STANDARD KEMAHIRAN PEKERJAAN KEBANGSAAN (NATIONAL OCCUPATIONAL SKILLS STANDARD)

STANDARD PRACTICE & STANDARD CONTENTS FOR

INDUSTRIAL PRODUCT DEVELOPMENT LEVEL 3

JPK

Jabatan Pembangunan Kemahiran
Kementerian Sumber Manusia, Malaysia

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STANDARD PRACTICE
NATIONAL OCCUPATIONAL SKILLS STANDARD (NOSS)
FOR;
INDUSTRIAL PRODUCT DEVELOPMENT
LEVEL 3

1. INTRODUCTION

The industrial product must satisfy a real need of the utilization and be distributed on a market that evolves increasingly and rapidly under the pressure of the competition and for the appearance of new technologies. Generically, the process of design and development of a product goes from the generation of the idea or of the detection of the commercial opportunity, up to the manufacture, test and monitoring of the prototype or the first-article (experimental products).

Today, changes to the emphasis of physical products are coupled with tremendous competition from a saturated industry, as well as other trends like the dominance of software that allow non-trained designers to create products. Industrial Product Design gives a perspective about product design, graphic design, art, drawing, prototyping, marketing and business law.

Prototyping is the design verification phase of product development used to demonstrate or prove aspects of a design. Prototyping is simply taking the design from a virtual, imaginary realm into the physical world. Prototypes or models have numerous uses. They make excellent visual aids for communicating ideas with co-workers or customers. Prototype Development focuses on constructing full-size and scale precision models of products. Mock up is easily build and altered to suit the early product development requirements. Prototype or mock-up is used by designers mainly to acquire feedback about designs and design ideas early in design process.

Physical model or proof-of-concept prototypes support evaluation by demonstrating the behaviour for comparison with the functional requirement. In addition, prototypes can be used for design testing. For example, an aerospace engineer might mount a model aerofoil in a wind tunnel to measure lift and drag forces. Designers have always utilized prototypes in their product design and development.

This is a NOSS developed for the Industrial Product Development under the Industrial Mechanical sub sector of the Machinery and Equipment Industry. The demand for qualified and experienced Industrial Product Development personnel is high at the moment and may increase in the near future. Therefore, the development of this NOSS is based on existing NOSS H-312-23 Industrial Product Design Technician and Senior Technician Level 2 and 3 respectively. This is essential for the industry because it provides certain guidelines and standards based on the level of competencies that have been set by the industrial experts in this field.

Based on the development findings, it was decided that the entry level for Industrial Product Development personnel career is at Level 3. The justification is based on the nature of work that requires competency in performing a broad range of varied work activities, performed in a variety of contexts, most of which are complex and non-routine. In addition, based on certain work requirement, the personnel at Level 3 shall be able to undertake the duties of personnel at Level 2. There is considerable responsibility and autonomy and control or guidance of others is often required.

Based on the existing Occupational Analysis Structure (refer to Figure 1.1), Industrial Product consists of Industrial Product Design Senior Technician and Industrial Product Design Technician at Level 2 and Level 3 respectively. It was then decided that these two job areas should be combined and renamed as Industrial Product Development (Level 3). Consequently, the development of this NOSS at Level 3 (refer to Figure 1.2) is essential so that the sub sector will have a complete set of standards and guidelines to be used by the industry.

The first stage of the NOSS development is to identify the individual Competency Unit (CU) for Industrial Product Development Level 3. The CU can be defined as a meaningful unit of work, which contains several activities to complete a work cycle objectively and the CU must be independent (stand-alone). Core CU are the competencies that are common/generic to the job according to the industry. Elective CUs are the competencies that are required for a specific industry/sub sector.

The second stage of NOSS development is to develop the Competency Profile (CP). The CP is the summary and analysis of all the CU that have been identified in the first stage of the development. Each CU will be analysed in order to determine the work activity involved. The performance criteria for each activity will also be determined.

The final stage of the NOSS development is to develop the Curriculum of Competency Unit (CoCU). This will be done based on the information from the developed CP. After the final stages of NOSS development, a complete final draft will be presented to *Jawatankuasa Teknikal Penilaian Standard* (JPTS) which is made up of experienced industrial experts for validation purposes. Later, this validated document will be submitted to *Majlis Pembangunan Kemahiran Kebangsaan* (MPKK) for approval and endorsement.

This NOSS provides first-hand information for the workers regarding the Machinery and Equipment Industry's working environment. This NOSS also provides a career path and employment development for those involved in this industry.

Pre-requisites

Based on the industry experts' findings, it was decided that the minimum requirement for those interested to enrol in this course are as follows:

- Medically and physically fit to meet the high demands of this particular job scope
- Pass in *Bahasa Malaysia* or English Sijil Pelajaran Malaysia (SPM) in order to communicate with clients and understand their requirements and needs, with the final outcome of delivering the most positive and satisfactory performance
- SKM Level 2 Industrial Product Design

2. OCCUPATIONAL STRUCTURE (OS)

Existing Occupational Structure

SECTOR	MACHINERY & EQUPMENT			
SUB SECTOR	INDUSTRIAL MECHANICAL			
JOB AREA	Industrial Quality Assurance	Industrial Product	Material Handling Equipment-Internal Combustion Engine Truck	Material Handling Equipment-Operations Personnel
LEVEL 5	Industrial Quality Assurance	Industrial Product Designer	Not Available	
LEVEL 4	Industrial Quality Assurance	Assistant Industrial Product Designer	Not Available	
LEVEL 3	Industrial Quality Assurance (Manufacturing)	Industrial Product Design Senior Technician	Maintenance Supervisor (MHE ICT)	Supervisor (MHE)
LEVEL 2	Industrial Quality Control	Industrial Product Design Technician	Maintenance Technician (MHE ICT)	Operator (MHE)
LEVEL 1	No Level		Junior Maintenance Technician (MHE ICT)	No Level

Figure 1.1: Occupational Structure for Industrial Mechanical Sub sector of Machinery and Equipment in Malaysia

Proposed Occupational Area Structure (OAS)

SECTOR	MACHINERY & EQUPMENT
SUB SECTOR	**INDUSTRIAL MECHANICAL**
LEVEL\JOB AREA	INDUSTRIAL PRODUCT
LEVEL 5	Industrial Product Design, Development & Management
LEVEL 4	Industrial Product Design & Development
LEVEL 3	Industrial Product Development
LEVEL 2	Embedded to L3
LEVEL 1	No Level

Figure 1.2: Occupational Area Structure for Industrial Mechanical Sub sector of Machinery and Equipment in Malaysia

3. DEFINITION OF COMPETENCY LEVELS

The NOSS is developed for various occupational areas. Candidates for certification must be assessed and trained at certain levels to substantiate competencies. Below is a guideline of each NOSS Level as defined by the Department of Skills Development, Ministry of Human Resources, Malaysia.

Malaysia Skills Certificate Level 1:	Competent in performing a range of varied (Operation and Production Level) work activities, most of which are routine and predictable.
Malaysia Skills Certificate Level 2:	Competent in performing a significant range of varied (Operation and Production Level) work activities, performed in a variety of contexts. Some of the activities are non-routine and require individual responsibility and autonomy.
Malaysia Skills Certificate Level 3:	Competent in performing a broad range of varied (Supervisory Level) 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.
Malaysia Skills Diploma Level 4:	Competent in performing a broad range of (Executive Level) 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.
Malaysia Skills Advanced Diploma Level 5:	Competent in applying a significant range of (Managerial Level) (Managerial Level) 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.

4. MALAYSIAN SKILLS CERTIFICATION

Candidates, after being assessed verified as having fulfilled the Malaysian Skills Certification requirements, shall be awarded with *Sijil Kemahiran Malaysia* (SKM) for Level 3. All candidates are also recommended to undergo on job training to attain knowledge and skills in the Industrial Product Development field of work.

Assessment must be in accordance with the following:

This NOSS outlines the Competency Unit (CU) in the Industrial Product Development working environment as required by the industry and has been developed and documented following extensive collaboration across key Malaysian organisations. To meet the requirements of this industry, it is imperative that the CUs outlined follow a high standard and consistency throughout the assessment process. This can only be done by stipulating a precise framework in which the assessment of they must be conducted. The training and assessment of an Industrial Product Development practitioner must be deployed in accordance with JPK policy and standard as follows:

a) The final assessment of competence must include the combination of documented continuous assessment conducted by the facilitator during training and the results of post-training examination;
b) The post-training examination must be practical in nature and involve demonstration and application of the CU utilising real equipment and real-world examples;
c) The CU as outlined in this NOSS must be assessed throughout the training programme and during a post-training examination;
d) The learning environment and facilities need to be in accordance with the requirements of the industries;
e) The development and assessment of the CU must demonstrate that they develop transferable skills;
f) The development and assessment of the CU must include documentation by candidates both during training and examination; and
g) All training and assessment materials must be mapped and verified to be in accordance with the NOSS Industrial Product Development by a panel of industry subject matter experts appointed by JPK.

5. JOB COMPETENCIES

Industrial Product Development (Level 3) personnel are competent in performing:-

- Component Drawing Development
- Prototype Part Fabrication
- Product Development Quality Control
- Prototype Testing and Evaluation
- Product Data Management and Communication
- Industrial Product Development Supervision

6. WORKING CONDITIONS

Generally they work within normal working hours from morning to evening depending on the organisation's nature of business. They may be required to work extra hours to fulfil internal and external requirements. In Industrial Product Development industry, they may be needed to work extra hours to accommodate work requirements. They need to use/wear appropriate attire during the commencement of their jobs. They may work individually or in a modular group in a conducive and ventilated environment.

7. EMPLOYMENT PROSPECTS

There are excellent prospects in the private sector due to a shortage of hands-on experts in the Industrial Product Development area. The same is also true in the public sector where this area seems to be currently experiencing a lack of professionals and well-experienced personnel. This area, however, has a very good job market potential abroad for skilled personnel due to a shortage of such highly skilled experts in this region.

Other related occupations with respect to employment opportunities are:

- Model Maker
- Prototype Technician
- Industrial Product Design Technician
- Senior Mechanical Drafter
- Fabricator
- Assembler

Other related industries with respect to employment opportunities are:

- Research and Development
- Manufacturing
- Furniture
- Design House/Studio
- Technical Training Institution

8. TRAINING, INDUSTRIAL RECOGNITIONS, OTHER QUALIFICATIONS AND ADVANCEMENTS

As for career advancement, most competent Industrial Product Development personnel develop their competency through real-world on-the-job situations. Trainees begin by observing and assisting experienced workers, sometimes in formal training programmes. They then advance to the more difficult tasks performed by experienced workers such as designing industrial product.

9. SOURCES OF ADDITIONAL INFORMATION

- MALAYSIA DESIGN DEVELOPMENT CENTRE
  No. 22, Jalan Kia Peng
  50450 Kuala Lumpur
  Tel: 603-2161 9002
  Fax: 603-2161 9003
  Website: www.ddec.my

- MAJLIS REKABENTUK MALAYSIA
  Level 11th & 12th (West Wing)
  Menara MATRADE
  Jalan Khidmat Usaha Off Jalan Duta
  50480 Kuala Lumpur
  Tel: 603-6203 0030
  Fax: 603-6203 0093
  Email: info@mrm.gov.my

- FEDERATION OF MALAYSIANS MANUFACTURERS
  Wisma FMM
  No. 3 Persiaran Dagang
  PJU 9, Bandar Sri Damansara,
  52200 Kuala Lumpur
  Tel: 603-6286 7200
  Fax: 603-6274 1266
  Email: webmaster@fmm.org.my

- PERUSAHAAN OTOMOBIL NASIONAL SDN. BHD. (PROTON)
  HICOM Industrial Estate
  Batu 3, P.O.Box 7100
  40918 Shah Alam, Selangor
  Tel: 603-5191 1055
  Website: www.proton.com.my

10. ACKNOWLEDGEMENT

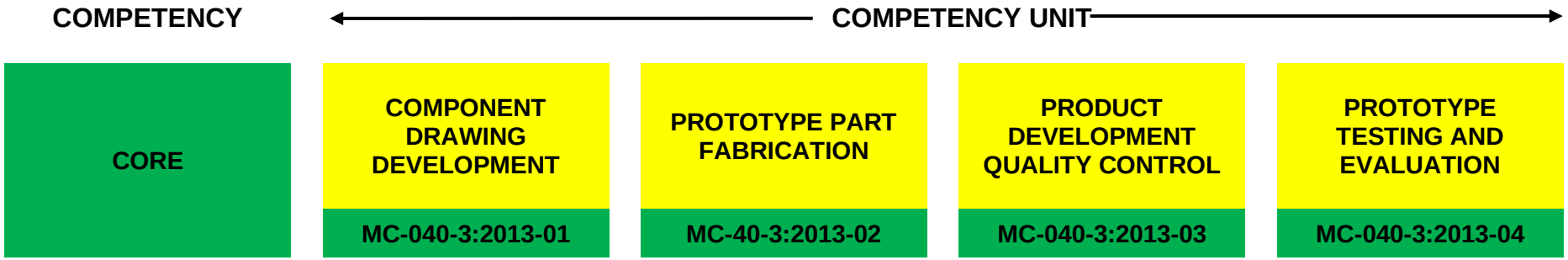
The Director General of the Department of Skills Development (DSD) would like to extend his gratitude to the organisations and individuals who have been involved in developing this standard.

11. COMMITTEE MEMBERS FOR THE DEVELOPMENT OF STANDARD PRACTICE (SP), COMPETENCY PROFILE CHART (CPC), COMPETENCY PROFILE (CP) AND CURRICULUM of COMPETENCY UNIT (CoCU)

PANEL EXPERTS		
1.	Muhammad Hazlee Bin Mohd Ali	Executive Designer Humee Furniture
2.	Mohamad Hanafee Bin Mohamad Isa	Engineer Designer Proton
3.	Mohd Azuhari Bin Ahmad Nazir	Engineer Designer Proton
4.	Mohd Faiz Bin Amri	Engineer Designer Proton
5.	Noor Hafisah Binti Hafizuddin	Engineer Designer Proton
6.	Mohamad Haizrul Bin Zainal Abidin	Engineer Mechmar
7.	Zalaludin Bin Slamat	Senior Manager Sapura Technical Centre
8.	Mohamad Hariri Abdullah	Director National Design Centre
FACILITATOR		
9.	Mohd Razali Bin Md Yunos	Adimega
DOCUMENTOR		
10.	Khairul Alia Binti Mohd Kharuddin	Adimega
11.	Khairani Binti Mokhtar	Adimega

COMPETENCY PROFILE CHART (CPC)

SECTOR	MACHINERY AND EQUIPMENT		
SUB SECTOR	INDUSTRIAL MECHANICAL		
JOB AREA	INDUSTRIAL PRODUCT		
NOSS TITLE	INDUSTRIAL PRODUCT DEVELOPMENT		
JOB LEVEL	THREE (3)	JOB AREA CODE	MC-040-3:2013



COMPETENCY PROFILE (CP)

Sub Sector	**INDUSTRIAL MECHANICAL**
Job Area	**INDUSTRIAL PRODUCT**
NOSS Title	**INDUSTRIAL PRODUCT DEVELOPMENT**
Level	**THREE (3)**

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
1. Component Drawing Development	*MC-040-3:2013-01*	Component Drawing Development is focusing in drafting or drawing. It is a discipline of creating plans/drawing that visually communicate how the function and form of any part and how it has to be constructed. Component Drawing Development uses technical standards that enable designer/drafter to communicate more concisely by using understood convention. The representation helps to ensure that the drawing is unambiguous and relatively easy to interpret. The person who is competent in Component Drawing Development shall be able to check component drawing development requirement, prepare design tools, setup drawing format, produce part drawing, produce assembly / installation drawing, produce 3D model and prepare component drawing.	1. Check component drawing development requirement 2. Prepare design tools 3. Setup drawing format	1.1 Drawing development requirement interpreted based on work instruction 1.2 Prototype geometrical, dimensional and tolerance determined as per component specification. 2.1 Design software and Design hardware (workstation, etc.) selected according to job requirement. 2.2 Measuring instrument determined (such as, Vernier Calliper, ruler, scale ruler, etc). 2.3 Paper size determined (A4, A3, A2, etc.) according to drawing standard. 3.1 Drawing format such as title block, drawing scale, dimensions, orthographic projection view and part tolerance determined in accordance to project

		The outcome of this competency is to ensure the form and dimension of intended part is correctly interpreted, translated and drawn into required drawing format such as manual drawing and using computer aided design software.		requirement. 3.2 Part size and dimensions 3.3 Drawing revisions selected
			4. Produce part drawing	4.1 Product parts function and fitting, Cross sectional drawing Perspective drawing produced 4.2 Parts numbering, Bills of materials determined according to drawing standard 4.3 Reference drawing listed
			5. Produce assembly / installation drawing	5.1 Assembly instruction such as various parts relationship, assembly sequence manual, installation remark/note indicated as per installation requirement. 5.2 Testing requirement indicated
			6. Produce 3D Model	6.1 Modeling technique identified in accordance to job requirement 6.2 Modeling technique selected 6.3 3D CAD drawing converted to 2D CAD model according to machine compatible format
			7. Prepare component drawing	7.1 Drawing printed out 7.2 Compare drawing with work instruction/requirements performed 7.3 Drawing evaluation status

				compiled in accordance to company Standard Operating Procedure.
3 Prototype Part Fabrication	*MC-040-3:2013-02*	The Prototype Part Fabrication is the competency in constructing full-size and scale precision models of products. Prototype is used by designers mainly to acquire feedback about designs and design ideas early in design process. Prototype is easily build and altered to suit the early product development requirements. The person who is competent in Prototype Part Fabrication shall be able to interpret prototype drawing, prepare prototype fabrication resources, carry out prototype fabrication, process, assemble prototype sample, carry out finishing process, inspect prototype sample, retrofit part process and update prototype fabrication status The outcome of this competency is to ensure Prototype is fabricated correctly and accurately according to design specifications and requirements.	1. Interpret prototype drawing 2. Prepare prototype fabrication resources 3. Carry out prototype fabrication process	1.1 Geometrical, dimensional and tolerance determined according to prototype drawing 1.2 Prototype methodology (manual / equipment) confirmed as per design specification. 2.1 Prototype material such as adhesive resin modeller, X-soluble support, solvent identified according to project requirement. 2.2 Prototype equipment / tool such as rapid prototyping machines, profile cutter selected 2.3 Prototype fabrication materials obtained as per Bill of Materials 3.1 Set up machining program / setting as per part drawing 3.2 Cutting line and dimension confirmed according to full size scale 3.4 Material cut according to dimension (cut to size) 3.5 Parts of the prototype joined using adhesive material 3.7 Surface profile trimmed 3.8 Surface protection applied

				on the prototype
			4. Assemble prototype sample	4.1 Detailed assembly interpreted as per schematics and blueprints 4.2 Hand tools or machines to assemble parts applied
			5. Carry out finishing process	5.1 Surface finishing work (sand paper) applied in accordance to Safety, Health and Environmental Standard 5.2 Powder-based RP product in oven heated up 5.3 Product blasted/cleaned using air gun` 5.4 Product/Prototype painted
			6. Inspect prototype sample	6.1 Profile / contour measurement, surface finish, geometrical dimension checked as per master drawing.
			7. Retrofit part process	7.1 Improvement for retrofit identified 7.2 New or updated parts fitted to old or outdated assemblies
			8. Update prototype fabrication status	8.1 Progress report submitted to superior through 8.2 Complete prototype stored 8.3 Work instruction report completed as per company Standard Operating

				Procedure
3 Product Development Quality Control	*MC-040-3:2013-03*	Product Development Quality Control is the competency in performing products and materials examination for defects or deviations from manufacturers' or industry specifications. The definition of quality encompasses both products and processes. In a specific sense, a quality product satisfies a need and functions properly. In a broader sense, quality processes ensure that these products are made without defects in a cost-effective manner. Quality control processes rely on a number of tools. The inspections results are recorded when defect are found. It helps to analyse and correct the production problems. The person who is competent in Product Development Quality Control shall be able to apply measuring tools, collect inspection data, analyse inspection and control data as well as to produce QC report. The outcome of this competency is to ensure mock up is fabricated correctly and accurately according to design specifications and requirements by using rapid prototyping machine/equipment.	1. Apply measuring tools 2. Collect inspection data 3. Check inspection and control data 4. Produce QC report	1.1 Approved drawing identified 1.2 Measuring tool identified according to tolerance requirement / shape / profile of parts 1.3 Measuring equipment operated and tool handled according to Standard Operating Procedure 2.1 Part dimensions measured and recorded in according to job requirement 2.2 Measurement data tabulated 3.1 Chart, graphs such as Cp/Cpk produced 3.2 Actual data and drawing compared 3.3 Data findings concluded 4.1 QC check sheet completed 4.2 Check sheet compiled 4.3 Report to superior for approval submitted

4 Prototype Testing and Evaluation	*MC-040-3:2013-04*	The Prototype Testing and Evaluation is the competency in performing series of test to evaluate the properties and ability of a mock up. The testing of a part to ensure that it meets its design specifications. Prototype testing can be a very critical stage of product development as it ensures that everything works as it should be. Any safety concern or risk from using the product (prototype) can be avoided and help the designer to make required modification. The person who is competent in Prototype testing and evaluation shall be able to identify the work instruction, carry out part testing, check testing data and update testing status. The outcome of this competency is to ensure Prototype is fabricated correctly and accurately according to design specifications and requirements by passing all required testing and evaluation procedure.	1. Carry out part testing 2. Check testing data 3. Update testing status	1.1 Testing / experiment methodology determined as per testing standard 1.2 Mechanical properties, chemical moisture content, composition analysis materials evaluated in accordance with Material Specification Data Sheet. 1.3 Durability, surface finishing such as hardness, roughness, thickness, appearance, endurance (salt spray test) in accordance with manufacturer specification measured. 1.4 Assembly fitting such as tolerance fitting, dimension accuracy, functional measured. 2.1 Prototype testing data analysis such as charts, graphs produced 2.2 Actual data compared as per master drawing 2.4 Test findings concluded in accordance with manufacturer specification. 3.1 Testing report prepared and notified to superior for verification 3.2 Report compiled into project file.

5. Product Data Management and Communication -	*MC-040-3:2013-05*	The Product Data Management and Communication is the competency in managing design data. Data is instantly available to all with access. There is no waiting for paper documents to be distributed nor time wasted while documents sit in an in-basket waiting for review. Time spent searching for component and product data is reduced. Collaboration features also speed and improve the process. One can manage configurations and assures that everyone is working from the most current data; it avoids problems of working with old data. Access control features assure that only authorized parties can access or change proprietary information. Control over engineering changes is improved with less manual effort. The person who is competent in product data management and communication shall be able to identify job requirements, manage drawing data, prepare project documents, coordinate internal / external discussion and conduct product/Prototype presentation and Prepare post meeting/ discussion report The outcome of this competency is to ensure product data are	1. Manage drawing data 2. Prepare project documents 3. Coordinate Internal / External discussion	1.1 Existing references referred 1.2 References number or name determined based on projects / parts 1.3 Drawing for document control purpose stamped / labelled 1.4 Drawing data stored in hardcopy & softcopy format retrieved according to project requirement 1.5 Drawing master list updated as per data management system requirement 2.1 Project requirement and existing facilities compared to master schedule 2.4 Testing/fabrication method proposed 2.5 Prototyping budget proposed to superior 2.6 Suppliers/vendors to outsource identified 3.1 Discussion information such as memo, meeting agenda, minutes of meeting to attendees issued to related departments as per company Standard Operating Procedure 3.3 Meeting/discussion venues prepared 3.5 Internal/external discussion participated

		managed appropriately and any critical decision and changes are communicated using proper channel.	4. Conduct product/Prototype presentation	4.1 Presentation materials prepared to according to format and audience 4.2 Sample demonstrated to the attendees 4.3 Presentation skills applied 4.4 Presentation etiquettes complied
			5. Prepare post meeting/ discussion report	5.1 Minutes of meeting to attendees issued 5.2 Updates to related departments distributed 5.3 Internal/external meeting/discussions compiled
6. Industrial Product Development Supervision	*MC-040-3:2013-06*	Industrial Product Development Supervision describes the competency in administrating subordinates in the same section / unit of the supervisor. He or she is the person who involve in acting as a middle man between the executives and the clerks to perform the operational activities in accordance to company rules and regulations. The person who is competent in this CU shall be able to identify work schedule operational activities requirement, plan work schedule operational activities, assign job / work to subordinates, evaluate subordinate work	1. Identify work schedule operational activities requirement	1.1 Subordinate administration activities workflow determined according to establishment's standard operating procedure
			2. Plan work schedule operational activities	2.1 Work schedule, subordinate performance report and subordinate record format confirmed according to company's standard operating procedure 2.2 Subordinate welfare program determined according to establishment's standard operating procedure
			3. Assign job / work to subordinates	3.1 Work schedule prepared according to job requirement

		performance, coordinate subordinate welfare program and update subordinate administration activities report. The outcome of this competency is to ensure the operational activities implemented as per job requirements and at the same time the schedule, work performance as well as welfare of the subordinates are monitored and taken care of.		3.2 Subordinates assigned to work according to work plan
			4. Evaluate subordinate work performance	4.1 Actual subordinate performance identified and acknowledged according to company Standard Operating Procedure 4.3 Improvement recommended in accordance with human resource guideline 4.4 Effectiveness of work schedule assessed in accordance with human resource guideline 4.5 Subordinate performance gap assessed in accordance with human resource guideline
			5. Coordinate subordinate welfare program	5.1 Subordinates welfare needs identified 5.2 Subordinate welfare program coordinated based on schedule
			6. Update subordinate operational activities report	6.1 Subordinate activities reported as per company's standard operating procedure 6.1 Subordinate activities reported as per company's standard operating procedure 6.2 Subordinates report compiled in personal file

CURRICULUM of COMPETENCY UNIT (CoCU)

Sub Sector	**INDUSTRIAL MECHANICAL**						
Job Area	**INDUSTRIAL PRODUCT**						
Competency Unit Title	**COMPONENT DRAWING DEVELOPMENT**						
Learning Outcome	The person who is competent in this CU shall be able to ensure the form and dimension of intended part is correctly interpreted, translated and drawn into required drawing format such as manual drawing and using computer aided design software. Upon completion of this competency unit, trainees will be able to: • Check component drawing development requirement • Prepare design tools • Setup drawing format • Produce part drawing • Produce assembly / installation drawing • Produce 3D Model • Prepare component drawing						
Competency Unit ID	MC-040-3:2013-01	**Level**	3	**Training Duration**	400	**Credit Hours**	40

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Check component drawing development requirement	i. Definition of job order ii. Job order information • Product name • Production target • Schedule • Quality standard iii. Definition of work instruction iv. Work instruction information • Process flow • Tools • Machine • Material			7	Lecture	i. Job order requirement listed out ii. Document format described iii. Drawing information explained

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Man power • Safety guidelines v. Types of document format • Soft/hard copy • draft drawing • Sketches • physical product vi. General drawing information • dimension • tolerance • scale • symbol • unit of measurement • projection type					
		iv. Identify job order v. Identify work instruction information vi. Determine document format vii. Determine drawing information	*Attitude:* i. Knowledgeable in dealing with important information	16	Demonstration & Observation	
2. Prepare design tools	i. Definition of drawing tools ii. Function of drawing tools			10	Lecture	i. Drawing tools stated ii. Design software

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	iii. Types of drawing tools • Manual • Computer-Aided iv. Types of design software • 2D (AutoCAD) • 3D (Inventor, Solidwork, CATIA) v. Types of drawing hardware • Drawing block (drawing table, T-square, set square etc.) • Personal computer vi. Types of measuring tools • Calliper • Ruler • Scale ruler vii. Types of paper • Tracing paper • Printing paper viii. Size of drawing paper • A4 • A3 • A2 • A1 • A0					selected iii. Drawing hardware identified iv. Measuring tools usage explained v. Paper size differentiate
		vi. Determine drawing tools vii. Select design		23	Demonstration & Observation	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
		software viii. Select drawing hardware ix. Identify measuring tools x. Identify paper size	*Attitude:* i. Careful in tool preparation ii. Creative in taking alternative approach			
3. Setup drawing format	i. Definition of title block ii. Information in title block • Part name • Drawing number • Personnel name (drawn by, checked by, approved by) • Revision number • Drawing date • Part tolerance (decimal place) iii. Types of drawing scale • Full scale • Scale up • Scale down iv. Selection of scale v. Methods of dimensioning • Absolute • Incremental			10	Lecture	i. Paper size selected ii. Title block drawn iii. Drawing scale identified iv. Drawing dimensioning applied v. Projection View differentiate vi. Part materials explained vii. Part size and dimensions stated viii. Part tolerance (decimal place) selected

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	vi. Difference of vii. projection view • First angle • Third angle viii. Part materials indicator • Hatching • Rendering					
		i. Identify paper size ii. Determine title block iii. Select drawing scale iv. Determine drawing dimensioning v. Determine projection view vi. Indicate part materials vii. Determine part size and dimensions viii. Determine part tolerance (decimal place)	*Attitude:* i. Meticulous in handling with detail ii. Knowledgeable in making decision	23	Demonstration & Observation	
4. Produce part drawing	i. Definition of Reverse Engineering Technology (application). ii. Types of projection			50	Lecture	i. Product assembly parts generated ii. Sample parts

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	view • Plan/Top • Front • Side iii. Purpose of cross sectional view • Hidden/internal geometry • Tolerance iv. Method of cross sectional drawing v. Perspective / isometric view					measurement taken iii. Parts specification identified based on reference drawing iv. Projection view generated v. Cross sectional plane determined vi. Cross sectional view produced vii. Perspective / isometric view explained
		i. Visualize product assembly parts ii. Measure sample parts iii. Determine parts specification based on reference drawing iv. Generate projection view v. Select cross sectional plane vi. Generate cross sectional view vii. Produce perspective / isometric view	*<u>Attitude:</u>* i. Neat in producing drawing ii. Proactive in using drawing tools	120	Demonstration & Observation	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
			Environmental: i. Ensure proper usage of printing papers			
5. Produce assembly / installation drawing	i. Bills of materials • List of parts (name and number) • Quantity • Material • Overall size (draft, final etc.) • Weight • Supplier name ii. Types of joints • Welded • Tongue and groove • Bolted • Dove- tail joint iii. Reference drawing • Master drawing • Catalogue • Template iv. Category of parts • Main part • Child part v. Assembly sequence • Exploded view • Assembly flow vi. Installation remark/note • Critical point			25	Lecture	i. Bills of Materials prepared ii. Parts numbering arranged iii. Types of joints compared iv. Reference drawing listed v. Various parts relationship compared vi. Assembly sequence manual described vii. Installation remark/note confirmed viii. Testing requirement listed out

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Tightening torque • Safety precaution vii. Testing requirement • Types of testing • Testing point • Testing specification					
		ix. Determine bills of materials x. Determine parts numbering xi. Determine types of joints xii. List reference drawing xiii. Identify various parts relationship xiv. Indicate assembly sequence manual xv. Indicate installation remark/note xvi. Indicate testing requirement	*Attitude:* i. Careful in handling with precise object ii. Knowledgeable in making decision	58	Demonstration & Observation	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
6. Produce 3D Model	i. Types of modeling technique • 3D Wire – frame • 3D Solid • 3D Surface ii. Selection of modeling Technique iii. Conversion of 2D drawing to 3D model iv. Assembly of 3D Component			15	Lecture	i. Modeling technique differentiate ii. Modeling technique applied iii. 2D drawing to 3D model conversion method selected
		iv. Identify modeling technique v. Select modeling Technique vi. Convert 3D model to 2D drawing	*Attitude:* i. Creative on utilize 3D software ii. Time saving	35	Project	
7. Prepare component drawing	i. Drawing format • .pdf file • .dwg file • .dxf file • Viewer file ii. Types of printing machine • Printer • Plotter iii. Document submission method • Softcopy (email			7	Discussion	i. Drawing printed out ii. Drawing checked as per work instruction / requirement iii. Drawing for approval steps described iv. Drawing revision status

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	attachment) • Hardcopy iv. Revision numbering method					updated
		v. Select drawing format vi. Print out drawing vii. Compare drawing with work instruction / requirement viii. Email drawing for approval ix. Compile drawing revision status	*Attitude:* i. Honest during works ii. Keep of record tidy and updated	16	Demonstration & Observation	

Employability Skills

Core Abilities	Social Skills
01.01 Identify and gather information. 01.02 Document information procedures or processes. 01.03 Utilize basic IT applications. 02.01 Interpret and follow manuals, instructions and SOP's. 02.02 Follow telephone/telecommunication procedures. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using standard forms. 02.05 Read/Interpret flowcharts and pictorial information. 03.01 Apply cultural requirement to the workplace. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.04 Seek and act constructively upon feedback about work performance. 03.05 Demonstrate safety skills. 03.06 Respond appropriately to people and situations. 06.01 Understand systems. 06.02 Comply with and follow chain of command. 06.03 Identify and highlight problems. 06.04 Adapt competencies to new situations/systems. 01.04 Analyse information. 01.06 Utilize word processor to process information. 02.08 Prepare pictorial and graphic information. 03.08 Develop and maintain cooperation within work group. 04.01 Organize own work activities. 04.02 Set and revise own objectives and goals. 04.03 Organize and maintain own workplace. 04.04 Apply problem solving strategies. 04.05 Demonstrate initiative and flexibility. 01.07 Utilize database applications to locate a process information. 01.08 Utilize spreadsheets applications to locate and process information. 01.09 Utilize business graphic application to process information. 01.10 Apply a variety of mathematical techniques. 01.11 Apply thinking skills and creativity.	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

Tools, Equipment and Materials (TEM)

ITEMS	RATIO (TEM : Trainees)
1. Computer	1:1
2. Design software 2D (AutoCAD)	1:2
3. Design software 3D (Inventor, Solidwork, CATIA)	1:2
4. Drawing block (drawing table, T-square, set square etc.)	1:3
5. Personal computer	1:1
6. Calliper	1:5
7. Ruler	1:5
8. Scale ruler	1:1
9. Printing paper	1:1
10. Tracing paper	1:1
11. Printer	1:25
12. Plotter	1:25

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CURRICULUM of COMPETENCY UNIT (CoCU)

Sub Sector	**INDUSTRIAL MECHANICAL**						
Job Area	**INDUSTRIAL PRODUCT**						
Competency Unit Title	**PROTOTYPE PART FABRICATION**						
Learning Outcome	The person who is competent in this CU shall be able to ensure prototype is fabricated correctly and accurately according to design specifications and requirements. Upon completion of this competency unit, trainees will be able to: • Interpret prototype drawing • Prepare Prototype Fabrication Resources • Carry out prototype fabrication • Assemble prototype parts • Carry out finishing process • Inspect Prototype • Retrofit part process • Update prototype fabrication status						
Competency Unit ID	MC-040-3-:2013-02	**Level**	3	**Training Duration**	550	**Credit Hours**	40

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Interpret prototype drawing	i. Bill of Materials ii. Types of prototype material • Clay • Wood • Metal • Foam • Plastic iii. Types of surface finish • Painting • Electro plating • Chroming			15	Lecture	i. Drawing dimensions set ii. Prototype Materials distinguished based on advantages and disadvantages iii. Surface Finishing symbols

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Lacquer iv. Cutting plan • Standard market size					explained iv. Cutting plan related
		i. Determine drawing dimensions ii. Identify prototype materials iii. Determine surface finishing iv. Determine cutting plan	*Attitude:* i. Meticulous in dealing with important information ii. Diligent in taking details iii. Knowledgeable in dealing with important information	35	Demonstration & Observation	
2. Prepare Prototype Fabrication Resources	i. Selection of prototype material. • Function • Formability • Cost • Availability ii. Material requisition procedure iii. Types of profile cutter • Manual (knife etc.) • Cutter machine			15	Lecture	i. Prototype material identified ii. Profile cutter selected based on application iii. Adhesive Material applied iv. Prototype

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	(band saw, heated wire) • CNC machine iv. Factor of profile cutter selection • Cutting type • Cutting finishing • Contour tool selection v. Types of profile template vi. Definition of RP vii. Advantage and dis-advantage of RP viii. Types of RP machine • Powder base printing • SLA 3D printing ix. Types of RP material x. resin modeller • X-soluble support • Solvent xi. Types of personal protective equipment • Eye protection • Head protection • Foot protection • Ear protection • Nose protection xii. Types of hazard xiii. Chemical • Noise • Accident					fabrication material classified v. Equipment such as RP machine (powder/SLA) function explained vi. Materials such as resin modeller, X-soluble support, solvent, PPE etc. listed out vii. Safety requirement such as PPE adhered

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
		i. Identify prototype material ii. Select prototype material iii. Request prototype material iv. Select profile cutter v. Select adhesive material vi. Select profile template vii. Select profile protective equipment viii. Obtain prototype fabrication material	*Attitude:* i. Selective when choosing proper tools / materials *Safety:* i. Careful when handling sharp tools / objects *Environmental:* i. Adhere to Standard Operating Procedure to dispose chemical waste	35	Demonstration & Observation	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
3. Carry out prototype fabrication	i. Marking tools • Scriber/height gauge • Pen/pencil/marker • Masking tape ii. Cutting line marking technique iii. Joining techniques • Adhesive • Fastener • Welding iv. Trimming techniques v. Surface finishing tools • Blasting • Grinding • Polishing vi. Machine setup • RP printing area • Material preparation (cartridge, powder and solvent) vii. Inspection of RP printing area • Cleanliness • Tray availability viii. Parameter setting • Default setting • Customized setting ix. RP machine operation • Switch on (start machine) • Process monitoring			55	Lecture	i. Cutting line produced on material ii. Cutting dimension checked according to full size scale iii. Material removed according to dimension (cut to size) iv. Parts of the prototype assembled v. Surface profile produced vi. Surface finishing work explained vii. Surface protection (film coating) applied on the prototype viii. Housekeeping performed

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Troubleshoot • Emergency measure x. Housekeeping practice (5S)					
		i. Mark cutting line on material ii. Confirm cutting dimension according to full size scale iii. Cut material according to dimension (cut to size) iv. Join parts of the prototype using adhesive material v. Trim surface profile vi. Perform surface finishing work vii. Apply surface protection (Film coating) on the prototype viii. Monitor prototyping process ix. Troubleshoot operation program x. Adjust operation parameter xi. Control quality for parts xii. Perform housekeeping		125	Demonstration & Observation	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
			Attitude: i. Alert during machine running ii. Knowledgeable when setting machine parameter *Safety:* i. Careful when handling tools / equipment *Environmental:* i. Adhere to Standard Operating Procedure to dispose chemical waste and when running machine			
4. Assemble prototype parts	i. Assembly sequence • Exploded view • Assembly flow ii. Types of hand tools • Screw driver • Allen key • Wrench/spanner • Hand drill • Plier iii. Assembly jig and fixture iv. Assembly techniques			20	Lecture	i. Assembly drawing checked ii. Hand tools or machines to assemble parts identified iii. Prototype parts assembled

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
		i. Interpret assembly drawing ii. Apply hand tools or machines to assemble parts	*Attitude:* i. Careful when handling fragile and small part ii. Patient during assembling process *Safety:* i. Careful when handling tools / equipment	45	Demonstration & Observation	
5. Carry out finishing process	i. Function of support ii. Types of support • Soluble • Non-soluble iii. Support removal tools • Solvent • Soft brush • Scoop • Air gun iv. Technique of support removal v. Surface finish tools • sand paper • cutter vi. Technique of surface finishing vii. Treatment of parts			22	Lecture	i. Safety requirement stated ii. Non-soluble support removed from part iii. Soluble support material cleaned iv. Part exterior cleaned v. Surface finishing work explained vi. Powder-based

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Heat (oven) • Bonding agent viii. Technique of parts treatment ix. Joining of parts • adhesive / tape • Fastener (rivet etc.) x. Technique of parts joining xi. Surface coating • Paint • Film xii. Technique of surface coating xiii. Housekeeping					RP product heated in oven vii. Part assembled according to drawing using adhesive viii. Product/mock painted up
		i. Adhere to safety requirement ii. Remove non-soluble support from part iii. Remove soluble support material iv. Blast/clean product using air gun` v. Apply surface finishing work vi. Heat up powder-based RP product in oven vii. Apply bonding agent viii. Assemble part using adhesive ix. Paint product/mock up		35	Demonstration & Observation	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
			Attitude: i. Alert during machine running *Safety:* i. Careful when handling tools / equipment ii. Wear proper PPE *Environmental:* ii. Adhere to Standard Operating Procedure of the process			
6. Inspect Prototype	i. Purpose of inspection ii. Types of measuring tools • ruler/calliper • height gauge • gauges iii. Types of profile measurement equipment • profile projector • coordinate measuring machine (CMM) • toolmaker microscope			22	Lecture	i. Profile / measurement inspected ii. Surface finish compared iii. Geometrical dimension (functional dimension check) fitting described

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
		i. Check profile / measurement ii. Check surface finish iii. Check Geometrical dimension (functional dimension check) fitting	*Attitude:* i. Careful when handling fragile and small part ii. Patient during assembling process *Safety:* i. Careful when handling tools / equipment	44	Demonstration & Observation	
7. Retrofit part process	i. Definition of retrofit ii. Advantages and disadvantages iii. Limitations of retrofit iv. Retrofit techniques • Removal • Installation v. Retrofit technology			14		i. Improvement for retrofit explained ii. Advantages of retrofit process described iii. Limitations of improvement listed out iv. New or updated parts replaced old or outdated parts assemblies v. Retrofit outcome
		i. Identify improvement for retrofit ii. Determine parts for retrofit purpose iii. Check existing / outdated assemblies iv. Fit new or updated		28		

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
		parts to old or outdated assemblies	*Attitude:* iii. Alert during machine running iv. Knowledgeable when setting machine parameter *Safety:* ii. Careful when handling tools / equipment *Environmental:* iii. Adhere to Standard Operating Procedure to dispose chemical waste and when running machine			checked
8. Update prototype fabrication status	i. Reporting format • Fabrication status report • QC report ii. Report submission procedure iii. Prototype storage system • Tagging/labelling • Storage area			6	Lecture	i. progress report to superior prepared ii. complete prototype storage system explained iii. work instruction report

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
						submitted
		v. Submit progress report to superior vi. Store complete prototype vii. Complete work instruction report	*Attitude:* i. Keep of record tidy and updated	14	Demonstration & Observation	

Employability Skills

Core Abilities	Social Skills
01.01 Identify and gather information. 01.02 Document information procedures or processes. 01.04 Analyze information. 02.01 Interpret and follow manuals, instructions and SOP's. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using 02.08 Prepare pictorial and graphic information. 02.10 Prepare reports and instructions. 02.11 Convey information and ideas to people 03.01 Apply cultural requirement to the workplace. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.05 Demonstrate safety skills. 03.06 Respond appropriately to people and situations. 03.07 Resolve interpersonal conflicts.	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

03.08 Develop and maintain a cooperation within work group. 03.09 Manage and improve performance of individuals 03.10 provide consultation and counseling 03.11 Monitor and evaluate performance of human resources. 03.12 Provide coaching/on the job training 03.13 Develop and maintain team harmony and resolve conflicts 03.14 Facilitate and coordinate teams and ideas 04.01 Organize own work activities. 04.02 Set and revise own objectives and goals. 04.03 Organize and maintain own workplace. 04.04 Apply problem solving strategies. 04.05 Demonstrate initiative and flexibility. 04.06 Allocate work. 06.01 Understand systems. 06.02 Comply with and follow chain of command. 06.03 Identify and highlight problems. 06.04 Adapt competencies to new situations/ 06.05 Analyze technical systems. 06.06 Monitor and correct performance of systems.	

Tools, Equipment and Materials (TEM)

ITEMS	RATIO (TEM : Trainees)
Adhesive	1:1
Air gun	1:1
Allen key	1:1
Assembly jig and fixture	1:1
Bonding agent	1:1
Cutter	1:1
Ear protection	1:1
Eye protection	1:1

Fastener (rivet etc.)	1:1
Foot protection	1:1
Hand drill	1:1
Head protection	1:1
Manual cutting tool (knife etc.)	1:1
Masking tape	1:1
Non-soluble support	1:1
Nose protection	1:1
Paint	1:1
Pen/pencil/marker	1:1
Plier	1:1
Resin modeller	1:1
Scoop	1:1
Screw driver	1:1
Scriber	1:1
Soft brush	1:1
Soluble support	1:1
Solvent	1:1
Wrench/spanner	1:1
Conventional Lathe	1:5
Conventional Milling	1:5
Sand paper	1:5
Welding	1:5
Gauges	1:10
Height Gauge	1:10
Blasting equipment	1:25
CNC machine	1:25
Conventional Grinding	1:25
Coordinate Measuring Machine (CMM)	1:25
Cutter machine (band saw, heated wire)	1:25
Film surface coating machine	1:25
Grinding equipment	1:25
Heater (oven)	1:25
Polishing	1:25
Profile Projector	1:25
RP machine	1:25
Toolmaker Microscope	1:25

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CURRICULUM of COMPETENCY UNIT (CoCU)

Sub Sector	**INDUSTRIAL MECHANICAL**						
Job Area	**INDUSTRIAL PRODUCT**						
Competency Unit Title	**PRODUCT DEVELOPMENT QUALITY CONTROL**						
Learning Outcome	The person who is competent in this CU shall be able to ensure mock up is fabricated correctly and accurately according to design specifications and requirements by using rapid prototyping machine/equipment. Upon completion of this competency unit, trainees will be able to: • Apply measuring tools • Collect inspection data • Check inspection and control data • Produce QC report						
Competency Unit ID	MC-040-3:2013-03	**Level**	3	**Training Duration**	240	**Credit Hours**	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Apply measuring tools	i. Definition of quality control ii. Purpose of quality control iii. Types of measuring tools • ruler/calliper • height gauge • gauges iv. Types of profile measurement equipment • profile projector • coordinate measuring machine (CMM) • toolmaker			38	Lecture	i. Measuring tool selected according to tolerance requirement/shape/profile ii. Tool handled according to standard operating procedure iii. Measuring equipment operated according to machine manual

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	microscope v. Techniques of tool handling vi. Techniques of machine/equipment operation vii. Tool storage procedure viii. Tool and equipment calibration status ix. Safety and precaution					
		i. Identify approved drawing Identify measuring tool according to tolerance requirement/shape/profile ii. Handle tool according to standard operating procedure iii. Operate measuring equipment	*Attitude:* i. Alert during machine running ii. Knowledgeable when setting parameter *Safety:* i. Careful when handling tools / equipment	59	Demonstration & Observation	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
			Environmental: i. Adhere to Standard Operating Procedure of handling tools			
2. Collect inspection data	i. Quality control document • Check sheet • Unit conversion table • Inspection standard procedure (manual) • Part drawing ii. Inspection data collection • Manual (check sheet) • Computerised data reading iii. Data processing • Manual • Software (Microsoft excel, Minitab etc.)			30	Lecture	i. Measurement of part dimensions confirmed ii. Dimensional measurement compared to drawing iii. Measurement data tabulated
		i. Measure part dimensions ii. Record dimensional measurement iii. Tabulate		45	Demonstration & Observation	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
		measurement data	*Attitude:* i. Meticulous with data collection work ii. Sincere when entering data input			
3. Check inspection and control data	i. Quality control tools • Check sheet • Fishbone • Bar chart • Pie chart • Pareto diagram • Scatter Diagram • Histogram ii. Application of QC tool • Selection of tool • Simulate collected data iii. Types of finding • Accept/pass • Reject (defect/defective) iv. Review of data finding			15	Lecture	i. Chart, graphs such as C_P/C_{PK} produced ii. Actual data and drawing differentiate iii. Data findings described
		i. Produce chart, graphs such as C_P/C_{PK} ii. Compare actual data and drawing iii. Conclude data		23	Demonstration & Observation	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
		findings	*Attitude:* i. Meticulous with data inspection ii. Proactive in finding any error			
4. Produce QC report	i. Importance of QC report ii. Types of quality report • Incoming raw material • In-process • Assembly • Final report iii. Reporting format • QC report • Check sheet • Reject sample iv. Report submission procedure • Daily report • Weekly report • Monthly report • Special report			12	Lecture	i. QC check sheet completed ii. Check sheet segregated iii. Report prepared to superior for approval
		i. Complete QC check sheet ii. Compile check sheet iii. Submit report to superior for approval	*Attitude:* i. Honest during	18	Demonstration & Observation	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
			works ii. Keep of record tidy and updated			

Employability Skills

Core Abilities	Social Skills
01.01 Identify and gather information. 01.02 Document information procedures or processes. 01.04 Analyze information. 02.01 Interpret and follow manuals, instructions and SOP's. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using 02.08 Prepare pictorial and graphic information. 02.10 Prepare reports and instructions. 02.11 Convey information and ideas to people 03.01 Apply cultural requirement to the workplace. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.05 Demonstrate safety skills. 03.06 Respond appropriately to people and situations. 03.07 Resolve interpersonal conflicts. 03.08 Develop and maintain a cooperation within work group. 03.09 Manage and improve performance of individuals 03.10 provide consultation and counseling 03.11 Monitor and evaluate performance of human resources.	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

03.12 Provide coaching/on the job training 03.13 Develop and maintain team harmony and resolve conflicts 03.14 Facilitate and coordinate teams and ideas 04.01 Organize own work activities. 04.02 Set and revise own objectives and goals. 04.03 Organize and maintain own workplace. 04.04 Apply problem solving strategies. 04.05 Demonstrate initiative and flexibility. 04.06 Allocate work. 06.01 Understand systems. 06.02 Comply with and follow chain of command. 06.03 Identify and highlight problems. 06.04 Adapt competencies to new situations/ 06.05 Analyze technical systems. 06.06 Monitor and correct performance of systems.	

Tools, Equipment and Materials (TEM)

ITEMS	RATIO (TEM : Trainees)
1. Computer	1:5
2. Printer	1:25
3. Check sheet	1:1
4. Unit conversion table	1:1
5. Part drawing	1:1
6. Software (Microsoft Excel, Minitab etc.)	1:1
7. Ruler	1:5
8. Calliper	1:1
9. Height gauge	1:5
10. Gauges	1:5
11. Profile projector	1:25
12. Coordinate Measuring Machine (CMM)	1:25
13. Toolmaker microscope	1:25
14. Inspection standard procedure manual	1:5
15. Tool handling manual	1:5
16. Machine/equipment operation manual	1:5
17. Storage procedure manual	1:5

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CURRICULUM of COMPETENCY UNIT (CoCU)

Sub Sector	**INDUSTRIAL MECHANICAL**						
Job Area	**INDUSTRIAL PRODUCT**						
Competency Unit Title	**PROTOTYPE TESTING AND EVALUATION**						
Learning Outcome	The person who is competent in this CU shall be able to ensure prototype is fabricated correctly and accurately according to design specifications and requirements by passing all required testing and evaluation procedure. Upon completion of this competency unit, trainees will be able to: • Carry out part testing • Check testing data/result • Update testing status						
Competency Unit ID	MC-040-3:2013-04	**Level**	3	**Training Duration**	150	**Credit Hours**	15

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Carry out part testing	i. Types of testing • Mechanical • Surface • Chemical • Functional • Fitting / assembly ii. Criteria of testing • Mechanical - drop test - fatigue test • Surface - hardness - roughness • Chemical - moisture content - salt spray • Functional			34	Lecture	i. Mechanical properties, chemical moisture content, composition analysis materials tested accordance with MSDS ii. Durability, surface finishing such as hardness, roughness, thickness, appearance,

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	- movement - safety - ergonomics • Fitting / assembly - Position matching - Clearance/gap 1.1 Standard testing procedure • Equipment setting • Equipment operation • Result retrieval iii. Material System Data Sheet (MSDS) iv. Manufacturer specification requirement • Specification limits • Control limits					endurance (salt spray test) measured in accordance with manufacturer specification iii. Fatigue, joining components tests carried out in accordance with manufacturer specification iv. Assembly fitting such as tolerance fitting, dimension accuracy, functional performed.
		i. Evaluate mechanical properties, chemical moisture content, composition analysis materials accordance with MSDS ii. Measure durability, surface finishing such as hardness, roughness, thickness, appearance, endurance (salt spray test) in accordance with manufacturer specification		56	Demonstration & Observation	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
		iii. Run fatigue, joining components tests in accordance with manufacturer specification iv. Measure assembly fitting such as tolerance fitting, dimension accuracy, functional	*Attitude:* i. Selective when choosing proper tools / materials *Safety:* i. Careful when handling sharp tools / objects *Environmental:* i. Adhere to Standard Operating Procedure to dispose chemical waste			
2. Check testing data/result	i. Testing result collecting/recording format • Check sheet • Bar chart • Scatter diagram ii. Application of testing result recording			15	Lecture	i. Prototype testing result such as charts, graphs produced ii. Test results printed out iii. Actual data and

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	format • Selection of format • Simulate collected data iii. Types of finding • Accept/pass • Reject/fail (defect/defective) iv. Review of data finding					drawing related iv. Test findings concluded in accordance with manufacturer specification.
		i. Produce prototype testing result such as charts, graphs ii. Print out test results iii. Compare actual data and drawing iv. Conclude test findings in accordance with manufacturer specification.	*Attitude:* i. Honest, sincere, in recording collecting correct data ii. Keep work tidy and clean	28	Demonstration & Observation	
3. Update testing status	i. Importance of testing result report ii. Reporting format • testing report • Check sheet • Reject specimen iii. Filing method			6	Lecture	i. Testing report prepared ii. Progress conveyed to superior through report for verification

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
		i. Notify progress to superior through report for verification ii. Prepare testing report iii. Ensure work instruction compliance iv. Compile report into project file.	*Attitude:* i. Keep of record tidy and updated	11	Demonstration & Observation	iii. Work instruction complied iv. Report compiled into project file.

Employability Skills

Core Abilities	Social Skills
01.01 Identify and gather information. 01.02 Document information procedures or processes. 01.04 Analyze information. 02.01 Interpret and follow manuals, instructions and SOP's. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using 02.08 Prepare pictorial and graphic information. 02.10 Prepare reports and instructions. 02.11 Convey information and ideas to people 03.01 Apply cultural requirement to the workplace. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.05 Demonstrate safety skills. 03.06 Respond appropriately to people and situations. 03.07 Resolve interpersonal conflicts. 03.08 Develop and maintain a cooperation within work group. 03.09 Manage and improve performance of individuals	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

03.10 provide consultation and counseling 03.11 Monitor and evaluate performance of human resources. 03.12 Provide coaching/on the job training 03.13 Develop and maintain team harmony and resolve conflicts 03.14 Facilitate and coordinate teams and ideas 04.01 Organize own work activities. 04.02 Set and revise own objectives and goals. 04.03 Organize and maintain own workplace. 04.04 Apply problem solving strategies. 04.05 Demonstrate initiative and flexibility. 04.06 Allocate work. 06.01 Understand systems. 06.02 Comply with and follow chain of command. 06.03 Identify and highlight problems. 06.04 Adapt competencies to new situations/ 06.05 Analyze technical systems. 06.06 Monitor and correct performance of systems.	

Tools, Equipment and Materials (TEM)

ITEMS	RATIO (TEM : Trainees)
1. drop test machine	1:25
2. fatigue test machine	1:25
3. Surface hardness tester	1:25
4. Surface roughness tester	1:25
5. Chemical moisture content analyser	1:25
6. Salt spray equipment	1:25
7. Ergonomics data sheet	1:5
8. Fitting / assembly jig	1:5
9. Position matching jig	1:5
10. Clearance/gap gauges	1:5
11. Material System Data Sheet (MSDS)	1:25

12. Computer	1:5
13. Printer	1:25
14. Check sheet	1:1
15. Unit conversion table	1:5
16. Part drawing	1:1
17. Software (Microsoft Excel, Minitab etc.)	1:5
18. Ruler	1:1
19. Calliper	1:1
20. Height gauge	1:5
21. Gauges	1:25
22. Profile projector	1:25
23. Coordinate Measuring Machine (CMM)	1:25
24. Toolmaker microscope	1:25
25. Inspection standard procedure manual	1:25

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CURRICULUM of COMPETENCY UNIT (CoCU)

Sub Sector	**INDUSTRIAL MECHANICAL**						
Job Area	**INDUSTRIAL PRODUCT**						
Competency Unit Title	**PRODUCT DATA MANAGEMENT & COMMUNICATION**						
Learning Outcome	The person who is competent in this CU shall be able to ensure mock up is fabricated correctly and accurately according to design specifications and requirements by passing all required testing and evaluation procedure. Upon completion of this competency unit, trainees will be able to: • Manage drawing data • Prepare project documents • Coordinate Internal/External discussion • Conduct product/mock up presentation • Prepare post meeting/ discussion report						
Competency Unit ID	MC-040-3:2013-05	**Level**	3	**Training Duration**	130	**Credit Hours**	13

Work Activities	**Related Knowledge**	**Related Skills**	**Attitude/Safety/ Environmental**	**Training Hours**	**Delivery Mode**	**Assessment Criteria**
1. Manage drawing data	i. Category of data • Drawing • Specification • Report (QC, testing) • Work order • Work instructions ii. Types of data format • Softcopy - server database - CD/DVD • Hardcopy iii. Reference coding • number • name • customer			8	Lecture	i. Types of data described ii. Data format selected iii. Reference number assigned or named based on projects / parts iv. Data submission approval obtained from superior v. Drawing

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• date iv. Organization of data • Approval • Stamp/label • Storage • Retrieval • Update v. Application of product data management system					labelled for document control purpose vi. Drawing in hardcopy & softcopy format save-kept vii. Drawing data retrieved according to project viii. Drawing master list explained ix. Product data management system described.
		i. Categorize data types ii. Determine data format iii. Identify reference number or name based on projects / parts iv. Obtain data submission approval from superior v. Stamp/label drawing for document control purpose vi. Store drawing in hardcopy & softcopy format vii. Retrieve drawing data according to project viii. Update drawing master list ix. Apply product data management system	*<u>Attitude:</u>* i. Resourceful in dealing with data	17	Demonstration & Observation	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
			file ii. Honest during works iii. Keep of record tidy and updated			
2. Prepare project documents	i. Project drawing • Master drawing • Part drawing • Assembly drawing • Installation drawing ii. Project master schedule • Main process • Sub-process • Activities • Time frame • Person in-charge / owner • Endorsement iii. Project requirement review iv. Testing / fabrication method v. Project budget vi. Suppliers / vendors outsourcing			12	Lecture	i. Project master schedule identified ii. Project requirement and existing facilities differentiated iii. Testing / fabrication method explained iv. Prototyping budget to superior described
		i. Obtain part drawing ii. Obtain project master schedule iii. Compare project requirement and existing facilities		18	Demonstration & Observation	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
		iv. Propose testing / fabrication method v. Propose prototyping budget to superior vi. Identify suppliers / vendors to outsource	*Attitude:* i. Meticulous in identifying client project information			
3. Coordinate Internal/External discussion	i. Definition of Discussion ii. Purpose of Discussion iii. Methods of Discussion iv. Discussion issue/topic such as: • Safety Discussion • Previous production performance/result • Problem encounter • Revise schedule • New planning • New feedback v. Leadership skills vi. Communication skills vii. Interpersonal skills			12	Shop Talk	i. Memo prepared to related departments ii. Meeting agenda prepared iii. Meeting / discussion venues arranged iv. Minutes of meeting to attendees drafted v. Internal/external discussion participated vi. Meeting etiquettes described.
		i. Issue memo to related departments ii. Issue meeting		18	Problem Based Learning	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
		agenda to related departments iii. Prepare meeting / discussion venues iv. Issue minutes of meeting to attendees v. Internal/external discussion participated vi. Comply meeting etiquettes	*Attitude:* i. Proactive and innovative in utilising discussion tools and materials ii. Good ethic in dealing with client's			
4. Conduct product/mock up presentation	i. Company presentation procedure ii. Presentation etiquettes iii. Presentation etiquettes iv. Demonstration Techniques v. Presentation Methods • Formal • Informal vi. Interpersonal skills			10	Lecture	i. Presentation materials prepared to according to format and audience ii. Sample demonstrated to the attendees iii. Presentation skills applied iv. Presentation etiquettes

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
		i. Presentation materials prepared to according to format and audience ii. Sample demonstrated to the attendees iii. Presentation skills applied iv. Presentation etiquettes complied	*Attitude:* i. Good ethic in dealing with client's ii. Honest and responsible in executing presentation.	15	Role Play	complied
5. Prepare post meeting/ discussion report	i. Reporting Format • Questionnaire (Satisfaction Level) • Activity Report Form ii. Report submission procedure iii. Compilation of operation work information report procedure			8	Lecture	i. Minutes of meeting to attendees issued i. Updates to related departments distributed ii. Internal / external meeting/discussions

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
		i. Minutes of meeting to attendees issued ii. Updates to related departments distributed iii. Internal/external meeting/discussions compiled	*Attitude:* iv. Honest during works v. Keep of record tidy and updated	12	Demonstration & Observation	compiled

Employability Skills

Core Abilities	Social Skills
01.01 Identify and gather information. 01.02 Document information procedures or processes. 01.04 Analyze information. 02.01 Interpret and follow manuals, instructions and SOP's. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline

02.08 Prepare pictorial and graphic information. 02.10 Prepare reports and instructions. 02.11 Convey information and ideas to people 03.01 Apply cultural requirement to the workplace. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.05 Demonstrate safety skills. 03.06 Respond appropriately to people and situations. 03.07 Resolve interpersonal conflicts. 03.08 Develop and maintain a cooperation within work group. 03.09 Manage and improve performance of individuals 03.10 provide consultation and counseling 03.11 Monitor and evaluate performance of human resources. 03.12 Provide coaching/on the job training 03.13 Develop and maintain team harmony and resolve conflicts 03.14 Facilitate and coordinate teams and ideas 04.01 Organize own work activities. 04.02 Set and revise own objectives and goals. 04.03 Organize and maintain own workplace. 04.04 Apply problem solving strategies. 04.05 Demonstrate initiative and flexibility. 04.06 Allocate work. 06.01 Understand systems. 06.02 Comply with and follow chain of command. 06.03 Identify and highlight problems. 06.04 Adapt competencies to new situations/ 06.05 Analyze technical systems. 06.06 Monitor and correct performance of systems.	8. Teamwork

Tools, Equipment and Materials (TEM)

ITEMS	RATIO (TEM : Trainees)
1. Master drawing	1:5
2. Part drawing	1:5
3. Assembly drawing	1:5
4. Installation drawing	1:5
5. draft drawing	1:5
6. Sketches	1:5
7. physical product	1:5
8. Drawing	1:5
9. Specification	1:5
10. Report (QC, testing)	1:5
11. Work order	1:5
12. Work instructions	1:5
13. Stamp/label	1:5
14. Questionnaire (Satisfaction Level)	1:5
15. Activity Report Form	1:5
16. Computer	1:5
17. Printer	1:25
18. LCD projector	1:25

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CURRICULUM of COMPETENCY UNIT (CoCU)

Sub Sector	**INDUSTRIAL MECHANICAL**						
Job Area	**INDUSTRIAL PRODUCT**						
Competency Unit Title	**INDUSTRIAL PRODUCT DEVELOPMENT SUPERVISION**						
Learning Outcome	The person who is competent in this CU shall be able to ensure the forwarding operation activities implemented as per job requirements and at the same time the schedule, work performance as well as welfare of the subordinates are monitored and taken care of. Upon this competency unit, trainees will be able to: - • Check work schedule operational activities requirement • Plan work schedule operational activities • Assign job / work to subordinates • Evaluate subordinate work performance • Coordinate subordinate welfare program • Update subordinate operational activities report						
Competency Unit ID	MC-040-3:2013-06	**Level**	3	**Training Duration**	130	**Credit Hours**	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Check work schedule operational activities requirement	i. Organization Structure • Top management • Middle management • Support group ii. Definition of Human Resource iii. Types of subordinate activities • Work schedule • Briefing session • Subordinate performance • Subordinate welfare program			6	Lecture	i. Work schedule determined ii. Briefing session determined iii. Subordinate performance determined iv. Subordinate welfare program determined v. Subordinate administration activities workflow determined

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	iv. Subordinate activities workflow v. Human resource standard operating procedure					according to establishment's standard operating procedure
		i. Determine work schedule ii. Determine briefing session iii. Determine subordinate performance iv. Determine subordinate welfare program v. Determine subordinate administration activities workflow according to establishment's standard operating procedure	*Attitude:* i. Resourceful in identifying work activities information and requirements	10	Demonstration & Observation	
2. Plan work schedule operational activities	i. Type of work schedule • Daily • Monthly • Ad-hoc / Contingency ii. Subordinate performance report • Yearly • Mid-year			12	Seminar	i. Work schedule, subordinate performance report and subordinate record format confirmed according to company's

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	iii. Subordinate record format • Appraisal Form • Show Cause Letter • Personal File • HR Database iv. Subordinate welfare program • Birthday • Marriage • Product discount • Meal voucher v. Briefing session checklist • Attendance List • Invitation List					standard operating procedure ii. Subordinate welfare program determined according to establishment's standard operating procedure iii. Briefing session checklist prepared according to company's standard operating procedure
		i. Confirm work schedule, subordinate performance report and subordinate record format according to company's standard operating procedure ii. Determine subordinate welfare program according to establishment's standard operating procedure iii. Prepare briefing session checklist according to company's standard operating procedure	*Attitude:*	20	Project	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
			i. Systematic in preparing work schedule ii. Not biased in preparing work schedule			
3. Assign job / work to subordinates	i. Definition of Job ii. Types of Work Plan • Daily-basis • Project-based • Customer-based iii. Job Assignment • Procedure / Method • Delegation • Supervision			8	Lecture	i. Work schedule prepared according to job requirement ii. Subordinates assigned to work according to work plan
		i. Prepare work schedule according to job requirement ii. Assign subordinates to work according to work plan	*Attitude:* i. Systematic in arranging unit manpower ii. Responsible in arranging unit manpower iii. Steadfast in following company SOP in arranging manpower	10	Simulation	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
4. Evaluate subordinate work performance	i. Types of Evaluation • Appraisal (Yearly / Mid-Yearly) • Promotion • Confirmation ii. Performance Identification • Attendance • Log-book • Appraisal Form (Report) • Personal File iii. Performance Acknowledgement • Promotion • Confirmation • Salary Rise iv. Improvement Recommendation v. Effectiveness Assessment • Target • Actual • Performance gap • Training Need Analysis vi. Factor of Briefing Effectiveness • One-way communication • Two-way communication			15	PBL	i. Actual subordinate performance identified ii. Actual subordinate performance acknowledged iii. Improvement recommended in accordance with human resource guideline iv. Effectiveness of work schedule assessed in accordance with human resource guideline v. Subordinate performance gap assessed in accordance with human resource guideline vi. Effectiveness of delivered briefing session assessed as per briefing schedule

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Communication / Presentation Skill • Response / Feedback					vii. Effectiveness and suitability of coordinated subordinate welfare program as per schedule and human resource guideline
		i. Identify actual subordinate performance ii. Acknowledge actual subordinate performance iii. Recommend improvement in accordance with human resource guideline iv. Assess effectiveness of work schedule in accordance with human resource guideline v. Assess subordinate performance gap in accordance with human resource guideline vi. Assess effectiveness of delivered briefing session as per briefing schedule vii. Coordinate effectiveness and suitability of subordinate welfare program as per		20	Project	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
		schedule and human resource guideline	*Attitude:* i. Knowledgeable and meticulous in evaluating staff administrative performance			
5. Coordinate subordinate welfare program	i. Importance of staff welfare program ii. Staff welfare program preparation process • Welfare Program Coordination • Set up team • Plan activities • Execute activities • Post Mortem			6	Lecture	i. Subordinates welfare needs identified ii. Subordinate welfare program coordinated based on schedule
		i. Identify subordinates welfare needs ii. Coordinate subordinate welfare program based on schedule	*Attitude:* i. Creative and resourceful in coordinating staff welfare program *Safety:* i. Adhere to safety	10	Role Play	

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
			requirement			
6. Update subordinate operational activities report	i. Reporting Format • Questionnaire (Satisfaction Level) • Activity Report Form ii. Budget Control • Allocation • Expenditure			5	Group Discussion	i. Subordinate administration activities reported as per company's standard operating procedure
		i. Report subordinate administration activities as per company's standard operating procedure	*Attitude:* i. Meticulous in generating operation report. ii. Accurate in operation reporting iii. Honest in presenting data and information	8	Project & Coaching	

Employability Skills

Core Abilities	Social Skills
01.01 Identify and gather information. 01.02 Document information procedures or processes. 02.01 Interpret and follow manuals, instructions and SOP. 02.02 Follow telephone/telecommunication procedures. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using standard forms. 02.05 Read/Interpret flowcharts and pictorial information. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.04 Seek and act constructively upon feedback about work performance. 03.06 Respond appropriately to people and situations. 03.07 Resolve interpersonal conflicts. 03.08 Develop and maintain a cooperation within work group. 02.11 Convey information and ideas to people. 03.09 Manage and improve performance of individuals. 03.13 Develop and maintain team harmony and resolve conflicts. 03.14 Facilitate and coordinate teams and ideas. 03.15 Liaise to achieve identified outcomes. 03.16 Identify and assess client/customer needs.	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

Tools, Equipment and Materials (TEM)

ITEMS	RATIO (TEM : Trainees)
1. Stationery	1:1
2. Work schedule format	1:1
3. Standard Operating Procedure related to nature of business	1:1
4. Work instruction format	1:1
5. Master checklist	1:1
6. Computer	1:5
7. Leave form format	1:1
8. Organisation chart	1:1
9. Skill chart	1:1
10. Inventory checklist format	1:1
11. Labelling/sticker	1:1
12. Operation report format	1:1

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INDUSTRIAL PRODUCT DEVELOPMENT : LEVEL 3

TRAINING HOURS DISTRIBUTION

CU		%	Hrs	WORK ACTIVITIES	Knowledge	Performance	TOTAL
1	COMPONENT DRAWING DEVELOPMENT	26%	420	1· Check component drawing development requirement	7	16	23
				2· Prepare design tools	10	23	33
				3· Setup drawing format	15	23	38
				4· Produce part drawing	50	120	170
				5· Produce assembly / installation drawing	25	58	83
				6· Produce 3D Model	15	35	50
				7· Prepare component drawing	7	16	23
					129	291	420
					30.7%	**69.3%**	**100.0%**
2	PROTOTYPE PART FABRICATION	33%	530	1· Interpret prototype drawing	15	35	50
				2· Prepare Prototype Fabrication Resources	15	35	50
				3· Carry out prototype fabrication	55	125	180
				4· Assemble prototype parts	20	45	65
				5· Carry out finishing process	22	35	57
				6· Inspect Prototype	22	44	66
				7· Retrofit part process	14	28	42
				8· Update prototype fabrication status	6	14	20
					169	361	530
					31.9%	**68.1%**	**100.0%**
3	PRODUCT DEVELOPMENT QUALITY CONTROL	15%	240	1. Apply measuring tools	38	59	97
				2. Collect inspection data	30	45	75
				3. Produce QC report	15	23	38
				4. Check inspection and control data	12	18	30
					95	145	240
					39.6%	**60.4%**	**100.0%**
4	PROTOTYPE TESTING AND EVALUATION	9%	150	1. Carry out part testing	34	56	90
				2. Check testing data/result	15	28	43
				3. Update testing status	6	11	17
					55	95	150
					36.7%	**63.3%**	**100.0%**
5	PRODUCT DATA MANAGEMENT AND COMMUNICATION -	8%	130	1. Manage drawing data	8	17	25
				2. Prepare project documents	12	18	30
				3. Coordinate Internal/External discussion	12	18	30
				4. Conduct product/mock up presentation	10	15	25
				5. Prepare post meeting/ discussion report	8	12	20
					50	80	130
					38.5%	**61.5%**	**100.0%**
6	INDUSTRIAL PRODUCT DEVELOPMENT SUPERVISION	8%	130	1. Check work schedule operational activities requirement	6	10	16
				2. Plan work schedule operational activities	12	20	32
				3. Assign job / work to subordinates	8	10	18
				4. Evaluate subordinate work performance	15	20	35
				5. Coordinate subordinate welfare program	6	10	16
				6. Update subordinate operational activities report	5	8	13
					52	78	130
					40.0%	**60.0%**	**100.0%**
	TOTAL	100.0%	1600	**HOURS**	**550**	**1050**	**1600**
				PERCENTAGE (%)	**34.4%**	**65.6%**	**100.0%**

ABBREVIATIONS

2D	Two-Dimensional
3D	Three-Dimensional
BOM	Bill Of Materials
CATIA	Computer Aided Three-Dimensional Interactive Application
CD	Compact Disc
CMM	Coordinate Measuring Machine
CNC	Computer Numerical Control
CoCU	Curriculum Of Competency Unit
CP	Competency Profile
CPC	Competency Profile Chart
CU	Competency Unit
DKM	Diploma Kemahiran Malaysia
DLKM	Diploma Lanjutan Kemahiran Malaysia
DSD	Department Of Skills Development
DVD	Digital Video Decoder
JPK	Jabatan Pembangunan Kemahiran
JPTS	Jawatankuasa Teknikal Penilaian Standard
LCD	Liquid-Crystal Display
MPKK	Majlis Pembangunan Kemahiran Kebangsaan
MSDS	Material System Data Sheet
NOSS	National Occupational Skills Standard
OAS	Occupational Area Structure
OS	Occupational Structure
PC	Performance Criteria
PPE	Personal Protective Equipment
QC	Quality Control
RP	Rapid Prototyping
SKM	Sijil Kemahiran Malaysia
SLA	Stereolithography
SP	Standard Practice
SPM	Sijil Pelajaran Malaysia
2D	Two-Dimensional
3D	Three-Dimensional
BOM	Bill Of Materials
CATIA	Computer Aided Three-Dimensional Interactive Application
CD	Compact Disc
CMM	Coordinate Measuring Machine
CNC	Computer Numerical Control
CoCU	Curriculum Of Competency Unit
CP	Competency Profile
CPC	Competency Profile Chart
CU	Competency Unit
DKM	Diploma Kemahiran Malaysia
DLKM	Diploma Lanjutan Kemahiran Malaysia

DSD	Department Of Skills Development
DVD	Digital Video Decoder
JPK	Jabatan Pembangunan Kemahiran
JPTS	Jawatankuasa Teknikal Penilaian Standard
LCD	Liquid-Crystal Display
MPKK	Majlis Pembangunan Kemahiran Kebangsaan
MSDS	Material System Data Sheet
NOSS	National Occupational Skills Standard
OAS	Occupational Area Structure
OS	Occupational Structure
PC	Performance Criteria
PPE	Personal Protective Equipment
QC	Quality Control
RP	Rapid Prototyping
SKM	Sijil Kemahiran Malaysia
SLA	Stereolithography
SP	Standard Practice
SPM	Sijil Pelajaran Malaysia