2008 HSC Notes from the Marking Centre Metal and Engineering

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2008 HSC NOTES FROM THE MARKING CENTRE METAL AND ENGINEERING

Introduction

This document has been produced for the teachers and candidates of the Stage 6 course in Metal and Engineering. It contains comments on candidate responses to the 2008 Higher School Certificate examination, indicating the quality of the responses and highlighting their relative strengths and weaknesses.

This document should be read along with the relevant syllabus, the 2008 Higher School Certificate examination, the marking guidelines and other support documents which have been developed by the Board of Studies to assist in the teaching and learning of Metal and Engineering.

Section I

Question	Correct response
1	D
2	C
3	D
4	A
5	C
6	B
7	B
8	A
9	A
10	B
11	D
12	C
13	C
14	D
15	A

Section II

Question 16

(a) Candidates were required to locate and identify the projection symbol included in the sketch of the crank arm. The angle of projection could also be determined by studying the two views. Better responses identified the angle of projection as third angle projection. Weaker responses incorrectly answered 'first angle projection'.

(b) Better responses correctly identified the drawing symbol as being that for diameter.

(c) This question required candidates to locate the part called the boss and to interpret from the drawing the shape of the hole which passes through both the boss and the arm. They were required to locate the dimension 25□. Better responses correctly identified the shape as a square.

(d) Most responses correctly identified the weld as a fillet and that the weld was all around the boss. Only the better responses specified the significance of the 10 and the correct relationship to the size of the weld.

(e) Better responses correctly identified the diameter of the boss as 60 mm and therefore the radius as 30 mm. Weaker responses incorrectly interpreted the boss end of the crank as being the same diameter as the handle end (which has a radius of 40 mm) and so calculations resulted in a total 260 mm rather than the correct answer of 250 mm.

(f) Better responses described several advantages to a depth that demonstrated a thorough understanding. Mid-range responses typically mentioned two advantages using nonindustry-specific terminology.

Question 17

(a) Better responses were easily interpreted and would allow the reader to readily mark out the arm following the sequence of steps provided. Most of the necessary marking-out tools were mentioned and the correct use of the industry terminology was evident.

Mid-range responses allowed the reader to logically follow the sequence although not all the steps were given to complete the marking-out process. Most of the basic marking-out tools were mentioned but the more precise tools were missing from their responses. These responses used general industry terminology but some tools were incorrectly named.

Weaker responses did not allow the reader to follow the sequence of steps to mark out the arm. The sequence of steps was incomplete or in incorrect order. Only a few tools were mentioned and/or incorrectly named. Incorrect non-industry terminology was used.

(b) Better responses outlined several quality checks used to verify the accuracy in the marking-out process, using correct industry terminology.

Weaker responses outlined one quality checking procedure using non-specific terminology.

Question 18

(a) The best responses correctly determined the value of 28.14 indicated by the vernier scale. The range of errors evident indicated a poor understanding of reading vernier scales.

(b) Candidates were required to correctly name the centre square and provide a specific application for the tool, which was to locate the centre of the round stock. Weaker responses gave the name of the tool as an angle line marker and said its application was for marking out 45º lines.

(c) (i) Weaker responses typically misplaced the decimal point giving responses of 0.2 and 0.6 instead of the correct answers 0.02 and 0.06.

(ii) Better responses calculated the maximum possible clearance using the correct data. Weaker responses typically used one or more incorrect dimensions from the examination.

(d) Weaker responses provided general information which, whilst correct, failed to include specific industry terminology. Many of these weaker responses failed to include specific examples and did not relate the strategy to any specific advantage.

Question 19

(a) Better responses named both power tools correctly and provided an appropriate application for each. The significance of the drill being cordless was evident in these responses. Mid-range responses named one tool, usually the cordless drill, and provided a suitable application. Mid-range responses did not name the nibbler but understood its use. Weaker responses usually used non-specific terminology when naming and providing an application for the tool. Many referred to the cordless drill simply as a drill.

(b) Better responses provided a series of correct pre-operational safety checks using precise industry terminology. Mid-range students displayed at least a sound understanding of checking a power tool before use.

Section III

Question 20

Better responses presented a well-reasoned and cohesive answer describing many practices incorporated by workplaces to prevent accidents. They briefly described the more obvious practices such as Personal Protective Equipment (PPE), signage and cleaning up, and then expanded on the more complex practices. These included administrative practices such as training, housekeeping, induction programs, accident report form data collection and analysis. They also discussed occupational health and safety committees and their role in keeping a worksite safe and accident free. They used precise industry terminology such as housekeeping, Safe Operating Procedures (SOPs), and Material Safety Data Sheets (MSDS).

Mid-range responses described in more depth the more obvious practices such as PPE and signage. They listed several items of PPE and explained why it is required. They described several workshop signs and their use. They used general industry terminology and mostly included housekeeping and the benefits of employing good housekeeping practices in the workshop.

Weaker responses listed and described several types of PPE required in a metal and engineering worksite. They often related their responses to the school workshop environment rather than to industrial situations. They did not use correct terminology, writing about sweeping and cleaning the worksite and how it prevents workplace accidents rather than naming it industrial housekeeping.

Question 21

Better responses gave complete integrated answers that incorporated a holistic approach to strategies to minimise waste in the metal and engineering workshop. Responses used specific industry terminology to explain how scrap metal, waste products and environmental hazards are reduced. Strategies to minimise scrap were clearly described and concepts of efficient project planning, re-use of offcut materials, and the separation and recycling of metal waste were well described. These responses mentioned filtering of extracted air and the re-use/recycling of oils and coolants through filtering as the main environmental hazard strategies. Filtration tended to be mentioned in the better responses. Candidates also mentioned the efficient use of materials through technology, including CNC machining and nesting and ordering the appropriate size and quantity of material for a specific project. The use of technical language and terms was accurate and appropriate.

Mid-range responses discussed only one area of the question in relation to minimising waste. Scrap metal was the key area many of the responses focused on. They highlighted points with good strategies to implement planning, marking out, and efficient use of material, new technologies and re-use/recycle materials, to name a few. These responses, however, only briefly touched on the other two areas, waste products and environmental hazards, demonstrating a limited knowledge and understanding of both these concepts. Mid-range responses did not address all key areas and were vague and disjointed with occasional use of technical language and terms.

Weaker responses were brief and limited in terms of demonstrating knowledge and understanding to describe and implement strategies to minimise waste. These responses were mainly about global environmental issues not related to the metal and engineering industry. Technical language was not present in many responses and many were of a minimal length. These responses focused on scrap metal in general terms with no strategies discussed.

Question 22

Better responses clearly addressed the various modes of communication: verbal, nonverbal and written. They described each mode using precise industry terminology and gave a range of examples. They also identified various situations where these modes of communication would be beneficial. Better responses were cohesive and written well, and explained those situations in which different modes of communication were appropriate. These responses mentioned the fact that one form of communication often cannot work alone but in fact all modes (verbal, nonverbal and written) support one another to effectively communicate how to complete or plan to undertake a routine task.

Mid-range responses described two modes of communication, giving some examples of both. These responses were clear, with some indication as to where the examples could be implemented. Some responses gave a detailed account of just one mode of communication with precise industry language, but only mentioned briefly one point from either of the other two modes of communication.

Weaker responses often identified one mode of communication, usually citing an example but demonstrating limited knowledge and understanding of how to apply the example to a given situation. These responses referred to PPE and signage, but did not address the question in relation to a routine task. These responses did not use correct terminology, often listing modes of communication as listening, drawing, hand signals and notes.

Metal and Engineering

2008 HSC Examination Mapping Grid

Question	Marks	Unit of competency / Element of competency
Section I		
1	1	MEM 15.24A – Apply quality procedures
2	1	MEM 18.2B – Use power tools/ hand held operations
3	1	MEM 18.1C – Use hand tools
4	1	MEM 13.14A – Apply principles of occupational health and safety in the work environment
5	1	MEM 12.24A – Perform computations
6	1	MEM 18.1C – Use hand tools
7	1	MEM 18.2B – Use power tools/ hand held operations
8	1	MEM 12.23A – Perform engineering measurements
9	1	MEM 13.14A – Apply principles of occupational health and safety in the work environment
10	1	MEM 18.1C – Use hand tools
11	1	MEM 12.24A – Perform computations
12	1	MEM 16.7A – Work with others in a manufacturing, engineering or related environment
13	1	MEM 13.14A – Apply principles of occupational health and safety in the work environment
14	1	MEM 15.2A – Apply quality systems
15	1	Manufacturing, engineering and related services industries induction
Section II		
16 (a)	1	MEM 9.2B – Interpret technical drawing
16 (b)	1	MEM 9.2B – Interpret technical drawing
16 (c)	1	MEM 9.2B – Interpret technical drawing
16 (d)	2	MEM 9.2B – Interpret technical drawing
16 (e)	2	MEM 9.2B – Interpret technical drawing MEM 12.23A – Perform engineering measurements MEM 12.24A – Perform computations
16 (f)	3	MEM 14.4A – Plan to undertake a routine task MEM 15.2A – Apply quality systems MEM 15.24A – Apply quality procedures MEM 16.7A – Work with others in a manufacturing, engineering or related environment
17 (a)	6	MEM 14.4A – Plan to undertake a routine task MEM 18.1C – Use hand tools MEM 9.2B – Interpret technical drawing
17 (b)	2	MEM 15.2A – Apply quality systems

Question	Marks	Unit of competency / Element of competency
18 (a)	1	MEM 12.23A – Perform engineering measurements
18 (b)	2	MEM 12.23A – Perform engineering measurements
18 (c) (i)	2	MEM 9.2B – Interpret technical drawing MEM 12.24A – Perform computations
18 (c) (ii)	2	MEM 9.2B – Interpret technical drawing MEM 12.24A – Perform computations
18 (d)	3	MEM 12.23A – Perform engineering measurements
19 (a)	4	MEM 18.2B – Use power tools/ hand held operations
19 (b)	3	MEM 18.2B – Use power tools/ hand held operations MEM 13.14A – Apply principles of occupational health and safety in the work environment
Section III		
20	15	MEM 13.14A – Apply principles of occupational health and safety in the work environment
21	15	Manufacturing, engineering and related services industries induction
22	15	MEM 16.7A – Work with others in a manufacturing, engineering or related environment

Section II

Question 16 (a)

Competencies assessed: MEM 9.2B

MARKING GUIDELINES

Criteria	Marks
• Correctly indicates the angle of projection	1

Sample answer/Answers could include:

Third Angle Projection

Question 16 (b)

Competencies assessed: MEM 9.2B

MARKING GUIDELINES

Criteria	Marks
• Correctly indicates the name of the symbol	1

Sample answer/Answers could include:

∅ = Diameter

Question 16 (c)

Competencies assessed: MEM 9.2B

MARKING GUIDELINES

Criteria	Marks
• Correctly identifies the cross-sectional shape	1

Sample answer/Answers could include:

Square

Question 16 (d)

Competencies assessed: MEM 9.2B

MARKING GUIDELINES

Criteria	Marks
• Explains TWO key concepts of the welding symbol	2
• Explains ONE key concept of the welding symbol	1

Sample answer/Answers could include:

10 mm – Fillet weld – all round – on side indicated by the arrow

Question 16 (e)

Competencies assessed: MEM 9.2B, MEM 12.23A, MEM 12.24A

MARKING GUIDELINES

Criteria	Marks
• Correctly calculates total length using correct data, showing working	2
• Correct answer only OR • Correct calculation based on incorrect data	1

Sample answer/Answers could include:

30 + 180 + 40 = 250 mm

Question 16 (f)

Competencies assessed: MEM 14.4A, MEM 15.2A, MEM 15.24A, MEM16.7A

MARKING GUIDELINES

Criteria	Marks
• Lists advantages of sketches as a communication tool, with reference to several examples	3
• Lists the advantages of sketches as a communication tool, with reference to an example	2
• Indicates an advantage of sketches as a communication tool	1

Sample answer/Answers could include:

Allows for additional information over verbal instructions
Simplicity of production over CAD etc – portable
Easy and fast to make changes
Used to better explain a sequence of tasks

Question 17 (a)

Competencies assessed: MEM 14.4A, MEM 18.1C, MEM 9.2B

MARKING GUIDELINES

Criteria	Marks
• Communicates the details of a suitable marking out procedure using precise industry terminology in a well-reasoned and cohesive response • Applies in-depth knowledge and understanding of the tools and equipment required to mark out the Crank Arm – Arm	5–6
• Communicates the details of a suitable marking out procedure using general industry terminology • Applies sound knowledge and understanding of the tools and equipment required to mark out the Crank Arm – Arm	3–4
• Communicates some steps of a marking out procedure using non-specific industry terminology with little evidence of reasoning or cohesion in response • Applies superficial knowledge and understanding of the tools and equipment required to mark out the Crank Arm – Arm	1–2

Sample answer/Answers could include:

Sequence of Steps	*Tools(s) required*
1. Apply a marking medium	Layout dye, texta, chalk
2. Determine and mark centre line	Dividers, Jenny calipers, surface gauge & plate
3. Mark centres of holes	Rules, dividers, scribers, engineers square, centre punch, hammer
4. Mark out R30 & R40 as circles	Rule and dividers
5. Mark the 40 width centre section	Dividers, Jenny calipers
6. Mark out the fillets (R40)	R40 Radius gauge/template
7. Witness mark external shape	Prick punch (centre punch) and hammer

Question 17 (b)

Competencies assessed: MEM 15.2A

MARKING GUIDELINES

Criteria	Marks
• Demonstrates knowledge and understanding of the application of quality procedures required to verify the accuracy of the Crank Arm – Arm	2
• Demonstrates a limited understanding of the quality procedures required to verify the accuracy of the Crank Arm – Arm	1

Sample answer/Answers could include:

Possible checking procedures would include:-

Double check marking out (measure twice, cut once)

Peer checking – give to another employee to double check your measurements

Supervisor/Quality Assurance checking

Use of appropriate gauges and tools

Question 18 (a)

Competencies assessed: MEM 12.23A

MARKING GUIDELINES

Criteria	Marks
• Provides the correct vernier reading	1

Sample answer/Answers could include:

28.14 mm

Question 18 (b)

Competencies assessed: MEM 12.23A

MARKING GUIDELINES

Criteria	Marks
• Provides the correct name and specific application	2
• Provides the correct name OR the specific application	1

Sample answer/Answers could include:

Centre Square, locating/checking the centres of round stock

Question 18 (c) (i)

Competencies assessed: MEM 9.2B, MEM 12.24A

MARKING GUIDELINES

Criteria	Marks
• Correctly calculates shaft AND hole tolerances	2
• Correctly calculates shaft OR hole tolerances	1

Sample answer/Answers could include:

- Shaft tolerance = 0.020 mm
- Hole tolerance = 0.060 mm

Question 18 (c) (ii)

Competencies assessed: MEM 9.2B, MEM 12.24A

MARKING GUIDELINES

Criteria	Marks
• Correctly calculates the clearance showing all required working	2
• Correctly calculates the clearance OR correctly calculates a clearance using incorrect data	1

Sample answer/Answers could include:

Clearance = maximum hole – minimum shaft
= 20.210 – 20.130
= 0.080 mm

Question 18 (d)

Competencies assessed: MEM 12.23A

MARKING GUIDELINES

Criteria	Marks
• Response shows a comprehensive understanding of the care and storage of measuring devices	3
• Response shows a reasonable understanding of the care and storage of measuring devices	2
• Response shows a limited understanding of the care and storage of measuring devices	1

Sample answer/Answers could include:

Destructive storage – avoid situations that will cause damage, eg stored with files
Destructive handling – used appropriately, eg not using an engineers square as a hammer
Environment damages – not allowing rust to form
Maintenance issues – keeping clean and lubricated where necessary

These will prolong the life and accuracy of the tools

Question 19 (a)

Competencies assessed: MEM 18.2B

MARKING GUIDELINES

Criteria	Marks
• Provides FOUR correct responses	4
• Provides THREE correct responses	3
• Provides TWO correct responses	2
• Provides ONE correct responses	1

Sample answer/Answers could include:

Portable battery/cordless drill – drilling small holes remote from power point, screwdriver
Portable nibbler – cutting irregular shapes in sheet metal

Question 19 (b)

Competencies assessed: MEM 18.2B, MEM 13.14A

MARKING GUIDELINES

Criteria	Marks
• Outlines a series of possible and correct pre-operational checks	3
• Provides TWO possible and correct pre-operational checks	2
• Lists a possible and correct pre-operational check	1

Sample answer/Answers could include:

Current test tag
Damage to leads/plugs – exposed wires
Damage to case
Safety guards attached and secure
Switch is functional
Tools is appropriate for task

Section III

Question 20

Competencies assessed: MEM 13.14A

MARKING GUIDELINES

Criteria	Marks
• Demonstrates an extensive knowledge and understanding of accident prevention in a metal and engineering environment • Describes at an in-depth level the safe use of tools, machines and equipment, in a well-reasoned and cohesive response • Communicates, using precise industry terminology, the importance of safe working practices and associated techniques in accident prevention	13–15
• Demonstrates a thorough knowledge and understanding of accident prevention in a metal and engineering environment • Describes at a detailed level the safe use of tools, machines and equipment, in a clear and organised response • Communicates, using industry terminology, safe working practices and associated techniques in accident prevention	10–12
• Demonstrates a sound knowledge and understanding of accident prevention in a metal and engineering environment • Describes at a basic level the safe use of tools, machines and equipment, with a substantially well-reasoned and organised response • Communicates, in general terms, some safe working practices and associated techniques in accident prevention	7–9
• Demonstrates some knowledge and understanding of accident prevention in a metal and engineering environment • Describes the safe use of some tools, machines and equipment with some organisation evident in the response • Mentions some safe working practices or associated techniques in accident prevention	4–6
• Demonstrates a minimal knowledge and understanding of accident prevention in a metal and engineering environment • Describes the safe use of a limited number of tools, machines and equipment with little evidence of reasoning or cohesion in response • Mentions, using non-industry specific terms, some safe working practices or associated techniques in accident prevention	1–3

Sample answer/Answers could include:

In any engineering workplace, whether it be a school or a work placement, there are many possibilities of accidents occurring. In all situations there should be an approach by both employers and employees that reduces the potential for accidents and associated injuries to occur.

Primary in the area of accident reduction is the induction of new employees. This can take many forms but it should allow employees to carry out work safely and in accordance with company policy and procedures, and in keeping with current legislation. Some examples of induction programs may include:-

- An explanation of a site safety plan
- Emergency evacuation procedures
- Training and operating manuals
- Standard operating procedures
- MSDS sheets for chemicals
- Correct supply and use of PPE
- Manual handling training

These types of induction ensures that the responsibilities and duties of all employees are understood and demonstrated on a day to day basis.

Another major way in which accidents and injuries can be reduced is by way of appropriate industrial housekeeping and clean up procedures. Housekeeping can involve some or all of the following strategies:-

- Cleaning techniques, such as brushing and sweeping
- The correct storage and maintenance of tools and equipment
- The correct storage and use of raw materials
- The containment of loose and/or scrap materials

In addition to these strategies many industrial sites have channels of communication and systems that constantly monitor, record and advise of potential hazardous situations.

Communication methods and systems that communicate hazards can include:-

- Safety signage indicating dangerous objects, materials or situations
- The formation of OHS committees or the election of representatives to monitor, report and advise of OHS issues
- Accident reports and statistics to allow for preventative techniques and hazard identification

While not exhaustive the above examples outline the primary measures that could be taken and these certainly contribute to the right of employers and employees to a safe and healthy work place.

Question 21

Competencies assessed: Manufacturing, engineering and related services industries induction

MARKING GUIDELINES

Criteria	Marks
• Demonstrates an extensive knowledge and understanding of waste identification and minimisation • Describes at an in-depth level maintenance strategies and waste minimisation, in a well-reasoned and cohesive response • Communicates, using precise industry terminology, waste management issues and the impact on industry	13–15
• Demonstrates a thorough knowledge and understanding of waste identification and minimisation • Outlines detailed maintenance strategies and waste minimisation, in a clear and organised response • Communicates, using industry terminology, waste management issues and the impact on industry	10–12
• Demonstrates a sound knowledge and understanding of waste identification and minimisation • Outlines at a basic level maintenance strategies and waste minimisation, with a substantially well-reasoned and organised response • Communicates, in general terms, some waste management issues	7–9
• Demonstrates some knowledge and understanding of waste identification and minimisation • Describes some maintenance strategies and/or examples of waste minimisation with some organisation evident in the response • Lists examples of manufacturing industry waste	4–6
• Demonstrates a minimal knowledge and understanding of waste identification and minimisation • Describes a maintenance strategy and/or limited examples of waste minimisation with little evidence of reasoning or cohesion in response • Lists, using non-industry specific terms some examples of waste	1–3

Sample answer/Answers could include:

Metal and engineering industries, like many industries, produce waste. Industrial and engineering sectors can adopt a series of strategies in order to eliminate, or at least minimise the amount of scrap metal and waste materials.

Primary to these strategies is the ability of the individual industry to identify areas of potential wastage and report on them. The identification and reporting process helps keep track of the issues, reminds employers and employees of the potential deleterious effects of the waste and allows for the effective management of the scrap metal and waste materials.

Waste management strategies aim to eliminate scrap metal and waste before it is produced or to reduce its quantity and toxicity after production. It would be difficult to completely eliminate waste from industrial processes, so it would appear that waste minimisation strategies would be more appropriate.

Waste minimisation could involve some or all of the following strategies. They are based on the simple but effective concepts of reduce, reuse or recycle.

The effective design of products enable a reduction of scrap metal and waste materials. Examples of pre-production strategies that would assist in this area could include:-

- Accurate measurements and calculations to make the most of the raw materials. Examples of this is the use of "nesting" techniques. Nesting is best described as the geometric layout of components for the optimal use of material

- This area also includes the thoughtful design of components that have a long service life, and have the potential to be recycled or refurbished for future use. This is particularly pertinent in the recycling of both ferrous and non-ferrous metals

- The use of environmentally friendly, biodegradable/non-toxic materials and/or recycled materials support the reduction of waste. This is particularly important when industries used organic lubricants, water for cooling and plastics for packaging

Improving operating and processing procedures within the industrial setting can also assist in the minimisation of scrap metal and waste materials. Techniques could include:-

- The implementation of sound housekeeping procedures by keeping storage and work areas clean, organised and labelled. This allows for a work environment that is conducive to positive attitudes towards minimising waste creation

- The regular review of inventory and stock management procedures. This may help identify any materials that are being over-used, whether materials being delivered are in an acceptable condition, and the batches of materials that need to be used next. Management procedures such as a 'first in, first out' materials policy avoids wastage of materials that are out of date – such as steels effected by corrosion

- Recycling that involves the collection, separation and processing to specification of scrap metals and waste materials and their use as raw materials for manufacture into new products. If possible wastes and off-cuts should be used on-site. If scrap metal and

waste materials are used on-site they should be classified, labelled and packaged properly

- The regular and efficient maintenance of machinery and equipment so as to reduce errors and faulty products also assists the reduction of waste. It allows for the creation of products within customer specification and to a quality standard, which is less likely to be discarded

Manufacturing and engineering industries produce scrap metal and waste materials. This has a negative effect on both the company's personnel and profits, as well as the environment. It makes good sense for industries to look at the materials, processes and equipment they use to see whether they can prevent and reduce waste rather than the treat and dispose of it.

Question 22

Competencies assessed: MEM 16.7A

MARKING GUIDELINES

Criteria	Marks
• Demonstrates an extensive knowledge and understanding of identifying task requirements and communication techniques • Describes at an in-depth level verbal, written and non-verbal modes of communication, in a well-reasoned and cohesive response • Communicates, using precise industry terminology, a range of examples for work instructions and procedures	13–15
• Demonstrates a thorough knowledge and understanding of identifying task requirements and communication techniques • Describes at a detailed level verbal, written and non-verbal modes of communication, in a clear and organised response • Communicates, using industry terminology, a range of examples for work instructions and procedures	10–12
• Demonstrates a sound knowledge and understanding of identifying task requirements and communication techniques • Describes at a basic level verbal, written and non-verbal modes of communication, with a substantially well-reasoned and organised response • Communicates, in general terms, some examples for work instructions and procedures	7–9
• Demonstrates some knowledge and understanding of identifying task requirements and communication techniques • Describes several modes of communication with some organisation evident in the response • Mentions some examples for work instructions and procedures	4–6
• Demonstrates minimal knowledge and understanding of identifying task requirements and communication techniques • Describes verbal and/or written and/or non-verbal modes of communication with little evidence of reasoning or cohesion in response • Mentions, using non-industry specific terms, limited sources for work instructions and procedures	1–3

Sample answer/Answers could include:

Communication is a vital element in the day to day functioning of an organisation. It is of particular importance when organising and planning for routine tasks that are at the heart of the industry.

An employee in an engineering workshop needs to be competent in receiving communications in a variety of methods such as verbal, written and non-verbal.

Verbal communications are most usually individual face to face meetings – such as an employer and employee, via telephony or group situations such as at work place meetings.
Verbal communications that are received require competence in listening skills. This means listening carefully, noting important points and seeking clarification when required. It is often a good strategy for the receiver of the communication to repeat the message to ensure complete understanding and accuracy.

Written communications that are received could be in the form of simple memos and messages, detailed job plans and descriptions, forms role statements, technical manuals to name but a few.

All written communication requires competence in reading and comprehension so that the reader is able to receive the correct information. There are a variety of techniques that help the reader understand the full meaning of the document. Highlighting important points, making summaries and clarifying issues with others all assist in understanding.

Non-verbal communications are generally in the form of engineering drawings, design sketches or simple freehand sketches. These drawings can be formal eg. orthogonal, following sets of standards or informal sketches that quickly relay ideas and concepts.

The receiver of these graphic communications needs to be familiar with these drawing techniques. A lack of knowledge of techniques, standards etc could lead to the incorrect interpretation of the communication.

In the workplace poor communication, especially the receiving and interpretation of communications can cause production and administrative errors which will cost the industry in terms of lost time, profits and consumer confidence.