last 20 years from the initial stages of Visison 2020, from the period of Sixth Malaysia Plan (1991-1995) to end of Ninth Malaysia Plan (2006-2010). In the Tenth and Eleventh Malaysia Plan the demand for engineering work, especially M&E Service Maintenance will experience a leap through in the industries due to diversity of engineering related industries being constructed and implemented.

The Rail Industry demand for technical manpower in 2017 is expected to triple from approximately 5,500 currently to 16,000 people due to the expansion of Light Rail Transit (LRT), Mass Rapit Transit (MRT) to form an interconnected rail transport for Klang Valley city centres, and Expressway Transport system (ETS) connecting Kuala Lumpur to Padang Besar. Based on these projects, demand for skilled and semi-skilled fresh graduates in the technical segment is predicted to grow at a CAGR of 29% between 2014 and 2020. The supply of skilled engineering fresh graduates is projected to be able to meet industry demand up to 2020, however, supply of semi-skilled fresh graduates from Community Colleges and Vocational Training Institutions, which is projected to grow at an average rate of 2% per annum, may not be able to keep up with demand by 2020.

The demand for technical personal, especially those in M&E Service Maintenance in Rail-network is projected to be higher beyond 2020, once the High Speed Rail (HSR) connecting Kuala Lumpur city center to Singapore via strategic cities in Malaysia start its operation, and the Conurbation Transport system linking the regional and local transportation to the national transportation system completed and fully operated.

The manufacturing and service for aviation industries is expected to show some improvement due to robust demand for commercial flight in the Asia Pacific region as shown in Figure 13. Malaysia will benefit from this industries through it flight service maintenance currently being employed by outsource companies for service and maintenance of their commercial flight, and through Boeing composites manufacturing currently undertaken.

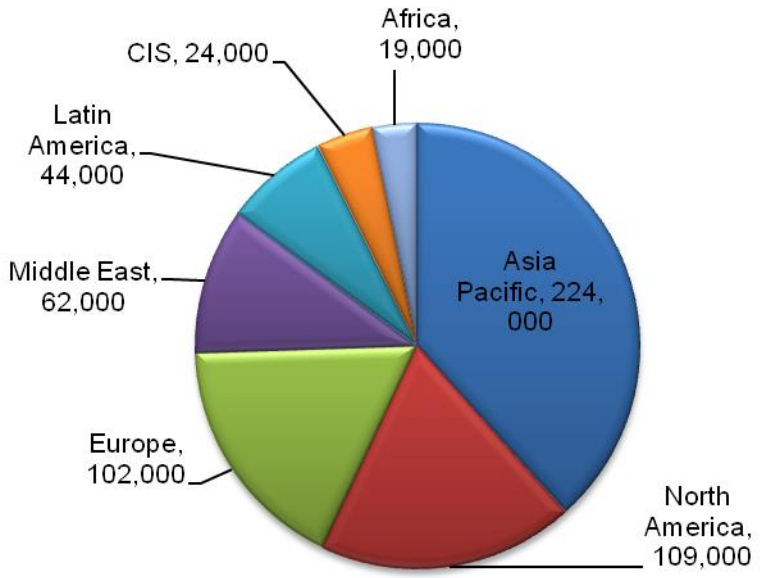


Figure 13 : Projected Technician Demand for Aviation Industries 2015-2034

Another thrust of Economic Transformation Program (ETP), mooted in the Tenth Malaysia Plan is the Oil and Gas industries. Pengerang Integrated Petroleum Complex (PIPC) Pengerang is a key and vital part of this thrust. It will help to create an oil storage and trading hub and increase petrochemical output. This will be done first by building a deep-water jetty and storage facilities to accommodate the inflow of raw materials to processing plants and the subsequent outflow of the products to destinations within and outside the country.

Currently, the structure of deep-water jetty and oil and petrochemical storage tanks are already being developed, and the Petronas' Refinery and Petrochemicals Integrated Development is showing good progress on the ground. Pengerang currently has RM69bil worth of projects in the pipeline. This accounts for 33% of investment costs of all our entry point projects and nearly 70% of those in the oil, gas and energy sector. These will serve as catalysts for economic growth and development in selected areas. Ultimate investment over time could be as high as RM170bil, including the committed RM69bil. Based on the committed investment figures, the government estimated that the PIPC will contribute RM18.3bil to gross national income and create 8,600 jobs in this industry by 2020.

5.2 Recommendation

The Eleventh Plan is the significant last five-year plan before Vision 2020 is achieved. It provides a crucial platform to ensure that Malaysia transitions to an advanced economy and inclusive nation. The framework for the development success already been laid, and the implementation are progressively done.

The M&E Service Maintenance will play a vital part in the near future and demand for this career will be higher once the development instrument already in place. It is recommended that to ensure the success of this M&E Service Maintenance across industries, steps need to be taken to include:

- Industry-academia collaborations should be continuously enhanced to meet the rapidly evolving business models and industry trends.
- Technical and Vocational Education and Training (TVET) programs should also continue to be promoted and enhanced, especially among young generation.
- Continuous effort to expose students to a wide spectrum of career opportunities across all industries and especially in niche industries through internship program and Industrial attachment.
- Continue to strongly cultivate a culture of up-skilling and lifelong learning, such as Malaysia Skill Standard (SKM/DKM) and National Dual Training Scheme (SLDN).
- Encourage companies to provide competitive salary packages while creating an attractive working environment to foster intrinsic motivation among talents to improve overall employee satisfaction and retention.

ANNEX 1 : MALAYSIAN OCCUPATIONAL SKILLS QUALIFICATION FRAMEWORK (MOSQF) LEVEL DESCRIPTOR

Level	Level Description
1	Achievement at this level reflects the ability to use relevant knowledge, skills and procedures to **complete routine and predictable tasks** that include responsibility for completing tasks and procedures subject to **direction or guidance**
2	Achievement at this level reflects the ability to select and use relevant knowledge, **ideas**, skills and procedures to **complete well-defined tasks and address straightforward problem**. It includes **taking responsibility** for completing tasks and procedures, **and exercising autonomy** and **judgment** subject to overall direction or guidance
3	Achievement at this level reflects the ability to **identify and use relevant understanding,** methods and skills to **complete task** and address problems that are well defined with a **measure of complexity.** It includes taking responsibility for initiating and completing tasks and procedures as well as exercising autonomy and judgments **within limited parameter.** It also reflects awareness of different perspectives or approaches within an area of study or work
4	Achievement at this level reflects the ability to identify and use relevant understanding, methods and skills to address problems that are well defined but **complex and non-routine**. It includes taking responsibility for overall courses of action as well as exercising autonomy and **judgment within fairly broad** parameters. It also reflects **under-standing of different** perspective or approaches within an area of study or work
5	Achievement at this level reflects the ability to identify and use relevant understanding, methods and skills to address **broadly-defined, complex problem**s. It includes taking responsibility for **planning and developing courses** of action as well as exercising autonomy and judgment within broad parameters. It also reflects **understanding of different perspectives, approaches or schools of thought and the reasoning behind them**
6	Achievement at this level reflects the ability to **refine** and use relevant understanding, methods and skills to address **complex problems that have limited definition**. It includes taking responsibility for planning and developing courses of action **that are able to underpin substantial change or development, as well as exercising broad autonomy and judgment.** It also reflects an understanding of different perspectives, **approaches of schools of thought and the theories that underpin them**

Level	Level Description
7	Achievement at this level reflects the ability to **reformulate** and use relevant understanding, methodologies and approaches to address **problematic situations** that involve many interacting factors. It includes taking responsibility for **planning and developing** courses of action that initiate or underpin substantial change or development, as well as exercising broad autonomy and judgment. It also reflects an understanding **of theoretical and relevant methodological perspectives, and how they affect their area of study or work**
8	Achievement at this level reflects the **ability to develop original understanding** and extend an area of knowledge or professional practice. It reflects the ability to address problematic situations that involve many complexes, interacting factors through initiating, designing and undertaking research, development or strategic activities. It involves the exercise of broad autonomy, judgement and leadership in sharing responsibility for the development of a field of work or knowledge, or for creating substantial professional or organisational change. It also reflects a critical understanding of relevant theoretical and methodological perspectives and how they affect the field of knowledge or work.

ANNEX 2 : LIST OF FACILITATORS OF THE MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE OCCUPATIONAL ANALYSIS DEVELOPMENT

ENCIK NABLAN BIN YUSOFF

FACILITATOR

EDUSURE SDN BHD

PUAN SITI HADRAWATI BINTI KASI

RESEARCHER

SUHAILA HANI BINTI ZAIDIN

PROOFREADER

ANNEX 3 : LIST OF INDUSTRY PANEL MEMBERS FOR THE MECHANICAL & ELECTRICAL SERVICES AND MAINTENANCE OCCUPATIONAL ANALYSIS DEVELOPMENT

NO	NAME	POSITION	ORGANISATION
1	ZALALUDIN SLAMAT	SENIOR MANAGER	SAPURA INDUSTRI & MANUFACTURING SDN BHD
2	ZOEL-FAREEZ OMAR	SENIOR MANAGER	SUTERA TEKNIK SDN BHD
3	AZARUDDIN BIN DAUD	MANAGING DIRECTOR	AMD GLOBAL ENGINEERING SDN BHD
4	MUHAMMAD NOOR AZALI BIN CHE'OM	Instructor	ABM Wilayah Tengah
5	MAT TAHA BIN SHARIFF	SN HUMAN RESOURCE MANAGER	SAPURA INDUSTRI & MANUFACTURING SDN BHD
6	AZHAR WAGIRAN	CEO	SAZA TECHNOLOGY SERVICE
7	LIEW SWEE CHEONG	TECHNICAL MANAGER	NALURI MERPATI SDN BHD
8	TAN CHOONG SING	PROJECT MANAGER	M&C ENGINEERING AND TRADING SDN BHD
9	PETER CW TAN	CEO	GENESIS PROMINAT SDN BHD
10	MOHD SYARAFI BIN ROHSELI	PROJECT MANAGER	CETEAU MALAYSIA SDN BHD