STRUKTUR PEKERJAAN BAGI

SEKTOR INDUSTRI MEKATRONIK

(Occupational Job Structures for

Mechatronics Industry Sector)

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1. EXECUTIVE SUMMARY

In conducting the Occupational Analysis on the Mechatronics sector, information on the Malaysian mechatronics industry was gathered through literature search, and interviews with the industry players from the public and private sectors. A workshop was held in an attempt to get a better understanding of the organisational structure, job titles, hierarchy objectives and primary activities of the said organisation.

Mechatronics is an industry with great potential. Endowed with strong government support and a substantial human resource, this industry could expand more in the future.

Mechatronics and other related sectors will be developed further under the Third Industrial Master Plan (IMP3), 2006-2020, to transform them into a strategic enabler to support and contribute directly to the growth of the economy. Mechatronics and other related sectors are biotechnology, shared services and outsourcing, digital content development, bioinformatics, e-commerce, services and applications, nanotechnology, radio frequency identification, wireless technology, micro-electromechanical system, photonics and robotics.

Lack of skilled workers is identified as one of the factors affecting the mechatronics industry, especially skilled workers at Levels 4, 5, 6 and 7. Thus, efforts and necessary action need to be taken to rectify the situation. Efforts to conduct the Occupational Analysis in the mechatronics industry followed by developing national occupational skills standard and training manuals by the Department of Skills Development is timely.

Malaysia has a severe "*brain drain*" problem especially in mechatronics technologies, as the more talented professionals look for a better technical education and more challenging work abroad. The labour force manning the assembly plants is not skilled enough to man the new industries that the Government wants to attract.

2. CONCEPT AND STRUCTURE OF MALAYSIAN SKILLS CERTIFICATION SYSTEM

2.1 NATIONAL OCCUPATIONAL SKILL STANDARD (NOSS)

NOSS is defined as a specification of the competencies expected of a skilled worker who is gainfully employed in Malaysia for an occupational area and Level and a path to acquire the competencies.

SKM LEVEL 1: (Operation and Production)	Competent in performing a range of varied work activities most of which are routine and predictable.
SKM LEVEL 2: (Operation & Production)	Competent in performing a significant range of varied work activities, performed in a variety of contexts. Some of the activities are non-routine and required individual responsibility and autonomy.
SKM LEVEL 3: (Supervisory)	Competent in performing a broad range of varied work activities, performed in a variety of contexts, most of which are complex and non-routine. There is considerable responsibility and autonomy and control or guidance of others is often required.
DKM LEVEL 4: (Executive)	Competent in performing a broad range of complex technical or professional work activities performed in a wide variety of contexts and with a substantial degree of personal responsibility and autonomy. Responsibility for the work of others and allocation of resources is often present.
DLKM LEVEL 5: (Managerial)	Competent in applying a significant range of fundamental principles and complex techniques across a wide and often unpredictable variety of contexts. Very substantial personal autonomy and often significant responsibility for the work of others and for the allocation of substantial resources features strongly, as do personal accountabilities for analysis, diagnosis, planning, execution and evaluation.

***Source**: Department of Skills Development*

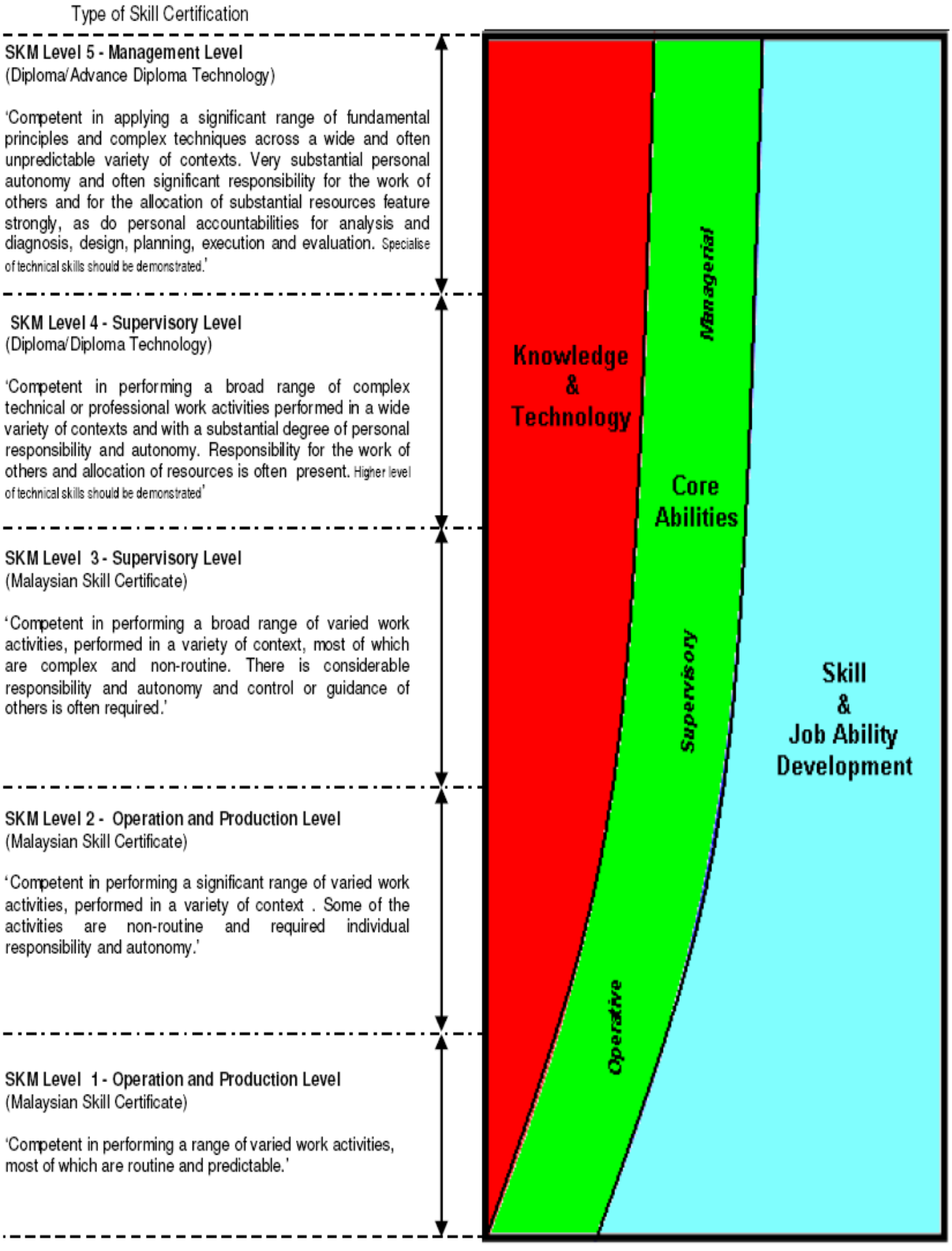


Figure 2.1: Skills Certification Structure

***Source**: Department of Skills Development*
Reviewed 16 January 2009

MALAYSIA OCCUPATIONAL SKILLS QUALIFICATION FRAMEWORK (MOSQF)

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**
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**

Level	Level Description
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.

Figure 2.3: Malaysia Occupational Skills Qualification Framework (MOSQF) Levels Description

***Source**: MOSQ Division, Department of Skills Development*

***Date Reviewed**: 2 April 2008*

3. MECHATRONICS INDUSTRY IN MALAYSIA – BACKGROUND OF THE SECTOR

3.1 PREAMBLE

The Malaysian Government has developed national development plans such as the Ninth Malaysian Plan and the Third Industrial Master Plan that are targeted at positioning Malaysia's long-term competitiveness to meet the challenges of a fast changing global economic environment. Among the thrusts of these development plans are to sustain the manufacturing and services sector as a major source of growth, where mechatronics is considered as one of the main key sectors in manufacturing.

Mechatronics can be described as the totality of fundamentals and techniques in a unified framework for service and production of future-orientated machines and products. Essentially, mechatronics can be defined in many different ways, but functionally, it is a blend of mechanics and the synergistic use of precision engineering, control theory, computer science, and finally sensor and actuator technology – all designed to improve products and processes. It also concentrates on mechanics, electronics, control and molecular engineering as well as computing, all combining to produce simpler, economical, reliable and versatile systems. Yet another definition of mechatronics relates to the synergistic integration of mechanical engineering, electronics and intelligent computer control for design and manufacture of industrial products and processes. All in all, Mechatronics has been associated with many different topics including manufacturing, motion control, robotics, intelligent control, system integration, vibration and noise control, automotive systems, modeling and design, actuators and sensors as well as micro devices.

The supply of competent workforce with the requisite skills in key sectors of Malaysia's economy, particularly in mechatronics will be increased in line with industry demand. The hiring of expatriates in these specialised areas will be facilitated. In addition, the intake into local skills training institutes and

institutions of higher learning as well as the offering of specialised courses will be expanded. Public-private sector collaboration for example the knowledge workers skills development programme will also be promoted in specific areas. University and industry collaboration and linkages will be enhanced to improve curriculum design to produce graduates with the relevant knowledge and skills required by industry.

3.2 DEFINITION OF MECHATRONICS

A Japanese engineer from Yasukawa Electric Company coined the term "mechatronics" in 1969 to reflect the merging of mechanical and electrical engineering disciplines. Until the early 1980s, mechatronics meant a mechanism that is electrified. In the mid-1980s, mechatronics came to mean engineering that is the boundary between mechanics and electronics. Today, the term encompasses a large array of technologies, many of which have become well known in their own right. Each technology still has the basic element of the merging of mechanics and electronics but now also may involve much more, particularly software and information technology.

For example, many early robots resulted from mechatronics development. As robot systems became smarter, software development, in addition to the mechanical and electrical systems, became central to mechatronics.

Mechatronics gained legitimacy in academic circles in 1996 with the publication of the first refereed journal: IEEE/ASME Transactions on Mechatronics. In the premier issue, the authors worked to define mechatronics. After acknowledging that many definitions have circulated, they selected the following for articles to be included in Transactions: "The synergistic integration of mechanical engineering with electronics and intelligent computer control in the design and manufacturing of industrial products and processes." The authors suggested 11 topics that should fall, at least in part, under the general category of mechatronics:

- modeling and design
- system integration
- actuators and sensors
- intelligent control
- robotics
- manufacturing
- motion control
- vibration and noise control
- micro devices and optoelectronic systems
- automotive systems, and
- other applications

Despite the growth of interest in mechatronics, the field faces several dilemmas. For example, while interest in mechatronics is on the rise, many younger people in Japan's engineering community have never heard the term used. Also, a thorough study of all areas under mechatronics as defined in that initial issue of Transactions would be very broad, and would include topics that have very little in common.

Essentially, Mechatronics is the concept of working smarter – not harder – and to inexpensively get the most done in as little time as possible. The term can be defined in many different ways, but functionally, it is a blend of mechanics and the synergistic use of precision engineering, control theory, computer science, and finally sensor and actuator technology – all designed to improve products and processes.

But mechatronics is more than that. It also concentrates on mechanics, electronics, control and molecular engineering as well as computing, all combining to produce simpler, economical, reliable and versatile systems. Mechatronics can also be described as the totality of fundamentals and techniques in a unified framework for service and production of future-orientated machines and products.

Yet another definition of mechatronics relates to the synergistic integration of mechanical engineering, electronics and intelligent computer control for design and manufacture of industrial products and processes. All in all, Mechatronics has been associated with many different topics including manufacturing, motion control, robotics, intelligent control, system integration, vibration and noise control, automotive systems, modeling and design, actuators and sensors as well as micro devices.

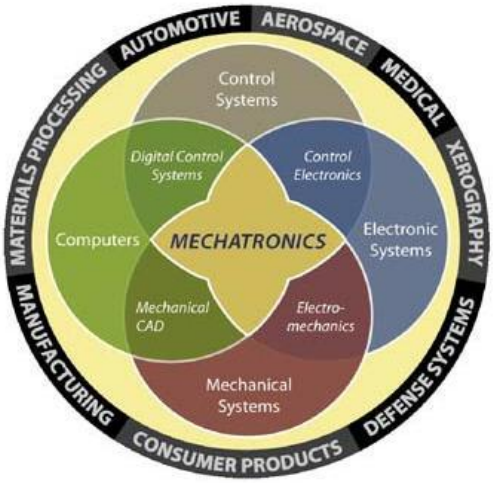


Figure 3.1: Various fields that make up mechatronics

***Source**: Rensselaer Polytechnic Institute*

The above is a diagram from Rensselaer Polytechnic Institute Web site, which describes the various fields that make up mechatronics.

3.3 CURRENT ANALYSIS OF THE SECTOR/SUB SECTOR OF MECHATRONICS

As the need for mechatronics continues to expand, the term continues to become more and more common. Two things that have contributed to its growth are the shrinking global market and the need for reliable and cost-effective products. To be competitive, companies must develop new technologies to design and manufacture their products. Mechatronics assists rapid reaction to change, competitive product properties and shortened product cycles – absolute necessities for any company.

While mechatronics still involves the merging of mechanics and electronics, it also includes software and information technology. Mechatronics melds new technologies to existing technologies and combines them to solve problems, creates products or even develops new ways of doing things. Mechatronics integrates different technologies to solve problems as efficiently as possible. In the past, engineers tried to use their own lines of study to solve a problem, but now they can use the thought processes of many different outlooks to enhance their research with the use of more efficient tools. When it comes to mechatronics, the sky is the limit as more and more ideas will be developed to improve the way we live and do things. With the ever-changing needs and wants of a complex and sophisticated world, innovations and technologies will have to improve and develop with the rapidly changing times.

In the future, mechatronics will increasingly focus on safety, reliability and affordability. Mechatronics will also play a large role in the use of robotics to assist with efficiency, productivity, accountability and control. Robots not only master repetitive and dangerous tasks, but they do it low cost and with lower margins of error. Companies using robotics will have the luxury of keeping work in their own plants rather then exporting it over seas.

Mechatronics also is projected to play a major role in the medical field, as well as in the computerised world and parts of industry-based manufacturing. Instead of building a computer to run a machine, mechatronics will help make the computer a part of the machine that builds a product.

Mechatronics shouldn’t change the design process, but rather give the engineer greater knowledge so that concepts can be developed more efficiently; so that communications with other engineering disciplines are improved. Client and market satisfaction are the major goals in the field of mechatronics. Once the needs of a client are expressed, product specifications can be developed from those needs.

3.4 POLICIES, ASSOCIATIONS AND DEVELOPMENT PLAN FOR MECHATRONICS

(i) Mechatronics and the Ninth Malaysia Plan

Malaysia launched the Ninth Malaysia Plan (2006-2010) on 31st March 2006. One of the objectives of the Plan is to position the country to achieve developed nation status by 2020. An allocation of RM200 billion (US$53.4 billion) for development expenditure has been provided under the Plan to sustain the economic development of the country. Within the period, the manufacturing sector is projected to expand by 6.7 per cent per annum. For the manufacturing sector, the Plan emphasises on:

• High technology, knowledge-based and skills-intensive activities in sectors such as:
- electronics
- biotechnology
- petrochemicals
- aerospace
- machinery and equipment

(ii) The Third Industrial Malaysia Plan (IMP3)

Besides the Ninth Malaysia Plan, the Malaysian Government has also launched the Third Industrial Master Plan (IMP3) (2006-2020). IMP3 will be targeted at positioning Malaysia's long-term competitiveness to meet the challenges of a fast changing global economic environment.
Among the thrusts of IMP3 are:

• sustaining the manufacturing and services sector as a major source of growth.
• improving Malaysia's competitiveness and ensuring a conducive investment environment.

The government expects the services sector to assume a major role in driving the growth of the economy during the Third Industrial Master Plan (IMP3) spanning from 2006 to 2020.

The ICT and other related sectors will be developed further under the Third Industrial Master Plan (IMP3), 2006-2020, to transform them into a strategic enabler to support and contribute directly to the growth of the economy. The focus areas are namely biotechnology, Shared Services and Outsourcing, digital content development, bioinformatics, e-commerce, services and applications, nanotechnology, radio frequency identification, wireless technology, micro-electromechanical system, photonics and robotics.

(iii) Approach employed by Malaysia to Develop The Mechatronics Sector

The supply of competent workforce with the requisite skills in key sectors of the economy, particularly in Islamic banking and finance, high-end retailing, creative multimedia content development, advanced materials, biotechnology, mechatronics and agriculture will be increased in line with industry demand. The hiring of expatriates in these specialised areas will be facilitated. In addition, the intake into skills training institutes and institutions of higher learning as well as the offering of specialised courses will be expanded. Public-private sector collaboration for example the knowledge workers skills development programme will also be promoted in specific areas. University and industry collaboration and linkages will be enhanced to improve curriculum design to produce graduates with the relevant knowledge and skills required by industry.

Malaysia offers a pool of talented human resources, but there is presently a shortage of skilled workforce in specialist fields in engineering, ICT and high end technologies.

Strengthening collaboration in human resource development among the industry, public sector organisation and the academia; reviewing laws legislations to provide flexibility and mobility in employment; and intensifying automation and labour-saving initiatives comprise the remaining thrusts.

The Ministry said strategies to increase the supply of technically-skilled workforce include reviewing and enhancing the capacity of vocational schools and community colleges, upgrading skills training to school leavers in vocational schools and community schools and increasing the supply of highly skilled workforce in the 17-23 age groups, from the present 30 percent to 40 percent by 2010.

According to MITI, the challenges in meeting human resources requirements in the IMP3 include enhancing total factor productivity, regional integration, enhancing capacity building and increasing employment opportunities for people with disabilities.

During the 2006-2010 periods, total employment in the economy is projected to register an average annual growth of 1.9 per cent, from 10.9 million workers in 2005 to 12 million in 2010.

(iv) Current Status Of The Mechatronics Sector

In Malaysia, there is presently a shortage of skilled workforce in the mechatronics sector. Currently, Malaysia is making effort to steer the economy towards a knowledge-based one. Furthermore, “Vision 2020”, Malaysia’s long term vision, calls for sustained, productivity-driven growth, possible only with a technologically literate, critically thinking workforce, prepared to participate fully in the global economy of the 21st century. At the same time, Malaysia’s National Philosophy of Education calls for “developing the potential of individuals in a holistic and integrated manner, so as to produce individuals who are intellectually, spiritually, emotionally and physically balanced and harmonious.

3.5 SKILLED WORKER REQUIREMENT IN THE LOCAL INDUSTRY SECTOR

The Government is fully aware of the concerns of supply of skilled manpower to sustain Malaysia's economic development. Under the 9th Malaysia Plan, a total of US$12.1 billion has been allocated for human capital development. Among the initiatives undertaken by the Malaysian Government for human capital development is through collaboration with the Japanese Government and private sector. The Malaysia-Japan University Centre, officially launched on 13 December 2005 by the Prime Ministers of both countries, has started its administrative operations. At this Centre, a consortium of 14 Universities from Japan and 17 Malaysian Public Institutions of Higher Learning will offer courses and joint-programmes to Malaysian students. There are also several industrial training institutes established through collaboration with foreign countries, one of which is the Japan-Malaysia Technical Institute. This Institute has been in operation since 1998 and offers courses in the fields of:

- computer engineering;
- electronics engineering;
- mechatronics engineering;
- manufacturing engineering.

There has also been strong cooperation with Germany in human resource development, through the establishment of the German-Malaysia Institute in 1992, which offers technical training at diploma level, and short-term courses in the specialized areas of mould and die, mechatronics, instrumentation and control electronics and IT. To date, 1,468 personnel have been trained.

3.6 INDUSTRIAL COMPETITION AT INTERNATIONAL LEVEL

In 2006, the Malaysian economy grew by 5.9 per cent compared to 5.2 per cent in 2005. The growth was led by the expansion of the manufacturing and services sectors.

GDP growth of 5.3 per cent was recorded in the first quarter of 2007 where the manufacturing sector grew by 1.7 per cent during the same period. In 2006, approved foreign investments into Malaysia increased by 13.1 per cent to US$5.5 billion. This is the highest level of foreign investments approved in the manufacturing sector. It shows that Malaysia continues to attract foreign investments, despite today's increasingly competitive global investment environment.

4. METHODOLOGY OF OCCUPATIONAL ANALYSIS – MECHATRONICS SECTOR

In conducting the Occupational Analysis, a kick off meeting was held primarily to strategise the Plan of Action in accordance with guidelines as presented by JPK in terms of scope of study, time frame and representation by panel of Mechatronics experts from both public and private sector as stipulated in the letter of offer. After the kick off meeting, a Plan of Action was formulated taking into consideration the activities and time frame required.

This chapter is divided into 2 sections; the proposed methodology to construct the Occupational Definition for the respective Job Titles and the methodology of the overall Occupational Analysis Process.

4.1 METHODOLOGY TO CONSTRUCT OCCUPATIONAL DEFINITION

This is a proposed methodology formulated by the facilitator, Dr. Amiron Ismail who is an experienced facilitator in NOSS, COS, LG and WIM development. This methodology is used in order to produce an Occupational Definition that is clear on the main job scope of the job title, the verb used is according to level of difficulty and the object is clearly described.

Below are the main steps in producing the Occupational Definition for the respective job titles obtained in the Occupational Analysis:

(i) Determine the main sub sectors and areas in the sector.

(ii) Identify the job titles

(iii) Identify the job scope

To describe the Occupational Definition clearly, the statement must consist of a ***Verb, Object*** and ***Qualifier****.* The rationale of determining the definition

attributes are, to ensure consistency and continuity of using those attributes right from Occupational Analysis, Job Analysis to Task Analysis Developmental.

(a) Object

Firstly, the object is determined before the other two attributes. The object of any job is the main determinant of distinguishing one job to the other. For example, a demi-chef (kitchen sub-sector of Hotel Industry), deals with food and cooking utensils as the objects in performing tasks. While, a hairdresser deals with client's hair, hairdressing chemical, etc.

The Objects are acquired from the expert panel members during a brainstorming session and written on DACUM cards so that all panel members can see the Objects identified. Objects of those in the related area or sub sector of the ICT industry (as an example) are determined such as in the example below:

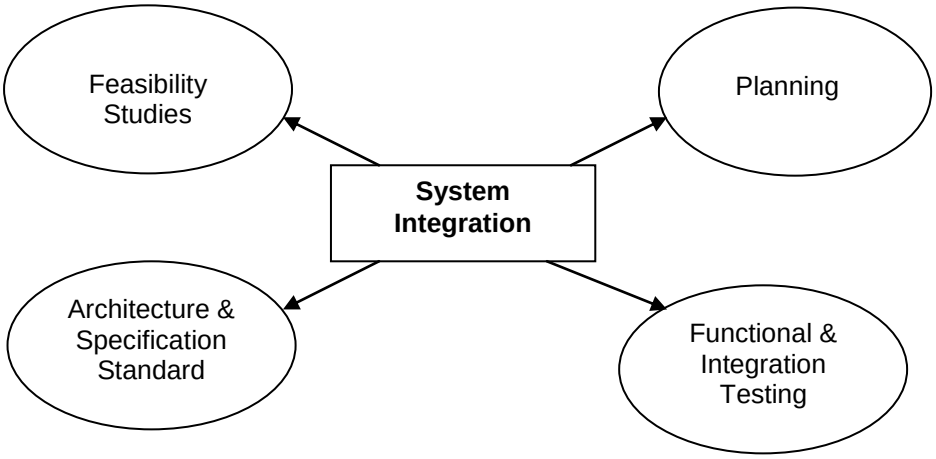
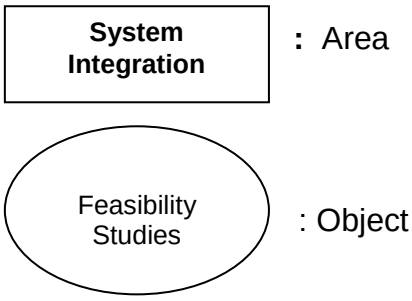


Figure 4.1: Example of Identifying Object in ICT sector

Legend:



(b) Verb

The Verb is then determined based on the level of difficulty of the identified job titles, such as below:

- ***Object*** *: architecture and specification standard*
- *Verb for Level 6 :* ***Prepare***
- *Verb for Level 7* ***: Analyse***
- *Verb for Level 8 :* ***Evaluate***

Hence, the contents of the job definitions will be as below

- **System Integration Project Executive (Level 6)**
  - ✓ ***Prepare*** *architecture and specification standard + (qualifier)*
- **System Integration Project Manager (Level 7)**
  - ✓ ***Analyse*** *architecture and specification standard + (qualifier)*
- **System Integration Project Director (Level 8)**
  - ✓ ***Evaluate*** *architecture and specification standard + (qualifier)*

(c) Qualifier

Based on the example above, the statement is not clear as there is no qualifier for the object, therefore a qualifier must be added to further clarify it. Below is an example:

- *Analyse architecture and specification standard* ***for system development and integration.***

4.2 METHODOLOGY OF THE OVERALL OCCUPATIONAL ANALYSIS PROCESS

(i) Literature survey

As outlined by the guidelines, a literature survey on the mechatronics sector was carried out to get some insight on the scope, policy, program, activities in the context of the Malaysian scenario. The scope covered under this search includes definitions, current analysis of the sector/sub sector, current status of the mechatronics industry sector, skilled workers requirement in the local industry and the industrial competition at international level.

(ii) Identifying industry & public players

The literature search findings were used as a guide to identify the scope of occupational study and analysis. Players from the mechatronics sector were identified and short listed for further communication and contact.

(iii) Establish contact with the mechatronics sector players

A pool of mechatronics experts from the industry and public sector were contacted. The list of experts is in Annex 1.

(iv) Information gathering

In the process of gathering the information, two methods were adopted, namely; brainstorming and the Developing a Curriculum (DACUM) session. The brainstorming and DACUM session was attended by expert panels who discussed the different sub sectors and areas. The information gathered was then used as input to the occupational analysis of the said industry.

(v) Analysing the information

Based on the activities done as above, substantial data and information were collected. The data and information were discussed and analysed in several in-house workshops attended by selected key person or experts from the public and industry sector. The presence of the key persons or experts was to help in the development of the Occupational Analysis for this sector.

During this session, attempts to reframe the mechatronics sub sector in Malaysia were done using the following framework:

(a) Scope of the mechatronics sector and its sub sector
(b) Main area
(c) Major occupational group of the industry
(d) Job title
(e) Hierarchy structure (Level 1 – 8)
(f) Occupational definition

(vi) Organise Workshop with expert panels

The first workshop was conducted in the development of the Occupational Analysis of the mechatronics sector. The details of the workshop are as below:

(a) Held on the 8th and 9th November, 2008 at the Tiara Beach Resort, Port Dickson and on the 13th and 14th December 2008, at PRITEC Academy, Melaka. The objectives of the workshops were:

- Presentation & review of findings
  - Outline of Job Title
  - Career structure
  - Hierarchy structure (Level 1 – 8)
  - Occupational Definition
- Occupational Analysis Session
- Validation & proofreading of the findings

5. FINDINGS

The findings from the research of the Mechatronics sector's Occupational Analysis can be divided into 4 categories, which are the existing job titles, proposed job titles, the mapping between the proposed job titles to the existing ones and the leveling & entry level justification.

5.1 EXISTING JOB TITLE AND HIERARCHY OF THE MECHATRONICS SECTOR

Based on the existing job titles in DSD's NOSS Registry, the Mechatronics sector in Malaysia is divided into 2 major sub sectors namely Industrial Automation & Mechatronic. A total of 7 job titles are present from Level 1 until Level 5. The job titles that exist for the Mechatronic and Industrial Automation sub sectors for Level 4 until Level 5 are as Engineers and Assistant Engineers, where the pre requisite for any of the two sub sectors are from Level 3, Industrial Manufacturing Technician. The entry level for this sector is at Level 1, as an Industrial Manufacturing Assistant. The existing Job Titles and OA Matrix for the Mechatronics sub sector are included in Figure 5.1: Existing OA Matrix for the Mechatronics Sector

5.2 NEWLY IDENTIFIED SUB SECTORS

The newly identified sub sectors for the Mechatronics sector were obtained through literature research and discussions with industry experts during the development workshop sessions. According to Malaysia's Industrial Plan (IMP3), The Ninth Malaysian Plan (RMK9) and other related national economical plans, the nation is targeted to propel itself towards improving the quality of life of Malaysians and at boosting Malaysia's global competitiveness.

During the development workshops, the panel members had identified 5 new sub sectors (compared to the existing 2 sub sectors) that reflect the current scenario and main Mechatronics' sub sectors currently in Malaysia. The 5 sub sectors are listed as below:-

(i) Industrial Automation
(ii) Civil Infrastructure
(iii) Transport
(iv) Medical
(v) Defence

The OA matrices for these 5 sectors are included in this section. A total of 61 job titles exist in the proposed sub sectors. Compared to the existing job titles in the mechatronics sector, the industry observes that if the next generation of workforce were more specialised in the different areas of mechatronics, this would save the employer's time and cost spent to train them. This is because each of the areas of mechatronics are rapidly changing and evolving; it would be more efficient for workers to update their knowledge and skills in their respective areas.

The mechatronics sector starts at Level 2 because it requires the Mechatronic Junior Technician to be competent in performing non-routine tasks and require individual responsibility and autonomy. Below are the descriptions of each of the different sub sectors.

(i) Industrial Automation

This sub sector is the fundamental sub sector of mechatronics as it covers the basic and important jobs dealing with other specialised mechatronics sub sectors. The job titles in this sub sector can be seen to be the majority of the mechatronics workforce in any type of organisation today.

This sub sector consists of 2 main areas; Process Automation and Industrial Automation. At Level 4 until Level 7, the job scope is more specialised between the Industrial Automation Senior Technologists for

Process Automation and Industrial Automation. The job title at Level 8 is as a Specialist.

(ii) Civil Infrastructure

This sub sector specialises in the use of mechatronics in civil infrastructures such as buildings, roads, airports and such. Mechatronics help to automate security systems such as fire detection, theft prevention, automate facilities such as lifts and escalators and also help to save energy consumption by ensuring that the air-conditioning, lighting and heating is switched off when not in use or according to other user requirements. Traffic control systems are also an area of mechatronics under the Civil Infrastructure sub sector.

The following are the different areas observed and proposed for the Civil Infrastructure sub sector:

(a) Security Systems
(b) Facilities Automation
(c) Energy Management
(d) Traffic Control

(iii)Transport Mechatronics

Transport vehicles benefit greatly from the use of mechatronics technology in order to further facilitate their efficiency and safety. The job titles are specialized from Level 5 until Level 8 because the personnel have to work in very different environments. Therefore, the diversified areas under the transport sub sector are divided according to the main categories of transportation which are:

(a) Automotive
(b) Marine Vessel
(c) Aerospace
(d) Locomotive

(v) Medical Mechatronics

The use of mechatronics in the medical field has evolved immensely such as the use of artificial organs, diagnostic tools that have an in depth knowledge base and surgical support equipment that may enable even the most complex of operations to be carried out with the use of mechatronics technology. The following are the different areas observed and proposed:

(a) Biomechatronic

(b) Diagnostic

(c) Surgical Support

(vi) Defence Mechatronics

Currently, the intelligence of mechatronics technology is an important component when designing state of the art equipment to be used for defence purposes. They start to specialise at Level 4 because the Armament and Surveillance technology are very different even starting at the Senior Technician level. Below are the different areas observed and proposed that utilise mechatronics technology:

(a) Surveillance

(b) Armament

MECHANICAL - INDUSTRIAL AUTOMATION & MECHATRONIC

	Mekatronik (Mechatronic)	**Automasi Perindustrian (Industrial Automation)**
L5	H-175-5 Jurutera Mekatronik *(Mechatronic Engineer)* (17-12-98)	H-176-5 Jurutera Automasi Perindustrian *(Industrial Automation Engineer)* (06-07-00)
L4	H-175-4 Pembantu Jurutera Mekatronik *(Mechatronic Assistant Engineer)* (17-12-98)	H-176-4 Pembantu Jurutera Automasi Perindustrian (Assistant Industrial Automation Engineer) (06-07-00)
L3	H-176-3 Juruteknik Industri Pembuatan (Industrial Manufacturing Technician) (25-10-96)	
L2	H-176-2 Pembantu Industri Pembuatan (Industrial Manufacturing Assistant) (25-10-96)	
L1	H-170-1 Pembantu Industri Pembuatan (Industrial Manufacturing Assistant) (25-10-96)	

Figure 5.1: Existing OA Matrix for the Mechatronics Sector

SUB SECTOR	CIVIL INFRASTRUCTURE				TRANSPORT MECHATRONICS				DEFENCE MECHATRONICS		MEDICAL AUTOMATION			INDUSTRIAL AUTOMATION	
AREA	**Security Systems**	**Facilities Automation**	**Energy Management**	**Traffic Control**	**Automotive**	**Marine Vessel**	**Aerospace**	**Locomotive**	**Surveillance**	**Armament**	**Bio Mecha-tronic**	**Diagnostic**	**Surgical Support**	**Process Automation**	**Industrial Automation**
LEVEL 8	Civil Infrastructure Mechatronics Specialist				Automotive Mechatronics Specialist	Marine Vessel Mechatronics Specialist	Aerospace Mechatronics Specialist	Locomotive Mechatronics Specialist	Defence Mechatronics Specialist*		Medical Automation Specialist			Industrial Automation Specialist	
LEVEL 7	Security Systems Senior Technologist	Facilities Automation Senior Technologist	Energy Management Senior Technologist	Traffic Control System Senior Technologist	Automotive Mechatronics Senior Technologist	Marine Vessel Mechatronics Senior Technologist	Aerospace Mechatronics Senior Technologist	Locomotive Mechatronics Senior Technologist	Surveillance Senior Technologist*	Armament Senior Technologist*	Biomechatronic Senior Technologist	Diagnostic Senior Technologist	Surgical Support Senior Technologist	Process Automation Senior Technologist*	Industrial Automation Senior Technologist*
LEVEL 6	Security Systems Tecnologist*	Facilities Automation Technologist*	Energy Management Technologist*	Traffic Control System Technologist*	Automotive Mechatronics Technologist	Marine Vessel Mechatronics Technologist	Aerospace Mechatronics Technologist	Locomotive Mechatronics Technologist	Surveillance Technologist*	Armament Technologist*	Biomechatronic Technologist*	Diagnostic Technologist *	Surgical Support Technologist *	Process Automation Technologist*	Industrial Automation Technologist *
LEVEL 5	Security Systems Assistant Technologist *	Facilities Automation Assistant Technologist *	Energy Management Assistant Technologist *	Traffic Control Assistant Technologist *	Automotive Mechatronics Assistant Technologist	Marine Vessel Mechatronics Assistant Technologist	Aerospace Mechatronics Assistant Technologist	Locomotive Mechatronics Assistant Technologist	Surveillance Assist. Technologist*	Armament Assist. Technologist*	Biomechatronic Assistant Technologist*	Diagnostic Assistant Technologist*	Surgical Support Assistant Technologist*	Process Automation Assistant Technologist*	Industrial Automation Assistant Technologist*
LEVEL 4	Civil Infrastructure Mechatronic Senior Technician *				Transport Mechatronics Senior Technician				Surveillance Senior Technician	Armament Senior Technician	Medical Automation Senior Technician*			Industrial Automation Senior Technician*	
LEVEL 3	Mechatronic Technician														
LEVEL 2	Mechatronic Junior Technician														
LEVEL 1	*- no level-*														

Figure 5.2: Overall Mechatronics sector matrix

SUB SECTOR	INDUSTRIAL AUTOMATION	
AREA	**PROCESS AUTOMATION**	**INDUSTRIAL AUTOMATION**
L8	INDUSTRIAL AUTOMATION SPECIALIST	
L7	PROCESS AUTOMATION SENIOR TECHNOLOGIST *	INDUSTRIAL AUTOMATION SENIOR TECHNOLOGIST*
L6	PROCESS AUTOMATION TECHNOLOGIST *	INDUSTRIAL AUTOMATION TECHNOLOGIST *
L5	PROCESS AUTOMATION ASSISTANT TECHNOLOGIST*	INDUSTRIAL AUTOMATION ASSISTANT TECHNOLOGIST*
L4	INDUSTRIAL AUTOMATION SENIOR TECHNICIAN*	
L3	*No Level*	
L2	*No Level*	
L1	*No Level*	

Note: (i) * Critical job titles

(ii) Pre requisite for all Level 4 is Level 3 , Mechatronic Technician
(iii) Pre requisite for all Level 7 in the same sub sector is Level 6

Figure 5.3: Industrial Automation sub sector

SUB SECTOR	CIVIL INFRASTRUCTURE MECHATRONICS			
AREA	**SECURITY SYSTEMS**	**FACILITIES AUTOMATION**	**ENERGY MANAGEMENT**	**TRAFFIC CONTROL**
L8	CIVIL INFRASTRUCTURE MECHATRONICS SPECIALIST			
L7	SECURITY SYSTEMS SENIOR TECHNOLOGIST	FACILITIES AUTOMATION SENIOR TECHNOLOGIST	ENERGY MANAGEMENT SENIOR TECHNOLOGIST	TRAFFIC CONTROL SENIOR TECHNOLOGIST
L6	SECURITY SYSTEMS TECNOLOGIST*	FACILITIES AUTOMATION TECHNOLOGIST*	ENERGY MANAGEMENT TECHNOLOGIST*	TRAFFIC CONTROL TECHNOLOGIST*
L5	SECURITY SYSTEMS ASSISTANT TECHNOLOGIST *	FACILITIES AUTOMATION ASSISTANT TECHNOLOGIST *	ENERGY MANAGEMENT ASSISTANT TECHNOLOGIST *	TRAFFIC CONTROL ASSISTANT TECHNOLOGIST *
L4	CIVIL INFRASTRUCTURE MECHATRONICS SENIOR TECHNICIAN *			
L3	*No Level*			
L2	*No Level*			
L1	*No Level*			

Note: (i) * Critical job titles

(ii) Pre requisite for all Level 4 is Level 3, Mechatronic Technician.
(iii) Pre requisite for all Level 7 in the same sub sector is Level 6.

Figure 5.4: Civil Infrastructure Mechatronics sub sector

SUB SECTOR	TRANSPORT MECHATRONICS			
AREA	**AUTOMOTIVE**	**MARINE VESSEL**	**AEROSPACE**	**LOCOMOTIVE**
L8	AUTOMOTIVE MECHATRONICS SPECIALIST	MARINE VESSEL MECHATRONICS SPECIALIST	AEROSPACE MECHATRONICS SPECIALIST	LOCOMOTIVE MECHATRONICS SPECIALIST
L7	AUTOMOTIVE SENIOR MECHATRONICS TECHNOLOGIST	MARINE VESSEL MECHATRONICS SENIOR TECHNOLOGIST	AEROSPACE MECHATRONICS SENIOR TECHNOLOGIST	LOCOMOTIVE MECHATRONICS SENIOR TECHNOLOGIST
L6	AUTOMOTIVE MECHATRONICS TECHNOLOGIST	MARINE VESSEL MECHATRONICS TECHNOLOGIST	AEROSPACE MECHATRONICS TECHNOLOGIST	LOCOMOTIVE MECHATRONICS TECHNOLOGIST
L5	AUTOMOTIVE MECHATRONICS ASSISTANT TECHNOLOGIST	MARINE VESSEL MECHATRONICS ASSISTANT TECHNOLOGIST	AEROSPACE MECHATRONICS ASSISTANT TECHNOLOGIST	LOCOMOTIVE MECHATRONICS ASSISTANT TECHNOLOGIST
L4	TRANSPORT MECHATRONICS SENIOR TECHNICIAN			
L3	*No Level*			
L2	*No Level*			
L1	*No Level*			

Note: (i) * Critical job titles

(ii) Pre requisite for all Level 4 is Level 3 , Mechatronic Technician.
(iii) Pre requisite for all Level 7 in the same sub sector is Level 6.

Figure 5.5: Transport Mechatronics sub sector

SUB SECTOR	MEDICAL MECHATRONICS		
	BIOMECHATRONIC	**DIAGNOSTIC**	**SURGICAL SUPPORT**
L8	MEDICAL AUTOMATION SPECIALIST		
L7	BIOMECHATRONIC SENIOR TECHNOLOGIST	DIAGNOSTIC SENIOR TECHNOLOGIST	SURGICAL SUPPORT SENIOR TECHNOLOGIST
L6	BIOMECHATRONIC TECHNOLOGIST*	DIAGNOSTIC TECHNOLOGIST *	SURGICAL SUPPORT TECHNOLOGIST *
L5	BIOMECHATRONIC ASSISTANT TECHNOLOGIST *	DIAGNOSTIC ASSISTANT TECHNOLOGIST *	SURGICAL SUPPORT ASSISTANT TECHNOLOGIST *
L4	MEDICAL AUTOMATION SENIOR TECHNICIAN		
L3	*No Level*		
L2	*No Level*		
L1	*No Level*		

Note: (i) * Critical job titles

(ii) Pre requisite for all Level 4 is Level 3 , Mechatronic Technician.
(iii) Pre requisite for all Level 7 in the same sub sector is Level 6.

Figure 5.6: Medical Mechatronics sub sector

SUB SECTOR	DEFENCE MECHATRONICS	
AREA	**SURVEILLANCE**	**ARMAMENT**
L8	DEFENCE MECHATRONICS SPECIALIST	
L7	SURVEILLANCE SENIOR TECHNOLOGIST	ARMAMENT SENIOR TECHNOLOGIST
L6	SURVEILLANCE TECHNOLOGIST	ARMAMENT TECHNOLOGIST
L5	SURVEILLANCE ASSISTANT TECHNOLOGIST	ARMAMENT ASSISTANT TECHNOLOGIST
L4	SURVEILLANCE SENIOR TECHNICIAN	ARMAMENT SENIOR TECHNICIAN
L3	*No Level*	
L2	*No Level*	
L1	*No Level*	

Note: (i) * Critical job titles

(ii) Pre requisite for all Level 4 is Level 3 , Mechatronic Technician.
(iii) Pre requisite for all Level 7 in the same sub sector is Level 6.

Figure 5.7: Defence Mechatronics sub sector

5.3 MAPPING BETWEEN THE PROPOSED SUB SECTORS TO THE EXISTING SUB SECTORS

Due to the current development in the mechatronics industry, the existing job titles in DSD's Registry of Job Titles for this sector have been reviewed and enhanced. The new proposed job titles reflect a more refined and specialised spectrum of job titles, while still maintaining the main framework of the mechatronics sector of the existing job titles. The mapping between the proposed job titles to the existing ones are included in this section in an overall view of all the sub sectors; *Figure 5.8: Mapping Between the Proposed Sub sectors to the Existing Sub sectors.*

There are some issues regarding the mapping between the proposed job titles to the existing job titles as below:

(i) Leveling

In accordance with JPK 's requirement to take into consideration job titles extended from the existing Level 5 up to Level 8, many of the existing leveling has been changed to a higher level than the existing one.

(ii) New existing Job Title, Area or Sub Sector

As there are newly defined job titles, areas and sub sectors, it is not possible to map them to existing NOSSes. However, mapping has been done between the proposed job titles to existing NOSSes according to the job scope that is felt relevant and can be used as reference such as the existing Mechatronics sub sector that has been further diversified into 4 more sub sectors ; Civil Infrastructure, Transport, Medical and Defence.

The existing sub sector, Industrial Automation is still in the proposed framework, where only the Job Titles and Leveling has been restructured.

EXISTING SUB SECTORS / PROPOSED SUB SECTORS		MECHATRONICS H- 175	INDUSTRIAL AUTOMATION H-176
CIVIL INFRASTRUCTURE MECHATRONICS	Security Systems		
	Facilities Automation		
	Energy Management		
	Traffic Control		
TRANSPORT MECHATRONICS	Automotive		
	Marine vessel		
	Aerospace		
	Locomotive		
MEDICAL MECHATRONICS	Biomechatronic		
	Diagnostic		
	Surgical Support		
INDUSTRIAL AUTOMATION	Process Automation		
	Industrial Automation		
DEFENCE MECHATRONICS	Surveillance		
	Armament		

Figure 5.8: Mapping Between the Proposed Sub sectors to the Existing Sub sectors.

5.4 ENTRY POINTS/CAREER PATH

(i) Entry Level at Level 2

Sector: Mechatronics

The mechatronics sector starts at Level 2 because it requires the Junior Mechatronic Technican to be competent in performing non-routine tasks and require individual responsibility and autonomy.

(ii) Entry Level at Level 4

Sub sector: Civil Infrastructure, Transport, Industrial Automation, Medical, Defence

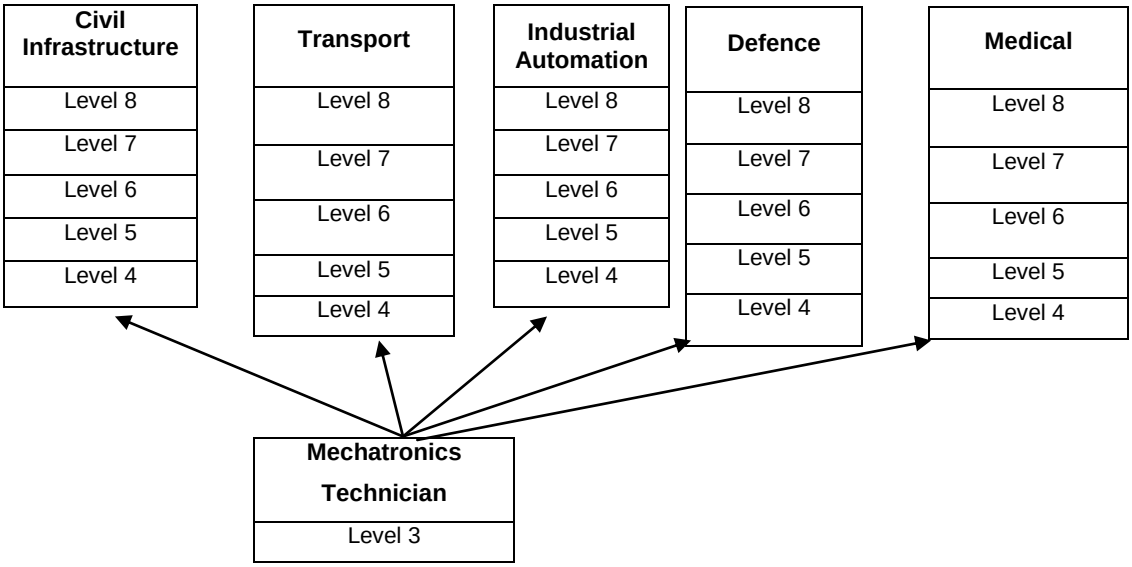


Figure 5.9: Entry level at Level 4

It is a pre requisite that those who wish to enter at Level 4 of any of the stated sub sectors must be competent at Level 3, as a Mechatronic Technician. This is because the Mechatronic Technician will have the know how to perform a broad range of varied work activities, performed in a variety of context, most of which are complex and non-routine.

(iii) Entry Level at Level 7

Sub sector: All Sub sectors

The pre requisite for Level 7 of other areas in the same sub sector is Level 6, this is because they must be competent as a Technologist and only then, they can expand their careers to other areas in the same sub sector. If they wish to expand to other sub sectors, then they must enter at Level 4 to determine their competency in the new sub sector.

5.5 OCCUPATIONAL DEFINITION

Under the mechatronics sector, job titles are identified and defined. Each of the job title is given a job definition as specified. The definition for all job titles is as in Annex 2.

5.6 CRITICAL JOB TITLE

The critical job titles have been determined based on the analysis conducted with the panel experts. It can be seen in Figure 5.9, a total of **28 job titles** are considered to be critical compared to the **33 non critical** job titles. Please refer to Figure 5.9 for summary of critical and non critical job titles.

(i) CRITICAL JOB TITLES

(a) SUB SECTOR: CIVIL INFRASTRUCTURE MECHATRONICS

No.	Job Title	Level
1	Civil Infrastructure Mechatronics Technician*	L4
2	Civil Infrastructure Security Systems Assistant Technologist *	L5
3	Facilities Automation Assistant Technologist *	L5
4	Energy Management Assistant Technologist *	L5
5	Traffic Control Assistant Technologist *	L5
6	Energy Management Technologist*	L6
7	Civil Infrastructure Security Systems Technologist*	L6
8	Facilities Automation Technologist*	L6
9	Traffic Control Technologist*	L6

(b) SUB SECTOR: DEFENCE MECHATRONICS

No.	Job Title	Level
1	Surveillance Assistant Technologist*	L5
2	Armament Assistant Technologist*	L5
3	Surveillance Technologist*	L6
4	Armament Technologist*	L6
5	Surveillance Senior Technologist*	L7
6	Armament Senior Technologist*	L7
7	Defence Mechatronics Specialist*	L8

(c) SUB SECTOR: INDUSTRIAL AUTOMATION

No.	Job Title	Level
1	Industrial Automation Assistant Technologist *	L5
2	Process Automation Assistant Technologist *	L5
3	Industrial Automation Technologist *	L6
4	Process Automation Technologist *	L6
5	Industrial Automation Senior Technologist *	L7
6	Process Automation Senior Technologist *	L7

(d) SUB SECTOR: MEDICAL MECHATRONICS

No.	Job Title	Level
1	Biomechatronic Assistant Technologist *	L5
2	Biomechatronic Assistant Technologist *	L5
3	Diagnostic Assistant Technologist *	L5
4	Surgical Support Assistant Technologist *	L5
5	Biomechatronic Technologist*	L6
6	Diagnostic Technologist *	L6
7	Surgical Support Technologist *	L6

(ii) NON CRITICAL JOB TITLES

(a) SUB SECTOR: CIVIL INFRASTRUCTURE MECHATRONICS

No.	Job Title	Level
1	Civil Infrastructure Security Systems Senior Technologist	L7
2	Facilities Automation Senior Technologist	L7
3	Energy Management Senior Technologist	L7
4	Traffic Control Senior Technologist	L7
5	Civil Infrastructure Mechatronics Specialist	L8

(b) SECTOR: MECHATRONICS

No.	Job Title	Level
1	Mechatronics Junior Technician	L2
2	Mechatronics Technican	L3

(c) SUB SECTOR: INDUSTRIAL AUTOMATION

No.	Job Title	Level
1	Industrial Automation Senior Technican	L4
2	Industrial Automation Specialist	L8

(d) SUB SECTOR: MEDICAL MECHATRONICS

No.	Job Title	Level
1	Medical Automation Senior Technician	L4
2	Biomechatronic Senior Technologist	L7
3	Diagnostic Senior Technologist	L7
4	Surgical Support Senior Technologist	L7
5	Medical Automation Specialist	L8

(e) SUB SECTOR: TRANSPORT MECHATRONICS

No.	Job Title	Level
1	Transport Mechatronics Technician	L4
2	Locomotive Assistant Technologist	L5
3	Automotive Assistant Technologist	L5
4	Marine Vessel Assistant Technologist	L5
5	Aerospace Assistant Technologist	L5
6	Marine Vessel Technologist	L6
7	Automotive Technologist	L6
8	Locomotive Technologist	L6
9	Aerospace Technologist	L6
10	Automotive Senior Technologist	L7
11	Marine Vessel Senior Technologist	L7
12	Aerospace Senior Technologist	L7
13	Locomotive Senior Technologist	L7
14	Automotive Mechatronics Specialist	L8
15	Marine Vessel Mechatronics Specialist	L8
16	Aerospace Mechatronics Specialist	L8
17	Locomotive Mechatronics Specialist	L8

(f) SUB SECTOR: DEFENCE MECHATRONICS

No.	Job Title	Level
1	Defence Senior Technician	L4
2	Surveillance Senior Technician	L4

(iii) SUMMARY OF CRITICAL AND NON CRITICAL JOB TITLES

SUB SECTOR			LEVEL									Total
			NL	L1	L2	L3	L4	L5	L6	L7	L8	
1	CIVIL INFRASTRUCTURE MECHATRONICS	*Critical*	0	0	0	0	1	4	4	0	0	9
		Non-Critical	0	0	0	0	0	0	0	4	1	5
2	DEFENCE MECHATRONICS	*Critical*	0	0	0	0	0	2	2	2	1	7
		Non-Critical	0	0	0	0	2	0	0	0	0	2
3	INDUSTRIAL AUTOMATION	*Critical*	0	0	0	0	0	2	2	2	0	6
		Non-Critical	0	0	0	0	1	0	0	0	1	2
4	MEDICAL MECHATRONICS	*Critical*	0	0	0	0	0	3	3	0	0	6
		Non-Critical	0	0	0	0	1	0	0	3	1	5
5	TRANSPORT MECHATRONICS	*Critical*	0	0	0	0	0	0	0	0	0	0
		Non-Critical	0	0	0	0	1	4	4	4	4	17
6	MECHATRONICS	*Non-Critical*	0	0	1	1	0	0	0	0	0	2
			Critical									**28**
			Non-Critical									**33**
Total			0	0	1	1	6	15	15	15	8	**61**

Figure 5.10.: Critical and Non Critical Schedule

6. CONCLUSION AND RECOMMENDATION

As a result of the Mechatronics Sector Occupational Analysis conducted together with expert panel members from various mechatronics sub sectors and organisations, a total of 61 job titles and 5 main sub sectors have been identified.

Referring to Malaysia's economical plans and vision for the coming years, such as the IMP 3 and RMK 9, a framework of the Mechatronics workforce has been identified. It is hoped that the result of this Occupational Analysis will be able to fulfill the future plans by training Malaysians to be skilled workers in the implementation of Mechatronics technology towards improving the quality of life of Malaysians and at boosting Malaysia's global competitiveness.

Malaysia has made significant strides to take advantage of advancements in Mechatronics to improve efficiency and productivity, thus contributing to the increased overall competitiveness of the economy. Additional measures must also be undertaken to enhance human resource development to provide adequate skilled and knowledgeable manpower to support the knowledge-based economy.

The Mechatronics industry has great potential. Endowed with strong government support and a substantial human resource, this industry could expand by the tight corporation between government, Mechatronics based and manufacturing companies and education centres.

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ANNEX 1: LIST OF PANEL EXPERTS AND FACILITATORS OF THE MECHATRONICS OCCUPATIONAL ANALYSIS DEVELOPMENT

LIST OF PANEL EXPERTS OF THE MECHATRONICS SECTOR OCCUPATIONAL ANALYSIS DEVELOPMENT

NO	NAME	POSITION	ORGANISATION	EXPERTISE
1	DR. AMIR AKRAMIN BIN SHAFIE	Deputy Dean (Academic) , Mechatronic Engineering Faculty	International Islamic University Malaysia	Embedded System Design
2	EN. IBRAHIM BIN MOHTAR	Manager	Microaim Sdn.Bhd.	Electromechanical
3	TUAN MEJAR SHAMSUDIN BIN MAT	Head Of Section	Malaysian Armed Forces	Mechatronics
4	EN. ZABIDI BIN ABD. GHANI	Managing Director	Intellifix Engineering Sdn.Bhd.	System Design and Programming, Computer Integrated Manufacturing System, Robotic and Material Handling
5	EN. AZMI BIN YUSOFF	Vice President	Pinelabs Sdn. Bhd.	Mechatronics Product Design
6	EN. YAHYA BIN LAMIN	Senior Leadman	Aida Mfg (M) Sdn. Bhd.	Total Maintenance For Facilities, Planer, Machining, Automation, Robotic, Mechanical and Safety
7	EN. ARIFF FAISAL BIN ILYAS	Technical Manager	Mark Plus Sdn. Bhd.	Mechatronics Application Development
8	EN. SYED NIZAM BIN SYED IDRIS	Head Of Section	German Malaysian Institute	PLC, Pneumatics and Robotic
9	EN. SHAHINSHA BIN T. MAHMOOD	Training Officer	German Malaysian Institute	Automation Engineering

LIST OF FACILITATORS OF THE MECHATRONICS SECTOR OCCUPATIONAL ANALYSIS DEVELOPMENT

DR. AMIRON BIN ISMAIL

FACILITATOR

PRITEC ACADEMY

PN. EVARINA BINTI AMIRON

FACILITATOR

PRITEC ACADEMY

EN. FAHISZAM BIN SAAD

CO-FACILITATOR

PRITEC ACADEMY

CIK NOR ZURIANI BINTI MOHD ZAINI

SECRETARIAT

PRITEC ACADEMY

CIK ROZIAH BINTI ISMAIL

SECRETARIAT

PRITEC ACADEMY

ANNEX 2: OCCUPATIONAL DEFINITIONS IN THE MECHATRONICS SECTOR

LEVEL 2
MECHATRONIC JUNIOR TECHNICIAN

A MECHATRONIC JUNIOR TECHNICIAN IS DESIGNATED TO TRANSLATE MECHANICAL & ELECTRONIC TECHNICAL DRAWING, OBTAIN STATISTICAL DATA, OPERATE AUTOMATION PANEL/CONTROL MECHANISM , CONDUCT MECHANICAL PARTS' FABRICATION AND ASSEMBLE AUTOMATION EQUIPMENT COMPONENTS.

A Mechatronic Junior Technician will:

1) Translate mechanical & electronic technical drawing
2) Obtain statistical data
3) Comply with quality control procedure
4) Operate automation panel/control mechanism
5) Conduct mechanical parts' fabrication
6) Assemble automation equipment components

LEVEL 3
MECHATRONIC TECHNICIAN

A MECHATRONIC TECHNICIAN IS DESIGNATED TO DRAFT MECHANICAL & ELECTRONIC TECHNICAL DRAWING, VERIFY STATISTICAL DATA COLLECTION, AND SUPERVISE AUTOMATION PANEL/CONTROL MECHANISM. THE PERSON WILL ALSO GUIDE MECHANICAL PARTS' FABRICATION AND ASSIST AUTOMATION EQUIPMENT INSTALLATION

A Mechatronic Technician will:

1) Draft mechanical & electronic technical drawing
2) Verify statistical data collection
3) Inspect quality control activities
4) Supervise automation panel/control mechanism
5) Guide mechanical parts' fabrication
6) Assist automation equipment installation

LEVEL 4
INDUSTRIAL AUTOMATION SENIOR TECHNICIAN

AN INDUSTRIAL AUTOMATION SENIOR TECHNICIAN IS DESIGNATED TO DEVELOP AUTOMATION PROGRAM, IMPLEMENT INDUSTRIAL AUTOMATION SYSTEM INSTALLATION & COMMISSIONING AND PERFORM SUPERVISORY DUTIES.

An Industrial Automation Senior Technician will:

1) Guide mechanical & electronic technical drawing
2) Evaluate industrial automation quality control activities
3) Verify mechanical parts' fabrication
4) Implement industrial automation system installation & commissioning
5) Develop automation program
6) Assist industrial automation system design
7) Implement supervisory activities
8) Implement industrial automation system integration

LEVEL 5
INDUSTRIAL AUTOMATION ASSISTANT TECHNOLOGIST

AN INDUSTRIAL AUTOMATION ASSISTANT TECHNOLOGIST IS DESIGNATED TO DESIGN AUTOMATION PROGRAM , IMPLEMENT INDUSTRIAL AUTOMATION SYSTEM DESIGN, COORDINATE INDUSTRIAL AUTOMATION SYSTEM INSTALLATION & COMMISSIONING, AND PERFORM SUPERVISORY ACTIVITIES.

An Industrial Automation Assistant Technologist will:

1) Verify mechanical & electronic technical drawing
2) Supervise industrial automation quality control activities
3) Plan mechanical parts' fabrication
4) Coordinate industrial automation system installation & commissioning
5) Design automation program
6) Implement industrial automation system design
7) Coordinate supervisory activities
8) Coordinate industrial automation system client,supplier, contractor liaison
9) Verify industrial automation system integration
10) Assist industrial automation machine design
11) Prepare section budget
12) Prepare industrial automation technical documentation
13) Assist product development for mechatronic equipment

LEVEL 5
PROCESS AUTOMATION ASSISTANT TECHNOLOGIST

A PROCESS AUTOMATION ASSISTANT TECHNOLOGIST IS DESIGNATED TO PLAN MECHANICAL PARTS' FABRICATION AND MECHANICAL & ELECTRONIC TECHNICAL DRAWING, DESIGN AUTOMATION PROGRAM , IMPLEMENT PROCESS AUTOMATION SYSTEM DESIGN, PREPARE PROCESS AUTOMATION TECHNICAL DOCUMENTATION, COORDINATE PROCESS AUTOMATION SYSTEM INSTALLATION & COMMISSIONING, AND PERFORM SUPERVISORY ACTIVITIES.

A Process Automation Assistant Technologist will:

1) Verify mechanical & electronic technical drawing
2) Supervise process automation quality control activities
3) Plan mechanical parts' fabrication
4) Coordinate process automation system installation & commissioning
5) Design automation program
6) Implement process automation system design
7) Coordinate supervisory activities
8) Coordinate process automation system client,supplier, contractor liaison
9) Verify process automation system integration
10) Assist process automation machine design
11) Prepare section budget
12) Prepare process automation technical documentation
13) Assist product development for mechatronic equipment

LEVEL 6
INDUSTRIAL AUTOMATION TECHNOLOGIST

AN INDUSTRIAL AUTOMATION TECHNOLOGIST IS DESIGNATED TO PRODUCE INDUSTRIAL AUTOMATION PROCESS LAYOUT DESIGN, INDUSTRIAL AUTOMATION SYSTEM DESIGN AND MACHINE DESIGN , PLAN INDUSTRIAL AUTOMATION SYSTEM INTEGRATION, VERIFY SUPERVISORY ACTIVITIES, CONDUCT PRODUCT DEVELOPMENT FOR MECHATRONIC EQUIPMENT, AND ORGANISE INDUSTRIAL AUTOMATION SYSTEM INSTALLATION & COMMISSIONING.

An Industrial Automation Technologist will:

1) Design mechanical & electronic technical drawing
2) Approve industrial automation quality control activities
3) Organise industrial automation system installation & commissioning
4) Develop industrial automation system design
5) Verify supervisory activities
6) Manage industrial automation system client,supplier, contractor liason
7) Plan industrial automation system integration
8) Develop industrial automation machine design
9) Conduct section budget
10) Verify industrial automation technical documentation
11) Produce industrial automation process layout design
12) Assist in industrial automation product innovation
13) Conduct product development for mechatronic equipment

LEVEL 6
PROCESS AUTOMATION TECHNOLOGIST

A PROCESS AUTOMATION TECHNOLOGIST IS DESIGNATED TO PRODUCE INDUSTRIAL AUTOMATION PROCESS LAYOUT DESIGN, PROCESS AUTOMATION SYSTEM DESIGN AND MACHINE DESIGN , PLAN PROCESS AUTOMATION SYSTEM INTEGRATION, VERIFY SUPERVISORY ACTIVITIES ,CONDUCT PRODUCT DEVELOPMENT FOR MECHATRONIC EQUIPMENT AND ORGANISE PROCESS AUTOMATION SYSTEM INSTALLATION & COMMISSIONING.

A Process Automation Technologist will:

1) Design mechanical & electronic technical drawing
2) Approve process automation quality control activities
3) Organise process automation system installation & commissioning
4) Develop process automation system design
5) Verify supervisory activities
6) Manage process automation system client,supplier, contractor liason
7) Plan process automation system integration
8) Develop process automation machine design
9) Conduct section budget
10) Verify process automation technical documentation
11) Produce industrial automation process layout design
12) Assist in industrial automation product innovation
13) Conduct product development for mechatronic equipment.

LEVEL 7
INDUSTRIAL AUTOMATION SENIOR TECHNOLOGIST

AN INDUSTRIAL AUTOMATION SENIOR TECHNOLOGIST IS DESIGNATED TO ANALYSE INDUSTRIAL AUTOMATION SYSTEM INTEGRATION AND INDUSTRIAL AUTOMATION PROCESS LAYOUT DESIGN, DESIGN INDUSTRIAL AUTOMATION SYSTEM AND INDUSTRIAL AUTOMATION MACHINE, DEVELOP INDUSTRIAL AUTOMATION PRODUCT INNOVATION, PLAN PRODUCT DEVELOPMENT FOR MECHATRONIC EQUIPMENT AND ORGANISE MANAGERIAL ACTIVITIES.

An Industrial Automation Senior Technologist will:

1) Verify industrial automation quality control activities
2) Verify industrial automation system installation & commissioning
3) Design industrial automation system design
4) Organise managerial activities
5) Plan industrial automation system client,supplier, contractor liaison
6) Analyse industrial automation system integration
7) Design industrial automation machine
8) Verify section budget
9) Analyse industrial automation technical documentation
10) Analyse industrial automation process layout design
11) Develop industrial automation product innovation
12) Plan product development for mechatronic equipment.

LEVEL 7
PROCESS AUTOMATION SENIOR TECHNOLOGIST

A PROCESS AUTOMATION SENIOR TECHNOLOGIST IS DESIGNATED TO ANALYSE PROCESS AUTOMATION SYSTEM INTEGRATION AND INDUSTRIAL AUTOMATION PROCESS LAYOUT DESIGN, DESIGN PROCESS AUTOMATION SYSTEM AND PROCESS AUTOMATION MACHINE, DEVELOP INDUSTRIAL AUTOMATION PRODUCT INNOVATION, PLAN PRODUCT DEVELOPMENT FOR MECHATRONIC EQUIPMENT AND ORGANISE MANAGERIAL ACTIVITIES.

A Process Automation Senior Technologist will:

1) Verify process automation quality control activities
2) Verify process automation system installation & commissioning
3) Design process automation system
4) Organise managerial activities
5) Plan process automation system client,supplier, contractor liaison
6) Analyse process automation system integration
7) Design process automation machine
8) Verify division budget
9) Analyse process automation technical documentation
10) Analyse industrial automation process layout design
11) Develop industrial automation product innovation
12) Plan product development for mechatronic equipment

LEVEL 8
INDUSTRIAL AUTOMATION SPECIALIST

AN INDUSTRIAL AUTOMATION SPECIALIST IS DESIGNATED TO STRATEGISE AND PLAN INDUSTRIAL AUTOMATION QUALITY CONTROL ACTIVITIES , PRODUCT DEVELOPMENT FOR MECHATRONIC EQUIPMENT, INDUSTRIAL AUTOMATION SYSTEM INSTALLATION & COMMISSIONING , INDUSTRIAL AUTOMATION SYSTEM DESIGN , MANAGERIAL ACTIVITIES, DIVISION BUDGET, INDUSTRIAL AUTOMATION TECHNICAL DOCUMENTATION AND INDUSTRIAL AUTOMATION PROCESS LAYOUT DESIGN, DESIGN INDUSTRIAL AUTOMATION SYSTEM INTEGRATION, ANALYSE INDUSTRIAL AUTOMATION MACHINE DESIGN REQUIREMENTS AND RESEARCH INDUSTRIAL AUTOMATION PRODUCT INNOVATION AND CONDUCT INDUSTRIAL AUTOMATION SYSTEM CLIENT, SUPPLIER, AND CONTRACTOR LIAISON.

An Industrial Automation Specialist will:

1) Strategise industrial automation quality control activities
2) Plan industrial automation system installation & commissioning
3) Plan industrial automation system design
4) Plan managerial activities
5) Conduct industrial automation system client, supplier, contractor liaison
6) Design industrial automation system integration
7) Analyse industrial automation machine design requirements
8) Plan division budget
9) Plan industrial automation technical documentation
10) Plan industrial automation process layout design
11) Research industrial automation product innovation
12) Strategise product development for mechatronic equipment

LEVEL 4
MEDICAL AUTOMATION SENIOR TECHNICIAN

A MEDICAL AUTOMATION SENIOR TECHNICIAN IS DESIGNATED TO PREPARE DATA ACCORDING TO REQUIRED FORMAT, IMPLEMENT AUTOMATION EQUIPMENT INSTALLATION AND MEDICAL AUTOMATION INTEGRATION, DESIGN AUTOMATION PROGRAM AND IMPLEMENT SUPERVISORY ACTIVITIES .

A Medical Automation Senior Technician will :

1) Prepare data according to required format
2) Guide medical automation maintenance
3) Guide medical automation safety design
4) Guide mechanical & electronic technical drawing
5) Evaluate medical automation quality control activities
6) Verify mechanical parts' fabrication
7) Implement automation equipment installation
8) Design automation program
9) Assist medical automation system design
10) Implement supervisory activities
11) Implement medical automation integration

LEVEL 5
BIOMECHATRONIC ASSISTANT TECHNOLOGIST

A BIOMECHATRONIC ASSISTANT TECHNOLOGIST IS DESIGNATED TO ANALYSE DATA ACCORDING TO REQUIRED FORMAT, PLAN MECHANICAL PARTS' FABRICATION, COORDINATE AUTOMATION EQUIPMENT INSTALLATION, DEVELOP AUTOMATION PROGRAM, IMPLEMENT MEDICAL AUTOMATION SYSTEM DESIGN AND PERFORM SUPERVISORY ACTIVITIES .

A Biomechatronic Assistant Technologist will :

1) Analyse data according to required format
2) Guide medical automation maintenance
3) Guide medical automation safety design
4) Verify mechanical & electronic technical drawing
5) Assist product development for medical automation equipment
6) Supervise biomechatronic quality control activities
7) Plan mechanical parts' fabrication
8) Coordinate automation equipment installation
9) Develop automation program
10) Implement medical automation system design
11) Coordinate supervisory activities
12) Coordinate client,supplier, contractor liaison
13) Verify medical automation integration
14) Assist biomechatronic machine design
15) Assist section budget
16) Prepare medical automation technical documentation

LEVEL 5
DIAGNOSTIC ASSISTANT TECHNOLOGIST

A DIAGNOSTIC ASSISTANT TECHNOLOGIST IS DESIGNATED TO ANALYSE DATA ACCORDING TO REQUIRED FORMAT, PLAN MECHANICAL PARTS' FABRICATION, COORDINATE AUTOMATION EQUIPMENT INSTALLATION, DEVELOP AUTOMATION PROGRAM, IMPLEMENT MEDICAL AUTOMATION SYSTEM DESIGN AND PERFORM SUPERVISORY ACTIVITIES .

A Diagnostic Assistant Technologist will:

1) Analyse data according to required format
2) Verify medical automation maintenance
3) Verify medical automation safety design
4) Verify mechanical & electronic technical drawing
5) Assist product development for medical automation equipment
6) Supervise diagnostic quality control activities
7) Plan mechanical parts' fabrication
8) Coordinate automation equipment installation
9) Develop automation program
10) Implement medical automation system design
11) Coordinate supervisory activities
12) Coordinate client,supplier, contractor liaison
13) Verify medical automation integration
14) Assist diagnostic machine design
15) Assist section budget
16) Prepare medical automation technical documentation

LEVEL 5
SURGICAL SUPPORT ASSISTANT TECHNOLOGIST

A SURGICAL SUPPORT ASSISTANT TECHNOLOGIST IS DESIGNATED TO ANALYSE DATA ACCORDING TO REQUIRED FORMAT, PLAN MECHANICAL PARTS' FABRICATION , COORDINATE AUTOMATION EQUIPMENT INSTALLATION, DEVELOP AUTOMATION PROGRAM, IMPLEMENT MEDICAL AUTOMATION SYSTEM DESIGN, PREPARE MEDICAL AUTOMATION TECHNICAL DOCUMENTATION AND COORDINATE SUPERVISORY ACTIVITIES .

A Surgical Support Assistant Technologist will:

1) Analyse Data according to required format
2) Verify Medical Automation Maintenance
3) Verify Medical Automation Safety Design
4) Verify Mechanical & electronic Technical Drawing
5) Conduct Product development for medical automation equipment
6) Supervise surgical support Quality Control activities
7) Plan mechanical parts' fabrication
8) Coordinate automation equipment Installation
9) Implement Medical Automation System Design
10) Coordinate Supervisory Activities
11) Coordinate Client,Supplier, Contractor Liaison
12) Verify Medical Automation Integration
13) Assist surgical support Machine design
14) Assist Section Budget
15) Prepare Medical automationtechnical Documentation

LEVEL 6
BIOMECHATRONIC TECHNOLOGIST

A BIOMECHATRONIC TECHNOLOGIST IS DESIGNATED TO MANAGE MEDICAL AUTOMATION MAINTENANCE, PLAN MEDICAL AUTOMATION SAFETY DESIGN, MEDICAL AUTOMATION INTEGRATIONAND PRODUCT DEVELOPMENT FOR MEDICAL AUTOMATION EQUIPMENT, DESIGN MECHANICAL & ELECTRONIC TECHNICAL DRAWING AND MEDICAL AUTOMATION SYSTEM, ORGANISE AUTOMATION EQUIPMENT INSTALLATION COMMISSIONING DEVELOP BIOMECHATRONIC MACHINE DESIGN , VERIFY SUPERVISORY ACTIVITIES AND MANAGE CLIENT,SUPPLIER, CONTRACTOR LIAISON.

A Biomechatronic Technologist will :

1) Confirm data analysis according to required format
2) Manage medical automation maintenance
3) Plan medical automation safety design
4) Design mechanical & electronic technical drawing
5) Conduct product development for medical automation equipment
6) Approve biomechatronic quality control activities
7) Organise automation equipment installation commissioning
8) Design medical automation system
9) Verify supervisory activities
10) Manage client,supplier, contractor liaison
11) Plan medical automation integration
12) Develop biomechatronic machine design
13) Implement section budget
14) Verify medical automationtechnical documentation.

LEVEL 6
DIAGNOSTIC TECHNOLOGIST

A DIAGNOSTIC TECHNOLOGIST IS DESIGNATED TO CONFIRM DATA ANALYSIS ACCORDING TO REQUIRED FORMAT, MANAGE MEDICAL AUTOMATION MAINTENANCE, PLAN MEDICAL AUTOMATION SAFETY DESIGN, MEDICAL AUTOMATION INTEGRATIONAND PRODUCT DEVELOPMENT FOR MEDICAL AUTOMATION EQUIPMENT, DESIGN MECHANICAL & ELECTRONIC TECHNICAL DRAWING AND MEDICAL AUTOMATION SYSTEM, ORGANISE AUTOMATION EQUIPMENT INSTALLATION COMMISSIONING , DEVELOP DIAGNOSTIC MACHINE DESIGN, VERIFY SUPERVISORY ACTIVITIES AND MANAGE CLIENT,SUPPLIER, CONTRACTOR LIAISON.

A Diagnostic Technologist will :

1) Confirm data analysis according to required format
2) Manage medical automation maintenance
3) Plan medical automation safety design
4) Design mechanical & electronic technical drawing
5) Plan product development for medical automation equipment
6) Approve diagnostic quality control activities
7) Organise automation equipment installation commissioning
8) Design medical automation system
9) Verify supervisory activities
10) Manage client,supplier, contractor liaison
11) Plan medical automation integration
12) Develop diagnostic machine design
13) Implement section budget
14) Verify medical automationtechnical documentation

LEVEL 6
SURGICAL SUPPORT TECHNOLOGIST

A SURGICAL SUPPORT TECHNOLOGIST IS DESIGNATED TO CONFIRM DATA ANALYSIS ACCORDING TO REQUIRED FORMAT, MANAGE MEDICAL AUTOMATION MAINTENANCE, PLAN MEDICAL AUTOMATION SAFETY DESIGN, MEDICAL AUTOMATION INTEGRATION AND PRODUCT DEVELOPMENT FOR MEDICAL AUTOMATION EQUIPMENT, DESIGN MECHANICAL & ELECTRONIC TECHNICAL DRAWING AND MEDICAL AUTOMATION SYSTEM, ORGANISE AUTOMATION EQUIPMENT INSTALLATION COMMISSIONING , DEVELOP DIAGNOSTIC MACHINE DESIGN, VERIFY SUPERVISORY ACTIVITIES AND MANAGE CLIENT,SUPPLIER, CONTRACTOR LIAISON.

A Surgical Support Technologist will :

1) Confirm data analysis according to required format
2) Manage medical automation maintenance
3) Plan medical automation safety design
4) Design mechanical & electronic technical drawing
5) Plan product development for medical automation equipment
6) Approve surgical support quality control activities
7) Organise automation equipment installation commissioning
8) Design medical automation system
9) Verify supervisory activities
10) Manage client,supplier, contractor liaison
11) Plan medical automation integration
12) Develop surgical support machine design
13) Implement section budget
14) Verify medical automationtechnical documentation

LEVEL 7
BIOMECHATRONIC SENIOR TECHNOLOGIST

A BIOMECHATRONIC SENIOR TECHNOLOGIST IS DESIGNATED TO PLAN DATA ANALYSIS FORMAT REQUIREMENTS, ANALYSE MEDICAL AUTOMATION MAINTENANCE , MEDICAL AUTOMATION SAFETY DESIGN, MEDICAL AUTOMATION INTEGRATION AND MEDICAL AUTOMATION TECHNICAL DOCUMENTATION, DEVELOP MEDICAL AUTOMATION SYSTEM DESIGN , DESIGN BIOMECHATRONIC MACHINE AND ORGANISE MANAGERIAL ACTIVITIES

A Biomechatronic Senior Technologist will :

1) Plan data analysis format requirements
2) Analyse medical automation maintenance
3) Analyse medical automation safety design
4) Verify biomechatronic quality control activities
5) Verify automation equipment installation commissioning
6) Develop medical automation system design
7) Organise managerial activities
8) Plan client,supplier, contractor liaison
9) Analyse medical automation integration
10) Design biomechatronic machine
11) Verify division budget
12) Analyse medical automationtechnical documentation.

LEVEL 7
DIAGNOSTIC SENIOR TECHNOLOGIST

A DIAGNOSTIC SENIOR TECHNOLOGIST IS DESIGNATED TO PLAN DATA ANALYSIS FORMAT REQUIREMENTS, ANALYSE MEDICAL AUTOMATION MAINTENANCE , MEDICAL AUTOMATION SAFETY DESIGN, MEDICAL AUTOMATION INTEGRATION AND MEDICAL AUTOMATION TECHNICAL DOCUMENTATION, DEVELOP MEDICAL AUTOMATION SYSTEM DESIGN , DESIGN DIAGNOSTIC MACHINE AND ORGANISE MANAGERIAL ACTIVITIES.

A Diagnostic Senior Technologist will :

1) Plan data analysis format requirements
2) Analyse medical automation maintenance
3) Analyse medical automation safety design
4) Verify diagnostic quality control activities
5) Verify automation equipment installation commissioning
6) Develop medical automation system design
7) Organise managerial activities
8) Plan client,supplier, contractor liaison
9) Analyse medical automation integration
10) Design diagnostic machine
11) Verify division budget
12) Analyse medical automationtechnical documentation

LEVEL 7
SURGICAL SUPPORT SENIOR TECHNOLOGIST

A SURGICAL SUPPORT SENIOR TECHNOLOGIST IS DESIGNATED TO PLAN DATA ANALYSIS FORMAT REQUIREMENTS, ANALYSE MEDICAL AUTOMATION MAINTENANCE, MEDICAL AUTOMATION SAFETY DESIGN, MEDICAL AUTOMATION INTEGRATION AND MEDICAL AUTOMATION TECHNICAL DOCUMENTATION, DEVELOP MEDICAL AUTOMATION SYSTEM DESIGN , DESIGN SURGICAL SUPPORT MACHINE AND ORGANISE MANAGERIAL ACTIVITIES.

A Surgical Support Senior Technologist will :

1) Plan data analysis format requirements
2) Analyse medical automation maintenance
3) Analyse medical automation safety design
4) Verify surgical support quality control activities
5) Verify automation equipment installation commissioning
6) Develop medical automation system design
7) Organise managerial activities
8) Plan client,supplier, contractor liaison
9) Analyse medical automation integration
10) Design surgical support machine
11) Verify division budget
12) Analyse medical automation technical documentation

LEVEL 8
MEDICAL AUTOMATION SPECIALIST

A MEDICAL AUTOMATION SPECIALIST IS DESIGNATED TO DESIGN DATA ANALYSIS FORMAT AND MEDICAL AUTOMATION INTEGRATION, ANALYSE MEDICAL AUTOMATION MACHINE DESIGN , PLAN MEDICAL AUTOMATION MAINTENANCE, AUTOMATION EQUIPMENT INSTALLATION COMMISSIONING, MEDICAL AUTOMATION SYSTEM DESIGN , MEDICAL AUTOMATION TECHNICAL DOCUMENTATION, MANAGERIAL ACTIVITIES, DIVISION BUDGET AND STRATEGISE MEDICAL AUTOMATION SAFETY DESIGN & MEDICAL AUTOMATION QUALITY CONTROL ACTIVITIES AND CONDUCT CLIENT,SUPPLIER, CONTRACTOR LIAISON.

A Medical Automation Specialist will:

1) Design data analysis format
2) Plan medical automation maintenance
3) Strategise medical automation safety design
4) Strategise medical automation quality control activities
5) Plan automation equipment installation commissioning
6) Plan medical automation system design
7) Plan managerial activities
8) Conduct client,supplier, contractor liaison
9) Design medical automation integration
10) Analyse medical automation machine design
11) Plan division budget
12) Plan medical automationtechnical documentation

LEVEL 4
SURVEILLANCE SENIOR TECHNICIAN

A SURVEILLANCE SENIOR TECHNICIAN IS DESIGNATED TO IMPLEMENT SURVEILLANCE EQUIPMENT INTEGRATION AND SURVEILLANCE MECHANISATION INSTALLATION, INSPECT EQUIPMENT INSTALLATION QUALITY CONTROL, PREPARE SURVEILLANCE TECHNICAL DATA AND IMPLEMENT SUPERVISORY ACTIVITIES .

A Surveillance Senior Technician will :

1) Implement surveillance equipment integration
2) Prepare section budget
3) Guide surveillance equipment maintenance
4) Inspect equipment installation Quality Control according to required specifications
5) Prepare surveillance technical data according to required format
6) Implement supervisory activities
7) Implement surveillance mechanisation installation
8) Guide surveillance equipment technical drawing

LEVEL 4
ARMAMENT SENIOR TECHNICIAN

AN ARMAMENT SENIOR TECHNICIAN IS DESIGNATED TO IMPLEMENT ARMAMENT INTEGRATION, INSPECT EQUIPMENT INSTALLATION QUALITY CONTROL, PREPARE ARMAMENT TECHNICAL DATA, IMPLEMENT ARMAMENT INSTALLATION, CONDUCT ARMAMENT GAUGING AND IMPLEMENT SUPERVISORY ACTIVITIES .

An Armament Senior Technician will :

1) Implement armament integration
2) Prepare section budget
3) Guide armament maintenance
4) Inspect equipment installation Quality Control according to required specifications
5) Prepare armament technical data according to required format
6) Implement supervisory activities
7) Implement armament installation
8) Guide armament technical drawing
9) Conduct armament gauging

LEVEL 5
SURVEILLANCE ASSISTANT TECHNOLOGIST

A SURVEILLANCE ASSISTANT TECHNOLOGIST IS DESIGNATED TO PREPARE SURVEILLANCE EQUIPMENT TECHNICAL DOCUMENTATION, ANALYSE DATA ACCORDING TO REQUIRED FORMAT, INTERPRET SURVEILLANCE MECHANISATION DESIGN, COORDINATE SURVEILLANCE MECHANISATION INSTALLATION AND SUPERVISORY ACTIVITIES .

A Surveillance Assistant Technologist will :

1) Verify surveillance equipment integration
2) Conduct section budget
3) Prepare surveillance equipment technical documentation
4) Verify surveillance equipment maintenance
5) Verify equipment installation Quality Control according to required specifications
6) Coordinate surveillance equipment client,supplier, contractor liason
7) Analyse data according to required format
8) Interpret surveillance mechanisation design
9) Coordinate supervisory activities
10) Coordinate surveillance mechanisation installation
11) Verify surveillance equipment technical drawing
12) Assist product development for surveillance equipment

LEVEL 5
ARMAMENT ASSISTANT TECHNOLOGIST

AN ARMAMENT ASSISTANT TECHNOLOGIST IS DESIGNATED TO CONDUCT SECTION BUDGET, PREPARE ARMAMENT TECHNICAL DOCUMENTATION, ANALYSE DATA ACCORDING TO REQUIRED FORMAT, INTERPRET ARMAMENT MECHANISATION DESIGN, COORDINATE ARMAMENT INSTALLATION AND SUPERVISORY ACTIVITIES .

An Armament Assistant Technologist will:

1) Verify armament integration
2) Conduct section budget
3) Prepare armament technical documentation
4) Verify armament maintenance
5) Verify equipment installation Quality Control according to required specifications
6) Coordinate armament client,supplier, contractor liason
7) Analyse data according to required format
8) Interpret armament mechanisation design
9) Coordinate supervisory activities
10) Coordinate armament installation
11) Verify armament technical drawing
12) Verify armament gauging
13) Assist product development for armament

LEVEL 6
SURVEILLANCE TECHNOLOGIST

A SURVEILLANCE TECHNOLOGIST IS DESIGNATED TO PLAN SURVEILLANCE EQUIPMENT INTEGRATION, MANAGE SURVEILLANCE EQUIPMENT MAINTENANCE AND SURVEILLANCE EQUIPMENT CLIENT,SUPPLIER, CONTRACTOR LIASON, CONFIRM DATA ANALYSIS ACCORDING TO REQUIRED FORMAT, DESIGN SURVEILLANCE EQUIPMENT TECHNICAL DRAWING, CONDUCT PRODUCT DEVELOPMENT FOR SURVEILLANCE EQUIPMENT AND VERIFY SUPERVISORY ACTIVITIES.

A Surveillance Technologist will :

1) Plan surveillance equipment integration
2) Verify section budget
3) Verify surveillance equipment technical documentation
4) Manage surveillance equipment maintenance
5) Approve equipment installation Quality Control according to required specifications
6) Manage surveillance equipment client,supplier, contractor liason
7) Confirm data analysis according to required format
8) Assist in designing surveillance mechanisation
9) Verify supervisory activities
10) Verify surveillance mechanisation installation & commissioning
11) Design surveillance equipment technical drawing
12) Interpret surveillance equipment innovation
13) Conduct product development for surveillance equipment

LEVEL 6
ARMAMENT TECHNOLOGIST

AN ARMAMENT TECHNOLOGIST IS DESIGNATED TO PLAN ARMAMENT EQUIPMENT INTEGRATION, MANAGE ARMAMENT MAINTENANCE AND ARMAMENT CLIENT,SUPPLIER, CONTRACTOR LIASON, CONFIRM DATA ANALYSIS ACCORDING TO REQUIRED FORMAT, DESIGN ARMAMENT TECHNICAL DRAWING, PLAN ARMAMENT GAUGING, CONDUCT PRODUCT DEVELOPMENT FOR ARMAMENT AND VERIFY SUPERVISORY ACTIVITIES .

An Armament Technologist will :

1) Plan armament equipment integration
2) Verify section budget
3) Verify armament technical documentation
4) Manage armament maintenance
5) Approve equipment installation Quality Control according to required specifications
6) Manage armament client,supplier, contractor liason
7) Confirm data analysis according to required format
8) Assist in designing armament mechanisation
9) Verify supervisory activities
10) Verify armament installation & commissioning
11) Design armament technical drawing
12) Interpret armament innovation
13) Plan armament gauging
14) Conduct product development for armament

LEVEL 7
SURVEILLANCE SENIOR TECHNOLOGIST

A SURVEILLANCE SENIOR TECHNOLOGIST IS DESIGNATED TO ANALYSE SURVEILLANCE MECHATRONICS INTEGRATION, SURVEILLANCE EQUIPMENT TECHNICAL DOCUMENTATION AND SURVEILLANCE EQUIPMENT MAINTENANCE, DESIGN SURVEILLANCE MECHANISATION, PLAN SURVEILLANCE MECHANISATION INSTALLATION & COMMISSIONING, SURVEILLANCE EQUIPMENT INNOVATION & PRODUCT DEVELOPMENT AND ORGANISE MANAGERIAL ACTIVITIES .

A Surveillance Senior Technologist will :

1) Analyse surveillance mechatronics integration
2) Plan division budget
3) Analyse surveillance equipment technical documentation
4) Analyse surveillance equipment maintenance
5) Verify equipment installation Quality Control according to required specifications
6) Plan surveillance equipment client,supplier, contractor liason
7) Plan data analysis format requirements
8) Design surveillance mechanisation
9) Organise managerial activities
10) Plan surveillance mechanisation installation & commissioning
11) Plan surveillance equipment innovation
12) Plan product development for surveillance equipment

LEVEL 7
ARMAMENT SENIOR TECHNOLOGIST

AN ARMAMENT SENIOR TECHNOLOGIST IS DESIGNATED TO ANALYSE ARMAMENT MECHATRONICS INTEGRATION, ARMAMENT EQUIPMENT TECHNICAL DOCUMENTATION, AND ARMAMENT EQUIPMENT MAINTENANCE, PLAN DATA ANALYSIS FORMAT REQUIREMENTS, PLAN ARMAMENT INSTALLATION & COMMISSIONING, ARMAMENT INNOVATION AND PRODUCT DEVELOPMENT , DESIGN ARMAMENT MECHANISATION AND ORGANISE MANAGERIAL ACTIVITIES .

An Armament Senior Technologist will :

1) Analyse armament mechatronics integration
2) Plan division budget
3) Analyse armament equipment technical documentation
4) Analyse armament equipment maintenance
5) Verify equipment installation Quality Control according to required specifications
6) Plan armament equipment client,supplier, contractor liason
7) Plan data analysis format requirements
8) Design armament mechanisation
9) Organise managerial activities
10) Plan armament installation & commissioning
11) Plan armament innovation
12) Plan product development for armament

LEVEL 8
DEFENCE MECHATRONICS SPECIALIST

A DEFENCE MECHATRONICS SPECIALIST IS DESIGNATED TO DESIGN DEFENCE MECHATRONICS INTEGRATION, SURVEILLANCE MECHANISATION & ARMAMENT INSTALLATION & COMMISSIONING, SURVEILLANCE EQUIPMENT & ARMAMENT INNOVATION AND DATA ANALYSIS FORMAT, PLAN DEFENCE MECHATRONICS EQUIPMENT TECHNICAL DOCUMENTATION AND DEFENCE MECHATRONICS EQUIPMENT MAINTENANCE, STRATEGISE EQUIPMENT INSTALLATION QUALITY CONTROL AND PRODUCT DEVELOPMENT FOR ARMAMENT & SURVEILLANCE EQUIPMENT AND PERFORM MANAGERIAL ACTIVITIES .

A Defence Mechatronics Specialist will :

1) Design defence mechatronics integration
2) Approve division budget
3) Plan defence mechatronics equipment technical documentation
4) Plan defence mechatronics equipment maintenance
5) Strategise equipment installation Quality Control according to required specifications
6) conduct defence mechatronics client,supplier, contractor liason
7) Design data analysis format
8) Plan surveillance & armament mechanisation
9) Plan managerial activities
10) Design surveillance mechanisation & armament installation & commissioning
11) Design surveillance equipment & armament innovation
12) Strategise product development for armament & surveillance equipment

LEVEL 4
CIVIL INFRASTRUCTURE MECHATRONIC SENIOR TECHNICIAN

A CIVIL INFRASTRUCTURE MECHATRONIC SENIOR TECHNICIAN IS DESIGNATED TO PREPARE DATA ACCORDING TO REQUIRED FORMAT, IMPLEMENT CIVIL AUTOMATION SYSTEM INSTALLATION, DESIGN AUTOMATION PROGRAM, IMPLEMENT CIVIL MECHATRONIC INTEGRATION AND SUPERVISORY ACTIVITIES .

A Civil Infrastructure Mechatronic Senior Technician will :

1) Prepare data according to required format
2) Guide civil automation system maintenance
3) Guide mechanical & electronic technical drawing
4) Evaluate civil automation quality control activities
5) Verify mechanical parts' fabrication
6) Implement civil automation system installation
7) Design automation program
8) Assist civil mechatronic system design
9) Implement supervisory activities
10) Implement civil mechatronic integration
11) Guide civil automation safety design

LEVEL 5
SECURITY SYSTEM ASSISTANT TECHNOLOGIST

A SECURITY SYSTEM ASSISTANT TECHNOLOGIST IS DESIGNATED TO ANALYSE DATA ACCORDING TO REQUIRED FORMAT, PLAN MECHANICAL PARTS' FABRICATION, COORDINATE SECURITY SYSTEMS INSTALLATION, DEVELOP AUTOMATION PROGRAM, IMPLEMENT SECURITY SYSTEM DESIGN, PREPARE SECURITY SYSTEMS TECHNICAL DOCUMENTATION AND COORDINATE SUPERVISORY ACTIVITIES .

A Security System Assistant Technologist will :

1) Analyse data according to required format
2) Verify security systems maintenance
3) Verify mechanical & electronic technical drawing
4) Supervise civil automation quality control activities
5) Plan mechanical parts' fabrication
6) Coordinate security systems installation
7) Develop automation program
8) Implement security system design
9) Coordinate supervisory activities
10) Coordinate client,supplier, & contractor liaison
11) Verify security system integration
12) Assist section budget
13) Prepare security systems technical documentation
14) Verify civil automation safety design
15) Assist product development for civil automation

LEVEL 5
FACILITIES AUTOMATION ASSISTANT TECHNOLOGIST

A FACILITIES AUTOMATION ASSISTANT TECHNOLOGIST IS DESIGNATED TO ANALYSE DATA ACCORDING TO REQUIRED FORMAT, PLAN MECHANICAL PARTS' FABRICATION, COORDINATE FACILITIES AUTOMATION INSTALLATION, DEVELOP AUTOMATION PROGRAM, IMPLEMENT FACILITIES AUTOMATION SYSTEM DESIGN, PREPARE FACILITIES AUTOMATION TECHNICAL DOCUMENTATION AND COORDINATE SUPERVISORY ACTIVITIES .

A Facilities Automation Assistant Technologist will :

1) Analyse data according to required format
2) Verify facilities automation maintenance
3) Verify mechanical & electronic technical drawing
4) Supervise civil automation quality control activities
5) Plan mechanical parts' fabrication
6) Coordinate facilities automation installation
7) Develop automation program
8) Implement facilities automation system design
9) Coordinate supervisory activities
10) Coordinate client,supplier, & contractor liaison
11) Verify facilities automation integration
12) Assist section budget
13) Prepare facilities automation technical documentation
14) Verify civil automation safety design
15) Assist product development for civil automation

LEVEL 5
ENERGY MANAGEMENT ASSISTANT TECHNOLOGIST

AN ENERGY MANAGEMENT ASSISTANT TECHNOLOGIST IS DESIGNATED TO ANALYSE DATA ACCORDING TO REQUIRED FORMAT, PLAN MECHANICAL PARTS' FABRICATION, COORDINATE ENERGY MANAGEMENT AUTOMATION SYSTEM INSTALLATION, DEVELOP AUTOMATION PROGRAM, IMPLEMENT ENERGY MANAGEMENT SYSTEM DESIGN, PREPARE ENERGY MANAGEMENT AUTOMATION SYSTEM TECHNICAL DOCUMENTATION AND COORDINATE SUPERVISORY ACTIVITIES .

An Energy Management Assistant Technologist will :

1) Analyse data according to required format
2) Verify energy management automation system maintenance
3) Verify mechanical & electronic technical drawing
4) Supervise civil automation quality control activities
5) Plan mechanical parts' fabrication
6) Coordinate energy management automation system installation
7) Develop automation program
8) Implement energy management system design
9) Coordinate supervisory activities
10) Coordinate client,supplier, & contractor liaison
11) Verify energy management automation system integration
12) Assist section budget
13) Prepare energy management automation system technical documentation
14) Verify civil automation safety design
15) Assist product development for civil automation

LEVEL 5
TRAFFIC CONTROL ASSISTANT TECHNOLOGIST

A TRAFFIC CONTROL ASSISTANT TECHNOLOGIST IS DESIGNATED TO ANALYSE DATA ACCORDING TO REQUIRED FORMAT, PLAN MECHANICAL PARTS' FABRICATION, COORDINATE TRAFFIC CONTROL AUTOMATION SYSTEM INSTALLATION, DEVELOP AUTOMATION PROGRAM, IMPLEMENT TRAFFIC CONTROL SYSTEM DESIGN, PREPARE TRAFFIC CONTROL AUTOMATION SYSTEM TECHNICAL DOCUMENTATION AND COORDINATE SUPERVISORY ACTIVITIES .

A Traffic Control Assistant Technologist will :

1) Analyse data according to required format
2) Verify traffic control automation system maintenance
3) Verify mechanical & electronic technical drawing
4) Supervise civil automation quality control activities
5) Plan mechanical parts' fabrication
6) Coordinate traffic control automation system installation
7) Develop automation program
8) Implement traffic control system design
9) Coordinate supervisory activities
10) Coordinate client,supplier, & contractor liaison
11) Verify traffic control automation system integration
12) Assist section budget
13) Prepare traffic control automation system technical documentation
14) Verify civil automation safety design
15) Assist product development for civil automation

LEVEL 6
SECURITY SYSTEM TECHNOLOGIST

A SECURITY SYSTEM TECHNOLOGIST IS DESIGNATED TO DESIGN MECHANICAL & ELECTRONIC TECHNICAL DRAWING AND SECURITY SYSTEM, PLAN SECURITY SYSTEM INTEGRATION AND CIVIL AUTOMATION SAFETY DESIGN, PRODUCE SECURITY SYSTEMS PROCESS LAYOUT DESIGN, CONDUCT PRODUCT DEVELOPMENT FOR CIVIL AUTOMATION AND PERFORM MANAGERIAL DUTIES.

A Security System Technologist will :

1) Confirm data analysis according to required format
2) Manage Security Systems maintenance
3) Design mechanical & electronic technical drawing
4) Approve Civil automation Quality Control activities
5) Organise Security Systems installation & commissioning
6) Design Security system
7) Verify supervisory activities
8) Manage client,supplier, & contractor liaison
9) Plan Security System integration
10) Implement section budget
11) Verify Security Systems technical documentation
12) Assist in civil automation product innovation
13) Produce Security Systems process layout design
14) Plan civil automation Safety Design
15) Conduct product development for civil automation

LEVEL 6
FACILITIES AUTOMATION TECHNOLOGIST

A FACILITIES AUTOMATION TECHNOLOGIST IS DESIGNATED TO DESIGN MECHANICAL & ELECTRONIC TECHNICAL DRAWING AND FACILITIES AUTOMATION SYSTEM, PLAN FACILITIES AUTOMATION INTEGRATION AND CIVIL AUTOMATION SAFETY DESIGN, PRODUCE FACILITIES AUTOMATION PROCESS LAYOUT DESIGN, CONDUCT PRODUCT DEVELOPMENT FOR CIVIL AUTOMATION AND PERFORM MANAGERIAL DUTIES.

A Facilities Automation Technologist will :

1) Confirm data analysis according to required format
2) Manage Facilities Automation maintenance
3) Design mechanical & electronic technical drawing
4) Approve Civil automation Quality Control activities
5) Organise Facilities Automation installation & commissioning
6) Design Facilities Automation system
7) Verify supervisory activities
8) Manage client,supplier, & contractor liaison
9) Plan Facilities Automation integration
10) Implement section budget
11) Verify Facilities Automation technical documentation
12) Assist in civil automation product innovation
13) Produce Facilities Automation process layout design
14) Plan civil automation Safety Design
15) Conduct product development for civil automation

LEVEL 6
ENERGY MANAGEMENT TECHNOLOGIST

AN ENERGY MANAGEMENT TECHNOLOGIST IS DESIGNATED TO DESIGN MECHANICAL & ELECTRONIC TECHNICAL DRAWING AND ENERGY MANAGEMENT SYSTEM, PLAN ENERGY MANAGEMENT INTEGRATION AND CIVIL AUTOMATION SAFETY DESIGN, PRODUCE ENERGY MANAGEMENT PROCESS LAYOUT DESIGN, CONDUCT PRODUCT DEVELOPMENT FOR CIVIL AUTOMATION AND PERFORM MANAGERIAL DUTIES

An Energy Management Technologist will :

1) Confirm data analysis according to required format
2) Manage energy management maintenance
3) Design mechanical & electronic technical drawing
4) Approve civil automation quality control activities
5) Organise energy management installation & commissioning
6) Design energy management system
7) Verify supervisory activities
8) Manage client,supplier, & contractor liaison
9) Plan energy management integration
10) Implement section budget
11) Verify energy management technical documentation
12) Assist in civil automation product innovation
13) Produce energy management process layout design
14) Plan civil automation safety design
15) Conduct product development for civil automation

LEVEL 6
TRAFFIC CONTROL SYSTEM TECHNOLOGIST

A TRAFFIC CONTROL SYSTEM TECHNOLOGIST IS DESIGNATED TO DESIGN MECHANICAL & ELECTRONIC TECHNICAL DRAWING AND TRAFFIC CONTROL SYSTEM, PLAN TRAFFIC CONTROL AUTOMATION SYSTEM INTEGRATION, PRODUCE TRAFFIC CONTROL AUTOMATION SYSTEM PROCESS LAYOUT DESIGN, PLAN CIVIL AUTOMATION SAFETY DESIGN , CONDUCT PRODUCT DEVELOPMENT FOR CIVIL AUTOMATION AND PERFORM MANAGERIAL DUTIES

A Traffic Control System Technologist will :

1) Confirm data analysis according to required format
2) Manage traffic control maintenance
3) Design mechanical & electronic technical drawing
4) Approve civil automation quality control activities
5) Organise traffic control installation & commissioning
6) Design traffic control system
7) Verify supervisory activities
8) Manage client,supplier, & contractor liaison
9) Plan traffic control integration
10) Implement section budget
11) Verify traffic control technical documentation
12) Assist in civil automation product innovation
13) Produce traffic control process layout design
14) Plan civil automation safety design
15) Conduct product development for civil automation

LEVEL 7
SECURITY SYSTEMS SENIOR TECHNOLOGIST

A SECURITY SYSTEMS SENIOR TECHNOLOGIST IS DESIGNATED TO PLAN DATA ANALYSIS FORMAT REQUIREMENTS AND PRODUCT DEVELOPMENT FOR CIVIL AUTOMATION, ANALYSE CIVIL AUTOMATION SAFETY DESIGN, SECURITY SYSTEMS MAINTENANCE, SECURITY SYSTEM INTEGRATION, SECURITY SYSTEMS TECHNICAL DOCUMENTATION AND SECURITY SYSTEMS PROCESS LAYOUT DESIGN, DEVELOP CIVIL AUTOMATION PRODUCT INNOVATION AND SECURITY SYSTEM DESIGN AND ORGANISE MANAGERIAL ACTIVITIES .

A Security Systems Senior Technologist will :

1) Plan data analysis format requirements
2) Analyse security systems maintenance
3) Verify civil automation quality control activities
4) Verify security systems installation & commissioning
5) Develop security system design
6) Organise managerial activities
7) Plan client,supplier, & contractor liaison
8) Analyse security system integration
9) Verify division budget
10) Analyse security systems technical documentation
11) Develop civil automation product innovation
12) Analyse security systems process layout design
13) Analyse civil automation safety design
14) Plan product development for civil automation

LEVEL 7
FACILITIES AUTOMATION SENIOR TECHNOLOGIST

A FACILITIES AUTOMATION SENIOR TECHNOLOGIST IS DESIGNATED TO PLAN DATA ANALYSIS FORMAT REQUIREMENTS AND PRODUCT DEVELOPMENT FOR CIVIL AUTOMATION, ANALYSE FACILITIES AUTOMATION MAINTENANCE, FACILITIES AUTOMATION INTEGRATION, FACILITIES AUTOMATION TECHNICAL DOCUMENTATION, FACILITIES AUTOMATION PROCESS LAYOUT DESIGN AND CIVIL AUTOMATION SAFETY DESIGN, DEVELOP FACILITIES AUTOMATION SYSTEM DESIGN AND CIVIL AUTOMATION PRODUCT INNOVATION AND ORGANISE MANAGERIAL ACTIVITIES .

A Facilities Automation Senior Technologist will :

1) Plan data analysis format requirements
2) Analyse facilities automation maintenance
3) Verify civil automation quality control activities
4) Verify facilities automation installation & commissioning
5) Develop facilities automation system design
6) Organise managerial activities
7) Plan client,supplier, & contractor liaison
8) Analyse facilities automation integration
9) Verify division budget
10) Analyse facilities automation technical documentation
11) Develop civil automation product innovation
12) Analyse facilities automation process layout design
13) Analyse civil automation safety design
14) Plan product development for civil automation

LEVEL 7
ENERGY MANAGEMENT SENIOR TECHNOLOGIST

AN ENERGY MANAGEMENT SENIOR TECHNOLOGIST IS DESIGNATED TO PLAN DATA ANALYSIS FORMAT REQUIREMENTS AND PLAN PRODUCT DEVELOPMENT FOR CIVIL AUTOMATION, ANALYSE ENERGY MANAGEMENT MAINTENANCE, ENERGY MANAGEMENT INTEGRATION, ENERGY MANAGEMENT TECHNICAL DOCUMENTATION, ENERGY MANAGEMENT PROCESS LAYOUT DESIGN AND CIVIL AUTOMATION SAFETY DESIGN, DEVELOP ENERGY MANAGEMENT SYSTEM DESIGN AND CIVIL AUTOMATION PRODUCT INNOVATION AND ORGANISE MANAGERIAL ACTIVITIES .

An Energy Management Senior Technologist will :

1) Plan data analysis format requirements
2) Analyse energy management maintenance
3) Verify civil automation quality control activities
4) Verify energy management installation & commissioning
5) Develop energy management system design
6) Organise managerial activities
7) Plan client,supplier, & contractor liaison
8) Analyse energy management integration
9) Verify division budget
10) Analyse energy management technical documentation
11) Develop civil automation product innovation
12) Analyse energy management process layout design
13) Analyse civil automation safety design
14) Plan product development for civil automation

LEVEL 7
TRAFFIC CONTROL SYSTEM SENIOR TECHNOLOGIST

A TRAFFIC CONTROL SYSTEM SENIOR TECHNOLOGIST IS DESIGNATED TO PLAN DATA ANALYSIS FORMAT REQUIREMENTS AND PRODUCT DEVELOPMENT FOR CIVIL AUTOMATION, ANALYSE TRAFFIC CONTROL MAINTENANCE, TRAFFIC CONTROL TECHNICAL DOCUMENTATION , TRAFFIC CONTROL PROCESS LAYOUT DESIGN AND CIVIL AUTOMATION SAFETY DESIGN, DEVELOP TRAFFIC CONTROL SYSTEM DESIGN AND CIVIL AUTOMATION PRODUCT INNOVATION AND ORGANISE MANAGERIAL ACTIVITIES .

A Traffic Control Automation System Senior Technologist will :

1) Plan data analysis format requirements
2) Analyse traffic control maintenance
3) Verify civil automation quality control activities
4) Verify traffic control installation & commissioning
5) Develop traffic control system design
6) Organise managerial activities
7) Plan client,supplier, & contractor liaison
8) Analyse traffic control integration
9) Verify division budget
10) Analyse traffic control technical documentation
11) Develop civil automation product innovation
12) Analyse traffic control process layout design
13) Analyse civil automation safety design
14) Plan product development for civil automation

LEVEL 8
CIVIL INFRASTRUCTURE MECHATRONICS SPECIALIST

A CIVIL INFRASTRUCTURE MECHATRONICS SPECIALIST IS DESIGNATED TO DESIGN DATA ANALYSIS FORMAT AND CIVIL MECHATRONIC INTEGRATION, PLAN CIVIL AUTOMATION SYSTEM MAINTENANCE, CIVIL AUTOMATION SYSTEM INSTALLATION & COMMISSIONING, CIVIL MECHATRONIC TECHNICAL DOCUMENTATION, CIVIL AUTOMATION PROCESS LAYOUT DESIGN AND CIVIL MECHATRONIC SYSTEM DESIGN, CONDUCT CLIENT,SUPPLIER, & CONTRACTOR LIAISON, RESEARCH CIVIL AUTOMATION PRODUCT INNOVATION, STRATEGISE CIVIL AUTOMATION SAFETY DESIGN ,CIVIL AUTOMATION QUALITY CONTROL ACTIVITIES, AND PRODUCT DEVELOPMENT FOR CIVIL AUTOMATION AND PLAN MANAGERIAL ACTIVITIES .

A Civil Infrastructure Mechatronics Specialist will :

1) Design data analysis format
2) Plan civil automation system maintenance
3) Strategise civil automation quality control activities
4) Plan civil automation system installation & commissioning
5) Plan civil mechatronic system design
6) Plan managerial activities
7) Conduct client,supplier, & contractor liaison
8) Design civil mechatronic integration
9) Plan division budget
10) Plan civil mechatronic technical documentation
11) Research civil automation product innovation
12) Plan civil automation process layout design
13) Strategise civil automation safety design
14) Strategise product development for civil automation

LEVEL 4
TRANSPORT MECHATRONICS SENIOR TECHNICIAN

A TRANSPORT MECHATRONICS SENIOR TECHNICIAN IS DESIGNATED TO PREPARE DATA ACCORDING TO REQUIRED FORMAT, DESIGN AUTOMATION PROGRAM, IMPLEMENT AUTOMATION EQUIPMENT INSTALLATION AND SUPERVISORY ACTIVITIES .

A Transport Mechatronics Senior Technician will :

1) Prepare data according to required format
2) Guide transport automation maintenance
3) Guide transport automation safety design
4) Guide transport automation technical drawing
5) Evaluate transport automation Quality Control activities
6) Verify mechanical parts' fabrication
7) Implement automation equipment installation
8) Design automation program
9) Implement supervisory activities

LEVEL 5
AUTOMOTIVE MECHATRONICS ASSISTANT TECHNOLOGIST

AN AUTOMOTIVE MECHATRONICS ASSISTANT TECHNOLOGIST IS DESIGNATED TO ANALYSE DATA ACCORDING TO REQUIRED FORMAT, PLAN MECHANICAL PARTS' FABRICATION, COORDINATE AUTOMATION EQUIPMENT INSTALLATION, DEVELOP AUTOMATION PROGRAM, COORDINATE CLIENT,SUPPLIER, & CONTRACTOR LIAISON, PREPARE TRANSPORT AUTOMATION TECHNICAL DOCUMENTATION AND COORDINATE SUPERVISORY ACTIVITIES .

An Automotive Mechatronics Assistant Technologist will :

1) Analyse data according to required format
2) Verify Automotive Mechatronics maintenance
3) Verify transport automation safety design
4) Verify Automotive Mechatronics technical drawing
5) Supervise transport automation Quality Control activities
6) Plan mechanical parts' fabrication
7) Coordinate automation equipment installation
8) Develop automation program
9) Coordinate supervisory activities
10) Coordinate client,supplier, & contractor liaison
11) Assist Automotive Mechatronics integration
12) Assist product development for automotive automation
13) Assist Automotive automation System design
14) Assist Section Budget
15) Prepare Transport automation Technical Documentation

LEVEL 5
MARINE VESSEL MECHATRONICS ASSISTANT TECHNOLOGIST

A MARINE VESSEL MECHATRONICS ASSISTANT TECHNOLOGIST IS DESIGNATED TO ANALYSE DATA ACCORDING TO REQUIRED FORMAT, PLAN MECHANICAL PARTS' FABRICATION, DEVELOP AUTOMATION PROGRAM, PREPARE TRANSPORT AUTOMATION TECHNICAL DOCUMENTATION AND COORDINATE SUPERVISORY ACTIVITIES .

A Marine Vessel Mechatronics Assistant Technologist will :

1) Analyse data according to required format
2) Verify marine vessel mechatronics maintenance
3) Verify transport automation safety design
4) Verify marine vessel mechatronics technical drawing
5) Supervise transport automation quality control activities
6) Plan mechanical parts' fabrication
7) Coordinate automation equipment installation
8) Develop automation program
9) Coordinate supervisory activities
10) Coordinate client,supplier, & contractor liaison
11) Assist marine vessel mechatronics integration
12) Assist product development for marine vessel automation
13) Assist marine vessel automation system design
14) Assist section budget
15) Prepare transport automation technical documentation

LEVEL 5
AEROSPACE MECHATRONICS ASSISTANT TECHNOLOGIST

AN AEROSPACE MECHATRONICS ASSISTANT TECHNOLOGIST IS DESIGNATED TO ANALYSE DATA ACCORDING TO REQUIRED FORMAT, PREPARE TRANSPORT AUTOMATION TECHNICAL DOCUMENTATION PLAN MECHANICAL PARTS' FABRICATION AND COORDINATE SUPERVISORY ACTIVITIES .

An Aerospace Mechatronics Assistant Technologist will :

1) Analyse data according to required format
2) Verify aerospace mechatronics maintenance
3) Verify transport automation safety design
4) Verify aerospace mechatronics technical drawing
5) Supervise transport automation quality control activities
6) Plan mechanical parts' fabrication
7) Coordinate automation equipment installation
8) Coordinate supervisory activities
9) Coordinate client,supplier, & contractor liaison
10) Assist aerospace mechatronics integration
11) Assist product development for aerospace automation
12) Assist aerospace automation system design
13) Assist section budget.
14) Prepare transport automation technical documentation

LEVEL 5
LOCOMOTIVE MECHATRONICS ASSISTANT TECHNOLOGIST

A LOCOMOTIVE MECHATRONICS ASSISTANT TECHNOLOGIST IS DESIGNATED TO ANALYSE DATA ACCORDING TO REQUIRED FORMAT, PREPARE TRANSPORT AUTOMATION TECHNICAL DOCUMENTATION, PLAN MECHANICAL PARTS' FABRICATION AND COORDINATE SUPERVISORY ACTIVITIES .

A Locomotive Mechatronics Assistant Technologist will :

1) Analyse data according to required format
2) Verify locomotive mechatronics maintenance
3) Verify transport automation safety design
4) Verify locomotive mechatronics technical drawing
5) Supervise transport automation quality control activities
6) Plan mechanical parts' fabrication
7) Coordinate automation equipment installation
8) Coordinate supervisory activities
9) Coordinate client,supplier, & contractor liaison
10) Assist locomotive mechatronics integration
11) Assist product development for locomotive automation
12) Assist locomotive automation system design
13) Assist section budget
14) Prepare transport automation technical documentation

LEVEL 6
AUTOMOTIVE MECHATRONICS TECHNOLOGIST

AN AUTOMOTIVE MECHATRONICS TECHNOLOGIST IS DESIGNATED TO PLAN TRANSPORT AUTOMATION SAFETY DESIGN, DESIGN AUTOMOTIVE MECHATRONICS TECHNICAL DRAWING, IMPLEMENT AUTOMOTIVE MECHATRONICS INTEGRATION, CONDUCT PRODUCT DEVELOPMENT FOR AUTOMOTIVE AUTOMATION AND AUTOMOTIVE AUTOMATION SYSTEM DESIGN AND PERFORM MANAGERIAL DUTIES.

An Automotive Mechatronics Technologist will :

1) Confirm data analysis according to required format
2) Manage automotive mechatronics maintenance
3) Plan transport automation safety design
4) Design automotive mechatronics technical drawing
5) Approve transport automation quality control activities
6) Organise automation equipment installation & commissioning
7) Verify supervisory activities
8) Manage client,supplier, & contractor liaison
9) Implement automotive mechatronics integration
10) Conduct product development for automotive automation
11) Assist in transport automation product innovation
12) Conduct automotive automation system design
13) Implement section budget
14) Verify transport automation technical documentation

LEVEL 6
MARINE VESSEL MECHATRONICS TECHNOLOGIST

A MARINE VESSEL MECHATRONICS TECHNOLOGIST IS DESIGNATED TO PLAN TRANSPORT AUTOMATION SAFETY DESIGN, DESIGN MARINE VESSEL MECHATRONICS TECHNICAL DRAWING, IMPLEMENT MARINE VESSEL MECHATRONICS INTEGRATION, CONDUCT PRODUCT DEVELOPMENT FOR MARINE VESSEL AUTOMATION AND MARINE VESSEL AUTOMATION SYSTEM DESIGN AND PERFORM MANAGERIAL DUTIES.

A Marine Vessel Mechatronics Technologist will :

1) Confirm data analysis according to required format
2) Manage marine vessel mechatronics maintenance
3) Plan transport automation safety design
4) Design marine vessel mechatronics technical drawing
5) Approve transport automation quality control activities
6) Organise automation equipment installation & commissioning
7) Verify supervisory activities
8) Manage client,supplier, & contractor liaison
9) Implement marine vessel mechatronics integration
10) Conduct product development for marine vessel automation
11) Assist in transport automation product innovation
12) Conduct marine vessel automation system design
13) Implement section budget
14) Verify transport automation technical documentation

LEVEL 6
AEROSPACE MECHATRONICS TECHNOLOGIST

AN AEROSPACE MECHATRONICS TECHNOLOGIST IS DESIGNATED TO PLAN TRANSPORT AUTOMATION SAFETY DESIGN, DESIGN AEROSPACE MECHATRONICS TECHNICAL DRAWING, IMPLEMENT AEROSPACE MECHATRONICS INTEGRATION, CONDUCT PRODUCT DEVELOPMENT FOR AEROSPACE AUTOMATION AND AEROSPACE AUTOMATION SYSTEM DESIGN AND PERFORM MANAGERIAL DUTIES.

An Aerospace Mechatronics Technologist will :

1) Confirm data analysis according to required format
2) Manage aerospace mechatronics maintenance
3) Plan transport automation safety design
4) Design aerospace mechatronics technical drawing
5) Approve transport automation quality control activities
6) Organise automation equipment installation & commissioning
7) Verify supervisory activities
8) Manage client,supplier, & contractor liaison
9) Implement aerospace mechatronics integration
10) Conduct product development for aerospace automation
11) Assist in transport automation product innovation
12) Conduct aerospace automation system design
13) Implement section budget
14) Verify transport automation technical documentation

LEVEL 6
LOCOMOTIVE MECHATRONICS TECHNOLOGIST

A LOCOMOTIVE MECHATRONICS TECHNOLOGIST IS DESIGNATED TO PLAN TRANSPORT AUTOMATION SAFETY DESIGN, DESIGN LOCOMOTIVE MECHATRONICS TECHNICAL DRAWING, IMPLEMENT LOCOMOTIVE MECHATRONICS INTEGRATION, CONDUCT PRODUCT DEVELOPMENT FOR LOCOMOTIVE AUTOMATION AND LOCOMOTIVE AUTOMATION SYSTEM DESIGN AND PERFORM MANAGERIAL DUTIES.

A Locomotive Mechatronics Technologist will :

1) Confirm data analysis according to required format
2) Manage locomotive mechatronics maintenance
3) Plan transport automation safety design
4) Design locomotive mechatronics technical drawing
5) Approve transport automation quality control activities
6) Organise automation equipment installation & commissioning
7) Verify supervisory activities
8) Manage client,supplier, & contractor liaison
9) Implement locomotive mechatronics integration
10) Conduct product development for locomotive automation
11) Assist in transport automation product innovation
12) Conduct locomotive automation system design
13) Implement section budget
14) Verify transport automation technical documentation

LEVEL 7
AUTOMOTIVE MECHATRONICS SENIOR TECHNOLOGIST

AN AUTOMOTIVE MECHATRONICS SENIOR TECHNOLOGIST IS DESIGNATED TO PLAN DATA ANALYSIS FORMAT REQUIREMENTS, ANALYSE AUTOMOTIVE MECHATRONICS MAINTENANCE, TRANSPORT AUTOMATION SAFETY DESIGN AND TRANSPORT AUTOMATION TECHNICAL DOCUMENTATION, PLAN PRODUCT DEVELOPMENT FOR AUTOMOTIVE AUTOMATION, DEVELOP TRANSPORT AUTOMATION PRODUCT INNOVATION AND ORGANISE MANAGERIAL ACTIVITIES .

An Automotive Mechatronics Senior Technologist will :

1) Plan data analysis format requirements
2) Analyse automotive mechatronics maintenance
3) Analyse transport automation safety design
4) Verify transport automation quality control activities
5) Verify automation equipment installation & commissioning
6) Organise managerial activities
7) Plan client,supplier, & contractor liaison
8) Verify automotive mechatronics integration
9) Plan product development for automotive automation
10) Develop transport automation product innovation
11) Verify automotive automation system design
12) Verify division budget
13) Analyse transport automation technical documentation

LEVEL 7
MARINE VESSEL MECHATRONICS SENIOR TECHNOLOGIST

A MARINE VESSEL MECHATRONICS SENIOR TECHNOLOGIST IS DESIGNATED TO PLAN DATA ANALYSIS FORMAT REQUIREMENTS, ANALYSE MARINE VESSEL MECHATRONICS MAINTENANCE, TRANSPORT AUTOMATION TECHNICAL DOCUMENTATION AND TRANSPORT AUTOMATION SAFETY DESIGN, PLAN PRODUCT DEVELOPMENT FOR MARINE VESSEL AUTOMATION, DEVELOP TRANSPORT AUTOMATION PRODUCT INNOVATION AND ORGANISE MANAGERIAL ACTIVITIES .

A Marine Vessel Mechatronics Senior Technologist will :

1) Plan data analysis format requirements
2) Analyse marine vessel mechatronics maintenance
3) Analyse transport automation safety design
4) Verify transport automation quality control activities
5) Verify automation equipment installation & commissioning
6) Organise managerial activities
7) Plan client,supplier, & contractor liaison
8) Verify marine vessel mechatronics integration
9) Plan product development for marine vessel automation
10) Develop transport automation product innovation
11) Verify marine vessel automation system design
12) Verify division budget
13) Analyse transport automation technical documentation

LEVEL 7
AEROSPACE MECHATRONICS SENIOR TECHNOLOGIST

AN AEROSPACE MECHATRONICS SENIOR TECHNOLOGIST IS DESIGNATED TO PLAN DATA ANALYSIS FORMAT REQUIREMENTS, ANALYSE AEROSPACE MECHATRONICS MAINTENANCE, TRANSPORT AUTOMATION TECHNICAL DOCUMENTATION AND TRANSPORT AUTOMATION SAFETY DESIGN, PLAN PRODUCT DEVELOPMENT FOR AEROSPACE AUTOMATION, DEVELOP TRANSPORT AUTOMATION PRODUCT INNOVATION AND ORGANISE MANAGERIAL ACTIVITIES .

An Aerospace Mechatronics Senior Technologist will :

1) Plan data analysis format requirements
2) Analyse aerospace mechatronics maintenance
3) Analyse transport automation safety design
4) Verify transport automation quality control activities
5) Verify automation equipment installation & commissioning
6) Organise managerial activities
7) Plan client,supplier, & contractor liaison
8) Verify aerospace mechatronics integration
9) Plan product development for aerospace automation
10) Develop transport automation product innovation
11) Verify aerospace automation system design
12) Verify division budget
13) Analyse transport automation technical documentation.

LEVEL 7
LOCOMOTIVE MECHATRONICS SENIOR TECHNOLOGIST

A LOCOMOTIVE MECHATRONICS SENIOR TECHNOLOGIST IS DESIGNATED TO PLAN DATA ANALYSIS FORMAT REQUIREMENTS, ANALYSE LOCOMOTIVE MECHATRONICS MAINTENANCE, TRANSPORT AUTOMATION SAFETY DESIGN AND TRANSPORT AUTOMATION TECHNICAL DOCUMENTATION , PLAN PRODUCT DEVELOPMENT FOR LOCOMOTIVE AUTOMATION, DEVELOP TRANSPORT AUTOMATION PRODUCT INNOVATION AND ORGANISE MANAGERIAL ACTIVITIES .

A Locomotive Mechatronics Senior Technologist will :

1) Plan data analysis format requirements
2) Analyse locomotive mechatronics maintenance
3) Analyse transport automation safety design
4) Verify transport automation quality control activities
5) Verify automation equipment installation & commissioning
6) Organise managerial activities
7) Plan client,supplier, & contractor liaison
8) Verify locomotive mechatronics integration
9) Plan product development for locomotive automation
10) Develop transport automation product innovation
11) Verify locomotive automation system design
12) Verify division budget
13) Analyse transport automation technical documentation.

LEVEL 8
AUTOMOTIVE MECHATRONICS SPECIALIST

AN AUTOMOTIVE MECHATRONICS SPECIALIST IS DESIGNATED TO DESIGN DATA ANALYSIS FORMAT, STRATEGISE TRANSPORT AUTOMATION SAFETY DESIGN , PRODUCT DEVELOPMENT FOR AUTOMOTIVE AUTOMATION, TRANSPORT AUTOMATION QUALITY CONTROL ACTIVITIES, CONDUCT CLIENT,SUPPLIER, & CONTRACTOR LIAISON, LEAD AUTOMOTIVE MECHATRONICS INTEGRATION, RESEARCH TRANSPORT AUTOMATION PRODUCT INNOVATION AND PLAN MANAGERIAL ACTIVITIES .

An Automotive Mechatronics Specialist will :

1) Design data analysis format
2) Plan automotive mechatronics maintenance
3) Strategise transport automation safety design
4) Strategise transport automation quality control activities
5) Plan automation equipment installation & commissioning
6) Plan managerial activities
7) Conduct client,supplier, & contractor liaison
8) Lead automotive mechatronics integration
9) Strategise product development for automotive automation
10) Research transport automation product innovation
11) Research & develop automotive automation system design
12) Plan division budget
13) Plan transport automation technical documentation.

LEVEL 8
MARINE VESSEL MECHATRONICS SPECIALIST

A MARINE VESSEL MECHATRONICS SPECIALIST IS DESIGNATED TO DESIGN DATA ANALYSIS FORMAT, STRATEGISE TRANSPORT AUTOMATION SAFETY DESIGN, PRODUCT DEVELOPMENT FOR MARINE VESSEL AUTOMATION AND TRANSPORT AUTOMATION QUALITY CONTROL ACTIVITIES, RESEARCH TRANSPORT AUTOMATION PRODUCT INNOVATION, LEAD MARINE VESSEL MECHATRONICS INTEGRATION AND PLAN MANAGERIAL ACTIVITIES .

A Marine Vessel Mechatronics Specialist will :

1) Design data analysis format
2) Plan marine vessel mechatronics maintenance
3) Strategise transport automation safety design
4) Strategise transport automation quality control activities
5) Plan automation equipment installation & commissioning
6) Plan managerial activities
7) Conduct client,supplier, & contractor liaison
8) Lead marine vessel mechatronics integration
9) Strategise product development for marine vessel automation
10) Research transport automation product innovation
11) Research & develop marine vessel automation system design
12) Plan division budget
13) Plan transport automation technical documentation

LEVEL 8
AEROSPACE MECHATRONICS SPECIALIST

AN AEROSPACE MECHATRONICS SPECIALIST IS DESIGNATED TO DESIGN DATA ANALYSIS FORMAT, PLAN AEROSPACE MECHATRONICS MAINTENANCE,STRATEGISE TRANSPORT AUTOMATION SAFETY DESIGN, PRODUCT DEVELOPMENT FOR AEROSPACE AUTOMATION AND TRANSPORT AUTOMATION QUALITY CONTROL ACTIVITIES, LEAD AEROSPACE MECHATRONICS INTEGRATION, RESEARCH TRANSPORT AUTOMATION PRODUCT INNOVATION, RESEARCH & DEVELOP AEROSPACE AUTOMATION SYSTEM DESIGN AND PLAN MANAGERIAL ACTIVITIES .

An Aerospace Mechatronics Specialist will :

1) Design data analysis format
2) Plan aerospace mechatronics maintenance
3) Strategise transport automation safety design
4) Strategise transport automation quality control activities
5) Plan automation equipment installation & commissioning
6) Plan managerial activities
7) Conduct client,supplier, & contractor liaison
8) Lead aerospace mechatronics integration
9) Strategise product development for aerospace automation
10) Research transport automation product innovation
11) Research & develop aerospace automation system design
12) Plan division budget
13) Plan transport automation technical documentation.

LEVEL 8
LOCOMOTIVE MECHATRONICS SPECIALIST

A LOCOMOTIVE MECHATRONICS SPECIALIST IS DESIGNATED TO DESIGN DATA ANALYSIS FORMAT, STRATEGISE TRANSPORT AUTOMATION SAFETY DESIGN, PRODUCT DEVELOPMENT FOR LOCOMOTIVE AUTOMATION AND TRANSPORT AUTOMATION QUALITY CONTROL ACTIVITIES, LEAD LOCOMOTIVE MECHATRONICS INTEGRATION, RESEARCH TRANSPORT AUTOMATION PRODUCT INNOVATION, RESEARCH & DEVELOP LOCOMOTIVE AUTOMATION SYSTEM DESIGN AND PLAN MANAGERIAL ACTIVITIES .

A Locomotive Mechatronics Specialist will :

1) Design data analysis format
2) Plan locomotive maintenance
3) Strategise transport automation safety design
4) Strategise transport automation quality control activities
5) Plan automation equipment installation & commissioning
6) Plan managerial activities
7) Conduct client,supplier, & contractor liaison
8) Lead locomotive mechatronics integration
9) Strategise product development for locomotive automation
10) Research transport automation product innovation
11) Research & develop locomotive automation system design
12) Plan division budget
13) Plan transport automation technical documentation