edexcel
advancing learning, changing lives

Engineering Level 3 Unit 3

Diploma Portfolio Extracts

A PEARSON COMPANY

Edexcel, a Pearson company, is the UK's largest awarding body, offering academic and vocational qualifications to more than 25,000 schools, colleges, employers and other places of learning in the UK and in over 100 countries worldwide. Qualifications include GCSEs, AS and A Levels, NVQs, Diplomas and our BTEC suite of vocational qualifications from entry level to BTEC Higher National Diplomas, recognised by employers and higher education institutions worldwide.

We deliver 9.4 million exam scripts each year, with more than 90% of exam papers marked onscreen annually. As part of Pearson, Edexcel continues to invest in cutting-edge technology that has revolutionised the examinations and assessment system. This includes the ability to provide detailed performance data to tutors and students which helps to raise attainment.

References to third-party material made in this specification are made in good faith. Edexcel does not endorse, approve or accept responsibility for the content of materials, which may be subject to change, or any opinions expressed therein. (Material may include textbooks, journals, magazines and other publications and websites.)

Authorised by Nick Kelly
Prepared by Mark Woodcock

Foreword

Welcome to the sample of portfolio guidance extracts for Phase One Principal Learning subjects. We are delighted to continue to add to the range of support materials Edexcel has on offer to further support Consortia in maximising their Principal Learning performance. For our full range of information and guidance across administration, delivery and assessment support please see our website www.edexcel.com/diploma, or contact the DAB delivery team to access our range or training and support.

Purpose

The purpose of these materials is to help practitioners understand the requirements of the Principal Learning unit assessment through review and commentary on extracts of learner work. We have used a selection of learner evidence across a range of learner performance to help improve understanding of how to maximise performance.

This material has been selected and commented on by our Senior Moderation team after the first year of reviewing and setting the standards on the initial cohort of learners. Please ensure to read all of the commentary available as this aims to show how the extracted evidence used is relevant for that mark band and, where possible, what might make it suitable for the other bands.

If you have any feedback or comments regarding these materials, or any of our Diploma services, please contact diplomaops@edexcel.com. Alternatively for further discussion or questions around standards or Principal Learning specifications please use our **Ask The Expert service**, via our website, for a direct response from our Senior team within 2 working days.

Using these materials

The basic principle when awarding marks against the relevant mark grids is that it is 'best fit'. It is not a hurdle approach. Marks may be awarded from the next band if one or more of the items within the marking criteria have been met. With this in mind it is essential when reviewing the enclosed commentaries that you read the comments across all 3 of the marks bands.

All marks awarded on the enclosed sample assignments are for "Marking Grid A" only. The awarding of marks for "Mark Grid B", which is ephemeral, has not been commented on or included in the overall marks awarded.

This work is indicative only, not all learners will approach their assignments in the same way. Similarly, they will not necessarily present their evidence in the same format.

Important note!

The evidence contained within these pages has been extracted from a variety of completed portfolios and not all of the learner's evidence has therefore been included. These extracts are not designed to show you how much work to produce but show different types of evidence that could contribute to a learner's final work.

Your Training & Support from Edexcel

Edexcel offers a wide range of support and training to support you in the delivery of Principal Learning, managing your consortium, as well as all other Diploma components.

Training
Our training events are an ideal opportunity for you to understand the qualification requirements, share experience and learn from emerging practice. The sessions are designed to be practical, stimulating and informative, and are developed each year to reflect the evolving needs of practitioners.

Previewing the Diploma events are Line of Learning specific and designed for practitioners who will be delivering the Principal Learning for the first time, Local authority advisors and Diploma advisors.

Delivery and assessment events cover all of our lines of Principal Learning and are focused on approaches to planning for assessment, writing assignments and assessing learner work.

Developing assignments and assessing learners events cover all of our lines of Principal Learning and will review tutor support materials and will look at developing assignments as well as standardisation exercises.

Online training is an ideal opportunity for you to participate in training without leaving your centre. These events are short in duration, stimulating in content and designed to answer a training need identified by practitioners.

Consortium-based training is for any consortium or group of consortia, working together, who wishes to access our off-the-shelf training, delivered at a time and place of your choice. There is also the option to customise the events to suit your own individual requirements. These events are aimed at consortium managers, assessors and practitioners – in fact, your whole Diploma team!

To book or search for an event visit **www.edexcel.com/training** if you are an Edexcel Online user. If you are not an Edexcel Online user email your request to **trainingbookings@edexcel.com** so our training team can process the booking for you.

Alternatively, call 0844 576 0028 for further details and book your place.

Diploma Delivery Pack
Your **Diploma Delivery Pack** is an essential administrative support tool for your Consortium. It also contains important information for your exams office, your teachers and tutors! For example it includes:

- Administration, procedures and delivery options and requirements
- ASL cross sector model and sector specific model
- Introduction to Diploma planning and roles
- 36 example Delivery Plans across Levels 1 & 2 for Phase I & II Diplomas
- CD-ROM access with practical guidance and useful links

These are available through your local training events or via your DAB Centre Support Officer.

Contact us about this Diploma Sample Portfolio
If you have ideas, comments or suggestions on what went well and what can be improved, please email diplomaops@edexcel.com or call your DAB Centre Support Officer (CSO) on 0844 576 0028.

LO1 Examples

Focus
Know about the structure and their effects on the mechanical properties of engineering materials

(1)

Tom [redacted] Unit 3

Band 1

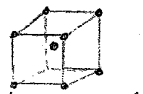
a) Crystal lattice structures are atoms that have adopted a certain formation in a material. The three main structures I shall look at are Body centred cubic (BCC), Face centred cubic (FCC) and Hexagonally closed packed (HCP). ~~Eac~~ All three of these structures are unique.

Body centred cubic have atoms at each corner of the cube like cell formation as well as an atom in the very centre. These structure is found in the cells of tungsten, for example that is used in the manufacture of darts.

Face centred cubic have atoms at every corner and side as well as an atom in the centre of the cell structure. Materials such as gold and silver are examples and are used in the manufacture of jewelry.

Hexagonally closed packed cells have atoms at imaginary corners of a hexagon. There is also a centre ~~atom~~ and 'tree' formation atoms that are both located at the centre.

• = atoms



Body - centred cubic

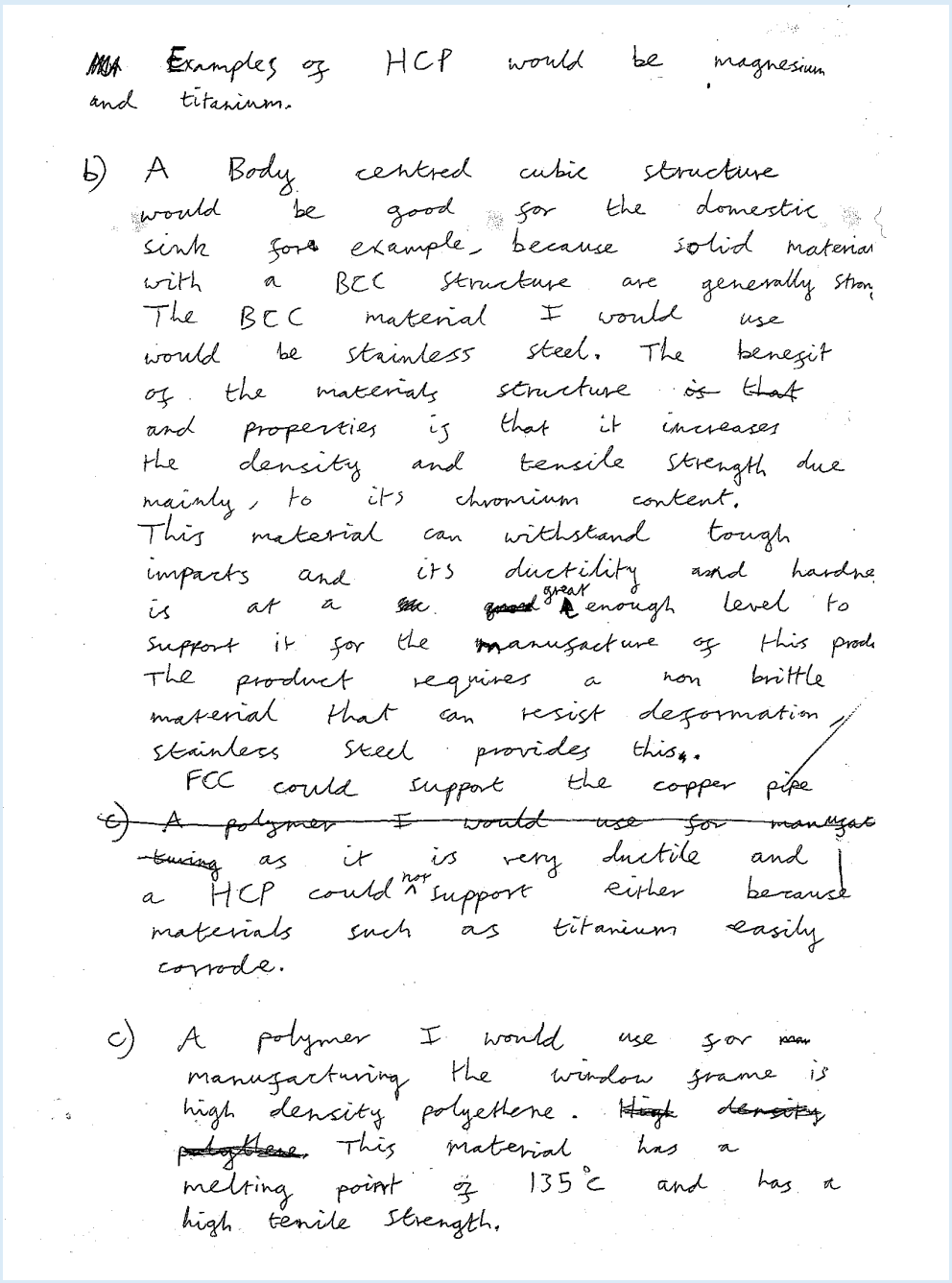
Face - centred cubic

Hexagonally closed

Mark Band 1
The learner has described each of the structures required and the effect on mechanical properties for both metals and polymers. Full marks can be awarded from this mark band.

Mark Band 2
The evidence also shows the effect on electrical properties for both types of materials therefore both marks from this mark band can be awarded.

Mark Band 3
There is reference to thermal properties and the effect on metals is described, however the description about thermal properties and polymers lacks technical reasoning and therefore the response can only attract one mark from this mark band.



Examples of HCP would be magnesium and titanium.

b) A Body centred cubic structure would be good for the domestic sink for example, because solid material with a BCC structure are generally stron The BCC material I would use would be stainless steel. The benefit of the materials structure ~~is that~~ and properties is that it increases the density and tensile strength due mainly, to its chromium content. This material can withstand tough impacts and its ductility and hardne is at a ~~good~~ great enough level to support it for the manufacture of this prod The product requires a non brittle material that can resist deformation, stainless steel provides this.

FCC could support the copper pipe

~~c) A polymer I would use for manufac turing~~ as it is very ductile and a HCP could not support either because materials such as titanium easily corrode.

c) A polymer I would use for manufacturing the window frame is high density polyethene. ~~High density polythene.~~ This material has a melting point of 135°C and has a high tensile strength.

Mark Band 1

The learner has described each of the structures required and the effect on mechanical properties for both metals and polymers. Full marks can be awarded from this mark band.

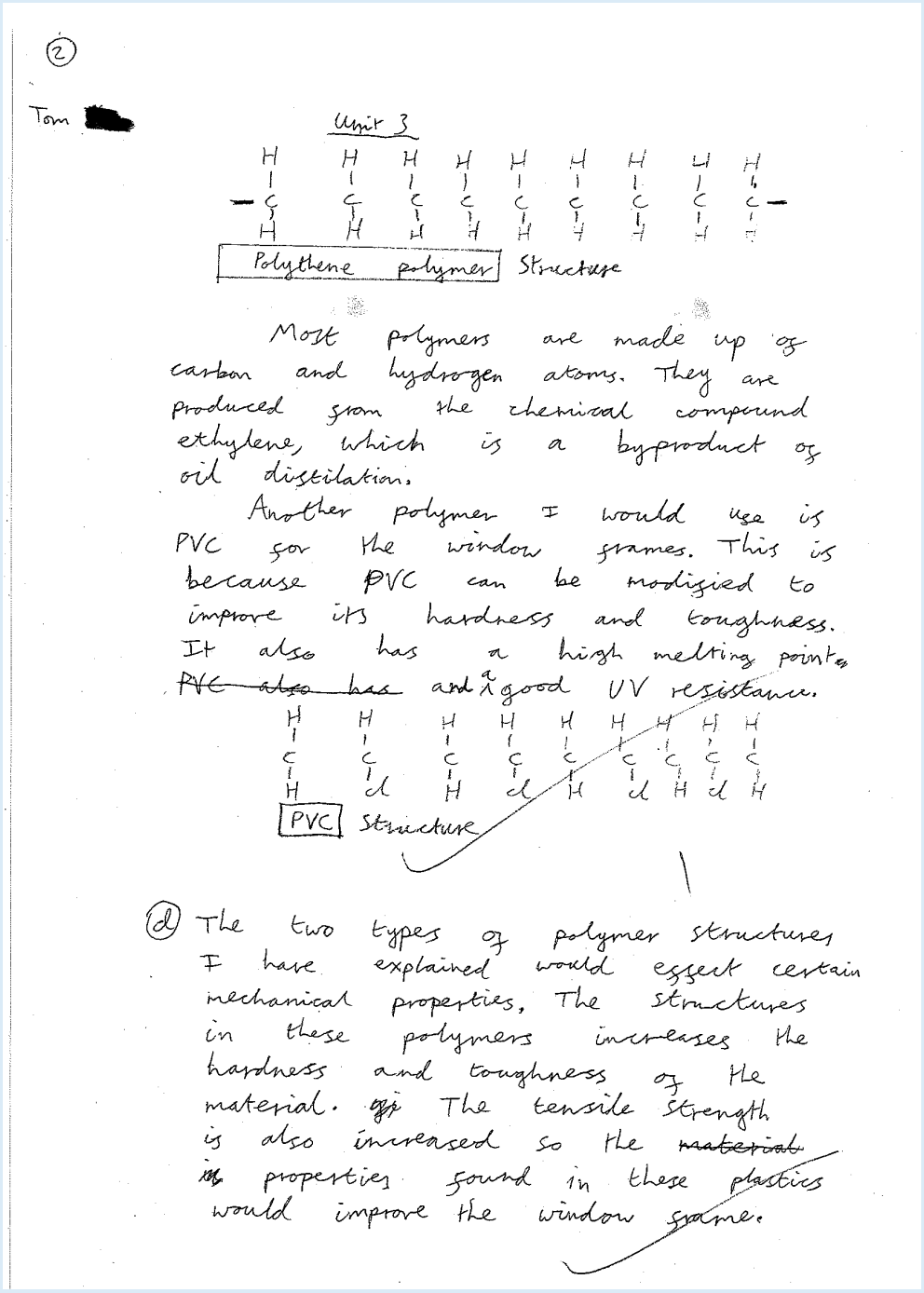
Mark Band 2

The evidence also shows the effect on electrical properties for both types of materials therefore both marks from this mark band can be awarded.

Mark Band 3

There is reference to thermal properties and the effect on metals is described, however the description about thermal properties and polymers lacks technical reasoning and therefore the response can only attract one mark from this mark band.

LO1 Examples continued



(2)

Tom [redacted]

Unit 3

Polythene polymer Structure

Most polymers are made up of carbon and hydrogen atoms. They are produced from the chemical compound ethylene, which is a byproduct of oil distillation.

Another polymer I would use is PVC for the window frames. This is because PVC can be modified to improve its hardness and toughness. It also has a high melting point ~~PVC also has~~ and a good UV resistance.

PVC Structure

(d) The two types of polymer structures I have explained would effect certain mechanical properties, The structures in these polymers increases the hardness and toughness of the material. The tensile strength is also increased so the ~~material~~ properties found in these plastics would improve the window frame.

Mark Band 1
The learner has described each of the structures required and the effect on mechanical properties for both metals and polymers. Full marks can be awarded from this mark band.

Mark Band 2
The evidence also shows the effect on electrical properties for both types of materials therefore both marks from this mark band can be awarded.

Mark Band 3
There is reference to thermal properties and the effect on metals is described, however the description about thermal properties and polymers lacks technical reasoning and therefore the response can only attract one mark from this mark band.

(3)

Tom [redacted]

Unit 3

Band 2

a) The internal structure of a metal ~~also~~ has an effect on the electrical properties of a metal. The structure of the metal allows ~~means~~ the material to ~~an~~ be a good conductor of electricity due to its free electrons. Free electrons are negatively charged particles which can freely move within its material. By moving freely around the metal, it is carrying a charge. Metals conducts this electricity well because of its low resistance. When it comes to metals with the best conductivity, copper is the industry standard.

b) On the other hand, the internal structure of polymers have proven to be poor conductors of electricity. The reason for this is that plastics have lower energy bands, ~~levels~~ so cannot conduct prior to the fact that they do not produce sufficient support for electricity conduction. Polymers can support static electricity due to the friction that allows them to ~~take~~ transfer ~~energy~~ electrons and neutrons.

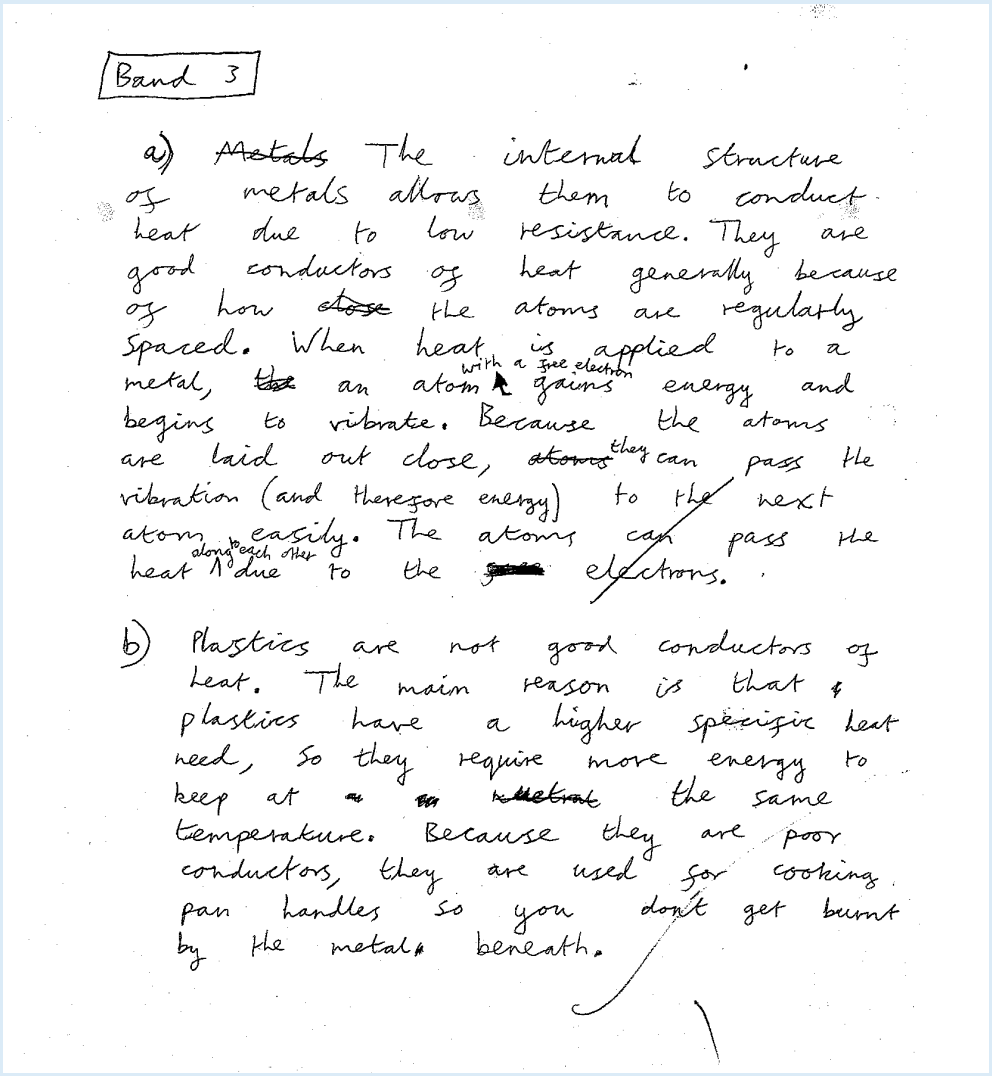
2

Mark Band 1
The learner has described each of the structures required and the effect on mechanical properties for both metals and polymers. Full marks can be awarded from this mark band.

Mark Band 2
The evidence also shows the effect on electrical properties for both types of materials therefore both marks from this mark band can be awarded.

Mark Band 3
There is reference to thermal properties and the effect on metals is described, however the description about thermal properties and polymers lacks technical reasoning and therefore the response can only attract one mark from this mark band.

LO1 Examples continued



Band 3

a) ~~Metals~~ The internal structure of metals allows them to conduct heat due to low resistance. They are good conductors of heat generally because of how ~~close~~ the atoms are regularly spaced. When heat is applied to a metal, ~~the~~ an atom with a free electron gains energy and begins to vibrate. Because the atoms are laid out close, ~~atoms~~ they can pass the vibration (and therefore energy) to the next atom easily. The atoms can pass the heat along to each other due to the ~~free~~ electrons.

b) Plastics are not good conductors of heat. The main reason is that plastics have a higher specific heat need, so they require more energy to keep at ~~a~~ ~~the~~ ~~electron~~ the same temperature. Because they are poor conductors, they are used for cooking pan handles so you don't get burnt by the metal beneath.

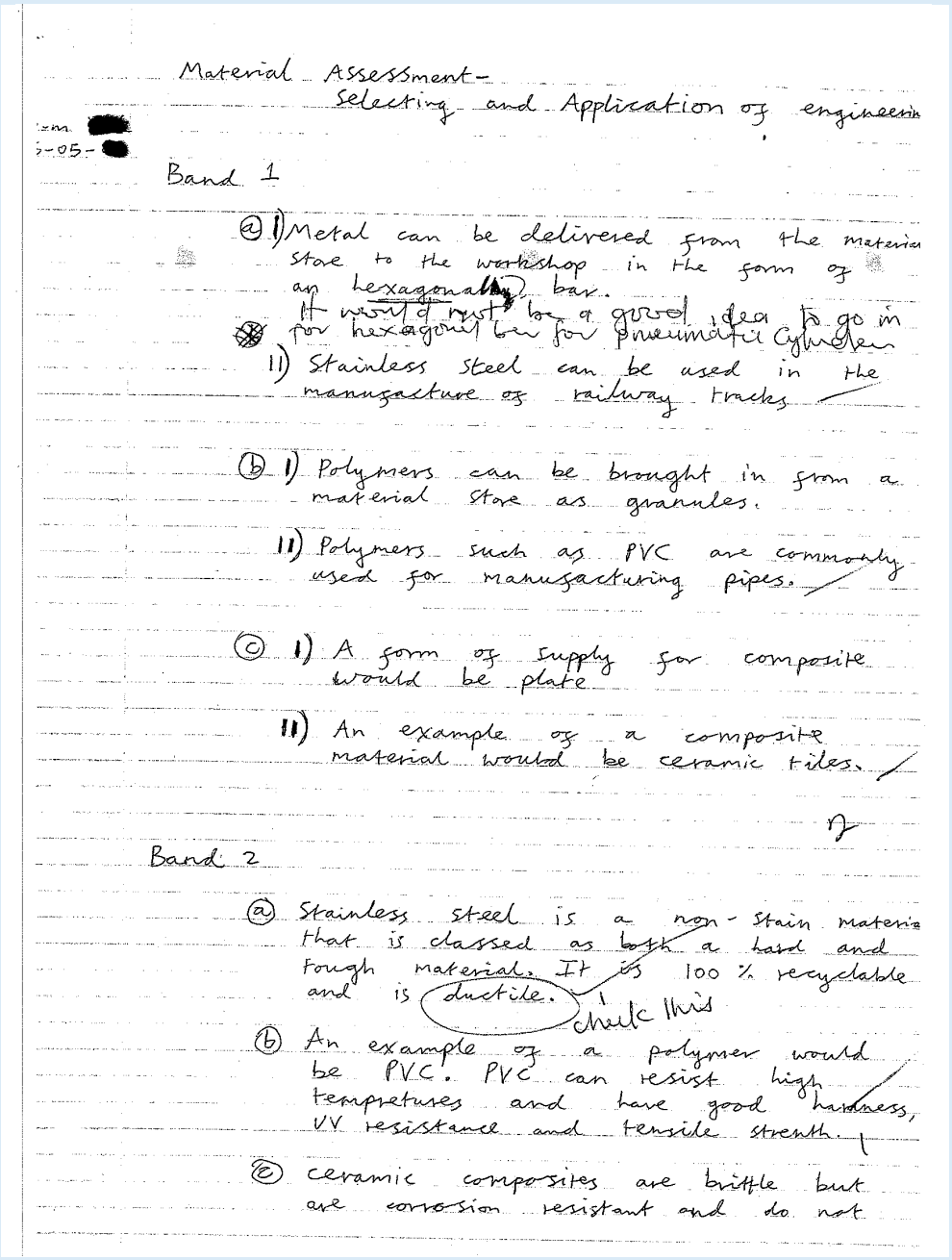
Mark Band 1
The learner has described each of the structures required and the effect on mechanical properties for both metals and polymers. Full marks can be awarded from this mark band.

Mark Band 2
The evidence also shows the effect on electrical properties for both types of materials therefore both marks from this mark band can be awarded.

Mark Band 3
There is reference to thermal properties and the effect on metals is described, however the description about thermal properties and polymers lacks technical reasoning and therefore the response can only attract one mark from this mark band.

LO2.1 Examples

Focus
Forms of supply and applications



Material Assessment –
Selecting and Application of engineering
[redacted]
-05-[redacted]

Band 1

(a) i) Metal can be delivered from the material store to the workshop in the form of an hexagonal bar.
It would not be a good idea to go in for hexagonal bar for pneumatic Cylinders
ii) Stainless steel can be used in the manufacture of railway tracks

(b) i) Polymers can be brought in from a material store as granules.

ii) Polymers such as PVC are commonly used for manufacturing pipes.

(c) i) A form of supply for composite would be plate

ii) An example of a composite material would be ceramic tiles.

Band 2

(a) Stainless steel is a non-stain material that is classed as both a hard and tough material. It is 100 % recyclable and is ductile. check this

(b) An example of a polymer would be PVC. PVC can resist high tempretures and have good hardness, UV resistance and tensile strenth.

(c) ceramic composites are brittle but are corrosion resistant and do not

Mark Band 1

The learner has been given products that metals, polymers and composites would be made from and not the actual specific material. This focus requires that they are given these, however the work produced describes a form of supply and application for each and so marks can be awarded from this mark band. The term 'plate' as a form of supply for a composite may be a little inaccurate.

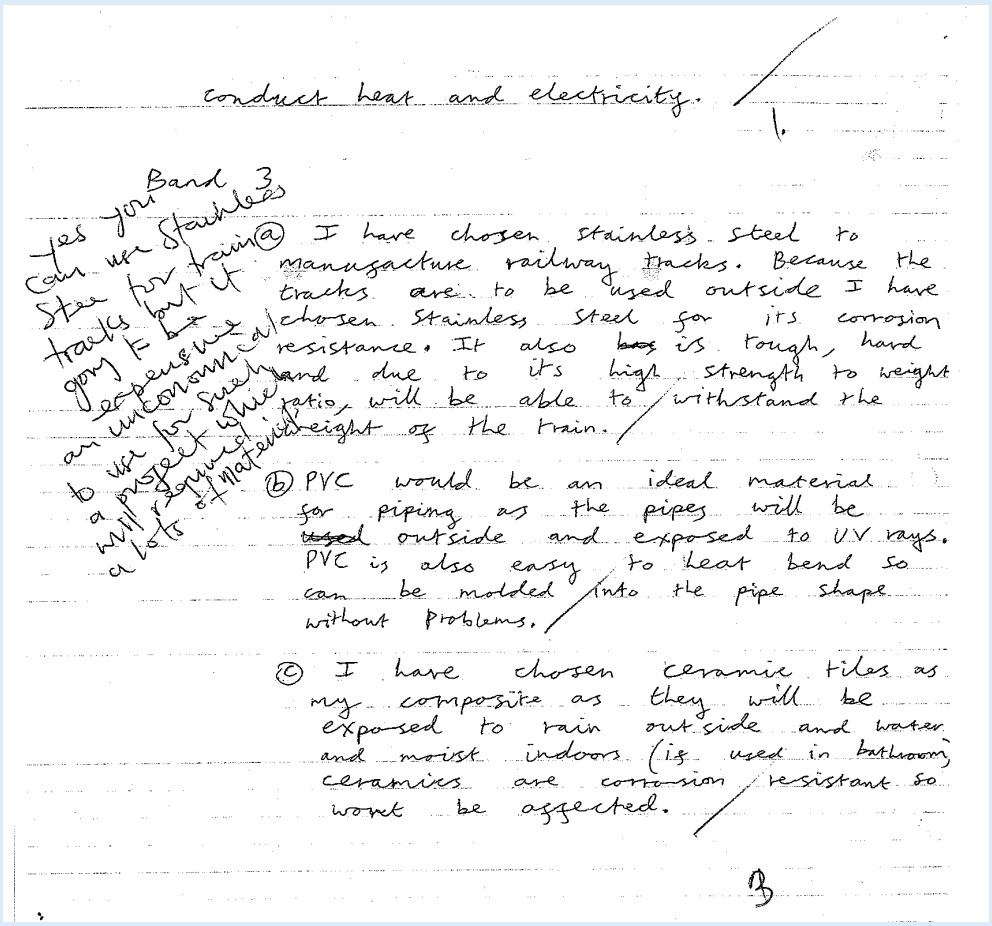
Mark Band 2

The properties for each material have been described. Some statements may show a lack of detailed knowledge about materials and their properties. Full marks can be awarded from this mark band.

Mark Band 3

Some justification has been given for a polymer and a composite however whist the justification of the use of stainless steel is correct the application is not appropriate. To improve the mark better justifications are required. This restricts marks from this mark band.

LO2.1 Examples continued



conduct heat and electricity. 1.

Band 3

yes you can use stainless steel for train tracks but it is expensive and uncommon for use for a project like this will require a lots of material

a) I have chosen stainless steel to manufacture railway tracks. Because the tracks are to be used outside I have chosen stainless steel for its corrosion resistance. It also ~~has~~ is tough, hard and due to its high strength to weight ratio, will be able to withstand the weight of the train.

b) PVC would be an ideal material for piping as the pipes will be ~~used~~ outside and exposed to UV rays. PVC is also easy to heat bend so can be molded into the pipe shape without problems.

c) I have chosen ceramic tiles as my composite as they will be exposed to rain outside and water and moist indoors (is used in bathroom) ceramics are corrosion resistant so wont be effected.

B

Mark Band 1

The learner has been given products that metals, polymers and composites would be made from and not the actual specific material. This focus requires that they are given these, however the work produced describes a form of supply and application for each and so marks can be awarded from this mark band. The term 'plate' as a form of supply for a composite may be a little inaccurate.

Mark Band 2

The properties for each material have been described. Some statements may show a lack of detailed knowledge about materials and their properties. Full marks can be awarded from this mark band.

Mark Band 3

Some justification has been given for a polymer and a composite however whist the justification of the use of stainless steel is correct the application is not appropriate. To improve the mark better justifications are required. This restricts marks from this mark band.

LO2.2 Examples

Focus
Information sources and material selection

Unit 3: Selecting and Application of Engineering Materials

Assessment for LO.2.2

Band 1
http://www.azom.com/Details.asp?ArticleID=1446
The site www.azom.com had information about aluminium. Aluminium has a weight of 2.7 g/cm^3. Aluminium is highly corrosion resistant, helped by its protective oxide coating, and is a non- toxic metal that makes it suitable for food stuffs as there is a very small risk of it reacting with food. Aluminium is also renown for generally being an excellent heat and electrical conductor and, in weight comparison, it is almost twice as good a conductor as copper. The heat exchanger could also benefit from the materials ductility, density and low melting point.

Aluminium is ductile and has a low melting point and density

1

Band 2
http://www.matweb.com/search/DataSheet.aspx?MatGUID=93a9f5357c084aa58b7cc6a7a16ad96a
I have researched Iron based alloy on www.matweb.com and found that the Incoloy alloy 907 possesses the properties to be a successfully solution. The Incoloy alloy has excellent strength at high temperatures, resulting in a melting point of 1335-1400°C and a good strength to weight ratio. The thermal conductivity of the Incoloy alloy 907 is 14.8 W/m-k which is within the requirement of the heat exchanger. This material does not react with foodstuffs; the end product (heat exchanger) will come into contact with food so this is a crucial piece of information and a main reason for the choosing this material.

3

Band 3
Finding the material was difficult as the search engine Google had many unsuccessful results for my searches. Thankfully I was able to find the two sites I used and was able to use the information to build strong evidence for using the highlighted materials in the solution. Matweb gave the information in a clear table-like format that made the information easy to manipulate. The azom sites information was also easy to use as it used sub headings to split the information. The data I needed was all available on both sites and the depth of the information was shown with precise figures on matweb but azom site had more facts and fewer figures to back up its information.

3

Thomas [redacted] Material Assessment

Mark Band 1
Again an information source should be given and not chosen by the learner. The task includes a source of information but unfortunately this was not used. Material has been selected for the given purpose. It is however appropriate to award full marks from this mark band.

Mark Band 2
A further information source has been used to select and verify the choice of material. Full marks can be awarded from this mark band. Copies of the information sources used have been included.

Mark Band 3
The justification has concentrated on comparing the two sources needed so this work can be awarded full marks from this mark band.

LO2.2 Examples continued

Aluminium - Advantages and Properties of Aluminium Page 1 of 2

azomaterials
AZoM.com | The A to Z of Materials
Search AZoM
Home | Directory | Content | Products | Publications | Information | Request Quote | Advertise
News | Articles | AZojomo Journal | Podcasts | Videos | Events | Courses | Jobs | Classifieds

Aluminium – Advantages and Properties of Aluminium

Topics Covered

Background

Physically, chemically and mechanically aluminium is a metal like steel, brass, copper, zinc, lead or titanium. It can be melted, cast, formed and machined much like these metals and it conducts electric current. In fact often the same equipment and fabrication methods are used as for steel.

Light Weight

Aluminium is a very light metal with a specific weight of 2.7 g/cm^3, about a third that of steel. For example, the use of aluminium in vehicles reduces dead-weight and energy consumption while increasing load capacity. Its strength can be adapted to the application required by modifying the composition of its alloys.

Corrosion Resistance

Aluminium naturally generates a protective oxide coating and is highly corrosion resistant. Different types of surface treatment such as anodising, painting or lacquering can further improve this property. It is particularly useful for applications where protection and conservation are required.

Electrical and Thermal Conductivity

Aluminium is an excellent heat and electricity conductor and in relation to its weight is almost twice as good a conductor as copper. This has made aluminium the most commonly used material in major power transmission lines.

Reflectivity

Aluminium is a good reflector of visible light as well as heat, and that together with its low weight, makes it an ideal material for reflectors in, for example, light fittings or rescue blankets.

View Properties
Email / Share
Key Suppliers
Metallurg Aluminium
Metallurg Aluminium - North America
Metallurg Aluminium - South & Central America
Goodfellow
Buy Aluminium From Goodfellow
Hadco Metal - Stockists of Aluminum, Stainless Steel and Magnesium
Key Services
European Aluminium Association
Key Experts
Daniel Liang
Books ASM
Aluminum Alloy Castings: Properties, Processes, and Applications
Aluminum Extrusion Technology
Aluminum: Properties and Physical Metallurgy
ASM Handbook Volume 02: Properties and Selection: Nonferrous Alloys and Special-Purpose Materials
ASM Handbook Volume 13B Corrosion: Materials

Thomas [redacted] Material Assessment

http://www.azom.com/Details.asp?ArticleID=1446 19/05/[redacted]

Mark Band 1
Again an information source should be given and not chosen by the learner. The task includes a source of information but unfortunately this was not used. Material has been selected for the given purpose. It is however appropriate to award full marks from this mark band.

Mark Band 2
A further information source has been used to select and verify the choice of material. Full marks can be awarded from this mark band. Copies of the information sources used have been included.

Mark Band 3
The justification has concentrated on comparing the two sources needed so this work can be awarded full marks from this mark band.

LO2.2 Examples continued

Aluminium - Advantages and Properties of Aluminium — Page 2 of 2

Ductility

Aluminium is ductile and has a low melting point and density. In a molten condition it can be processed in a number of ways. Its ductility allows products of aluminium to be basically formed close to the end of the product's design.

Impermeable and Odourless

Aluminium foil, even when it is rolled to only 0.007 mm thickness, is still completely impermeable and lets neither light aroma nor taste substances out. Moreover, the metal itself is non-toxic and releases no aroma or taste substances which makes it ideal for packaging sensitive products such as food or pharmaceuticals.

Recyclability

Aluminium is 100 percent recyclable with no downgrading of its qualities. The re-melting of aluminium requires little energy: only about 5 percent of the energy required to produce the primary metal initially is needed in the recycling process.

Source: European Aluminium Association

For more information on this source please visit European Aluminium Association.

Date Added: Jun 4, 2002

Search AZoM Articles

ASM Specialty Handbook: Aluminum and Aluminum Alloys

Corrosion of Aluminum and Aluminum Alloys

Friction Stir Welding and Processing

Metallurgy for the Non-Metallurgist

Parametric Analyses of High-Temperature Data for Aluminum Alloys

Books Elsevier

Light Alloys, 4th Edition - From Traditional Alloys to Nanocrystals

Books Taylor & Francis

Aluminum Recycling

Δ Top

Back One

Thomas [redacted] Material Assessment

http://www.azom.com/Details.asp?ArticleID=1446 19/05/[redacted]

Mark Band 1

Again an information source should be given and not chosen by the learner. The task includes a source of information but unfortunately this was not used. Material has been selected for the given purpose. It is however appropriate to award full marks from this mark band.

Mark Band 2

A further information source has been used to select and verify the choice of material. Full marks can be awarded from this mark band. Copies of the information sources used have been included.

Mark Band 3

The justification has concentrated on comparing the two sources needed so this work can be awarded full marks from this mark band.

LO2.2 Examples continued

Special Metals INCOLOY® Alloy 907

Categories: Metal; Superalloy; Iron Base

Material Notes: A nickel-iron-cobalt alloy with additions of niobium and titanium for precipitation hardening. It has the low coefficient of expansion and high strength of INCOLOY alloy 903 but with improved notch-rupture properties at elevated temperatures. Used for components of gas turbines including seals, shafts, and casings. Standard product forms are round, flats, forging stock, extruded section, and wire.

Data provided by the manufacturer, Special Metals.

Key Words: UNS N19907

Vendors: Click here to view all available suppliers for this material.

Please click here if you are a supplier and would like information on how to add your listing to this material.

Physical Properties	Metric	English	Comments
Density	8.33 g/cc	0.301 lb/in³	

Mechanical Properties	Metric	English	Comments
Tensile Strength, Ultimate	1140 MPa @Temperature 550 °C	165000 psi @Temperature 1020 °F	Precipitation Hardened prior to test
	1350 MPa	196000 psi	Precipitation Hardened. Value at room temperature.
Tensile Strength, Yield	970 MPa @Temperature 550 °C	141000 psi @Temperature 1020 °F	Precipitation Hardened prior to test; 0.2% offset
	1100 MPa	160000 psi	Precipitation Hardened. Value at room temperature; 0.2% offset.
Elongation at Break	10.0 %	10.0 %	Precipitation Hardened
	10.0 % @Temperature 550 °C	10.0 % @Temperature 1020 °F	Precipitation Hardened prior to test.

Electrical Properties	Metric	English	Comments
Electrical Resistivity	0.0000697 ohm-cm	0.0000697 ohm-cm	
Curie Temperature	427.5 °C	801.5 °F	Range is 400-455°C

Thermal Properties	Metric	English	Comments
CTE, linear	7.70 µm/m-°C @Temperature 20.0 - 427 °C	4.28 µin/in-°F @Temperature 68.0 - 801 °F	
Specific Heat Capacity	0.431 J/g-°C	0.103 BTU/lb-°F	
Thermal Conductivity	14.8 W/m-K	103 BTU-in/hr-ft²-°F	
Melting Point	1335 - 1400 °C	2435 - 2550 °F	
Solidus	1335 °C	2435 °F	
Liquidus	1400 °C	2550 °F	

Material Components Properties	Metric	English	Comments
Aluminum, Al	0.030 %	0.030 %	
Cobalt, Co	13.0 %	13.0 %	
Iron, Fe	42.0 %	42.0 %	
Nickel, Ni	38.0 %	38.0 %	
Niobium, Nb (Columbium, Cb)	4.70 %	4.70 %	
Silicon, Si	0.15 %	0.15 %	
Titanium, Ti	1.50 %	1.50 %	

Thomas [redacted] Material Assessment

http://www.matweb.com/search/DataSheet.aspx?MatGUID=... 12/05 [redacted]

Mark Band 1

Again an information source should be given and not chosen by the learner. The task includes a source of information but unfortunately this was not used. Material has been selected for the given purpose. It is however appropriate to award full marks from this mark band.

Mark Band 2

A further information source has been used to select and verify the choice of material. Full marks can be awarded from this mark band. Copies of the information sources used have been included.

Mark Band 3

The justification has concentrated on comparing the two sources needed so this work can be awarded full marks from this mark band.

LO2.2 Examples continued

Special Metals INCOLOY® Alloy 907 Page 2 of 2

Some of the values displayed above may have been converted from their original units and/or rounded in order to display the information in a consistant format. Users requiring more precise data for scientific or engineering calculations can click on the property value to see the original value as well as raw conversions to equivalent units. We advise that you only use the original value or one of its raw conversions in your calculations to minimize rounding error. We also ask that you refer to MatWeb's disclaimer and terms of use regarding this information. Click here to view all the property values for this datasheet as they were originally entered into MatWeb.

Users viewing this material also viewed the following:
Special Metals INCOLOY® Alloy 903
Special Metals INCOLOY® Alloy 909
Special Metals INCOLOY® Alloy 925
Special Metals INCOLOY® Alloy MA 956
Special Metals NI-SPAN-C™ Alloy 902

NINC85 / 17428

Thomas [redacted] Material Assessment

http://www.matweb.com/search/DataSheet.aspx?MatGUID=02a0f52f57a984...

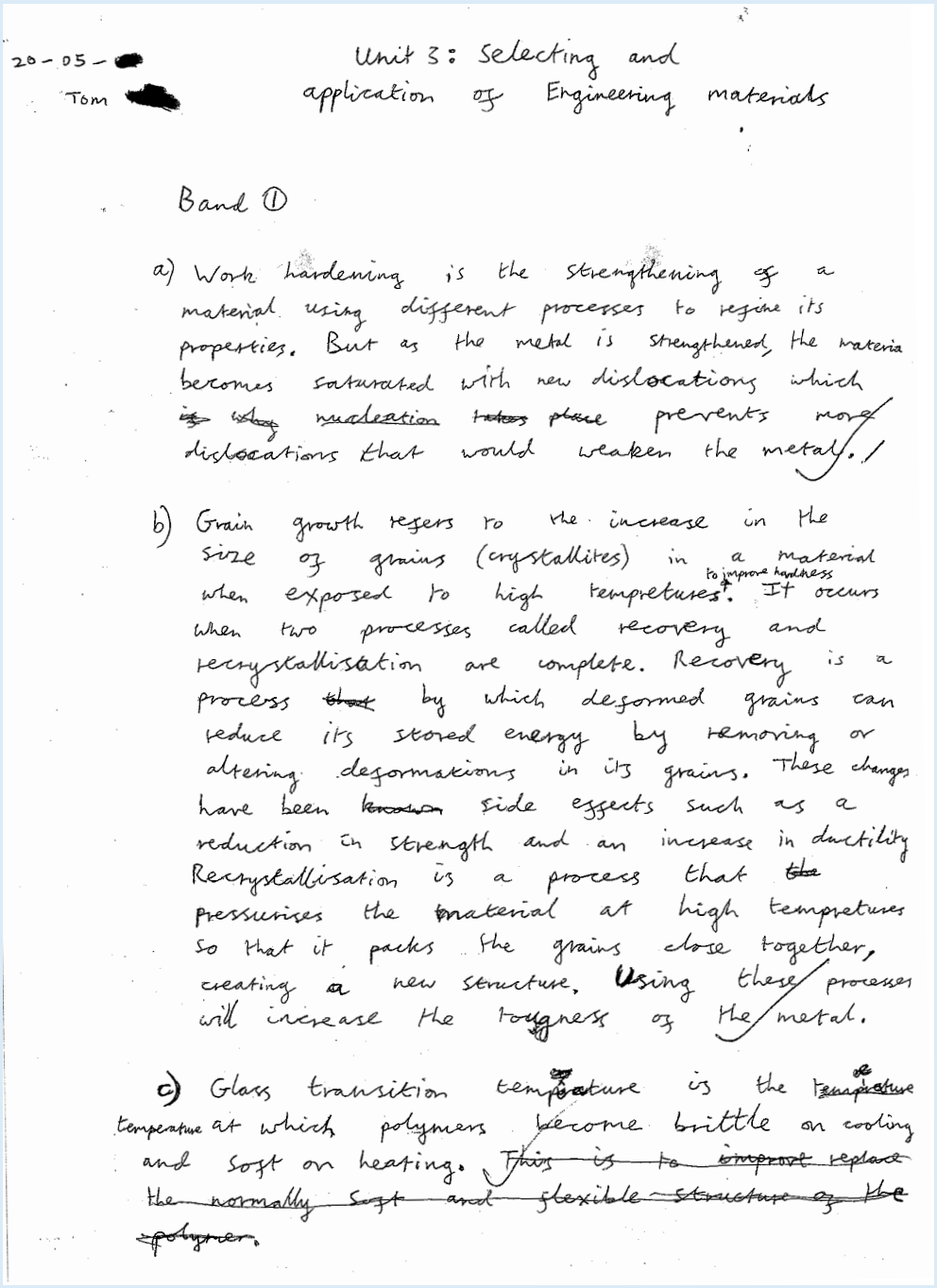
Mark Band 1
Again an information source should be given and not chosen by the learner. The task includes a source of information but unfortunately this was not used. Material has been selected for the given purpose. It is however appropriate to award full marks from this mark band.

Mark Band 2
A further information source has been used to select and verify the choice of material. Full marks can be awarded from this mark band. Copies of the information sources used have been included.

Mark Band 3
The justification has concentrated on comparing the two sources needed so this work can be awarded full marks from this mark band.

LO3.1 Examples

Focus
Impact of processing



20-05-[redacted]
Tom [redacted]

Unit 3: Selecting and application of Engineering materials

Band ①

a) Work hardening is the strengthening of a material using different processes to refine its properties. But as the metal is strengthened, the materia becomes saturated with new dislocations which ~~is~~ ~~stop~~ ~~nucleation~~ ~~takes~~ ~~place~~ prevents more dislocations that would weaken the metal.

b) Grain growth refers to the increase in the size of grains (crystallites) in a material when exposed to high tempretures to improve hardness. It occurs when two processes called recovery and recrystallisation are complete. Recovery is a process ~~that~~ by which deformed grains can reduce its stored energy by removing or altering deformations in its grains. These changes have been ~~known~~ side effects such as a reduction in strength and an increase in ductility Recrystallisation is a process that ~~the~~ pressurises the ~~material~~ at high tempretures so that it packs the grains close together, creating a new structure. Using these processes will increase the toughness of the metal.

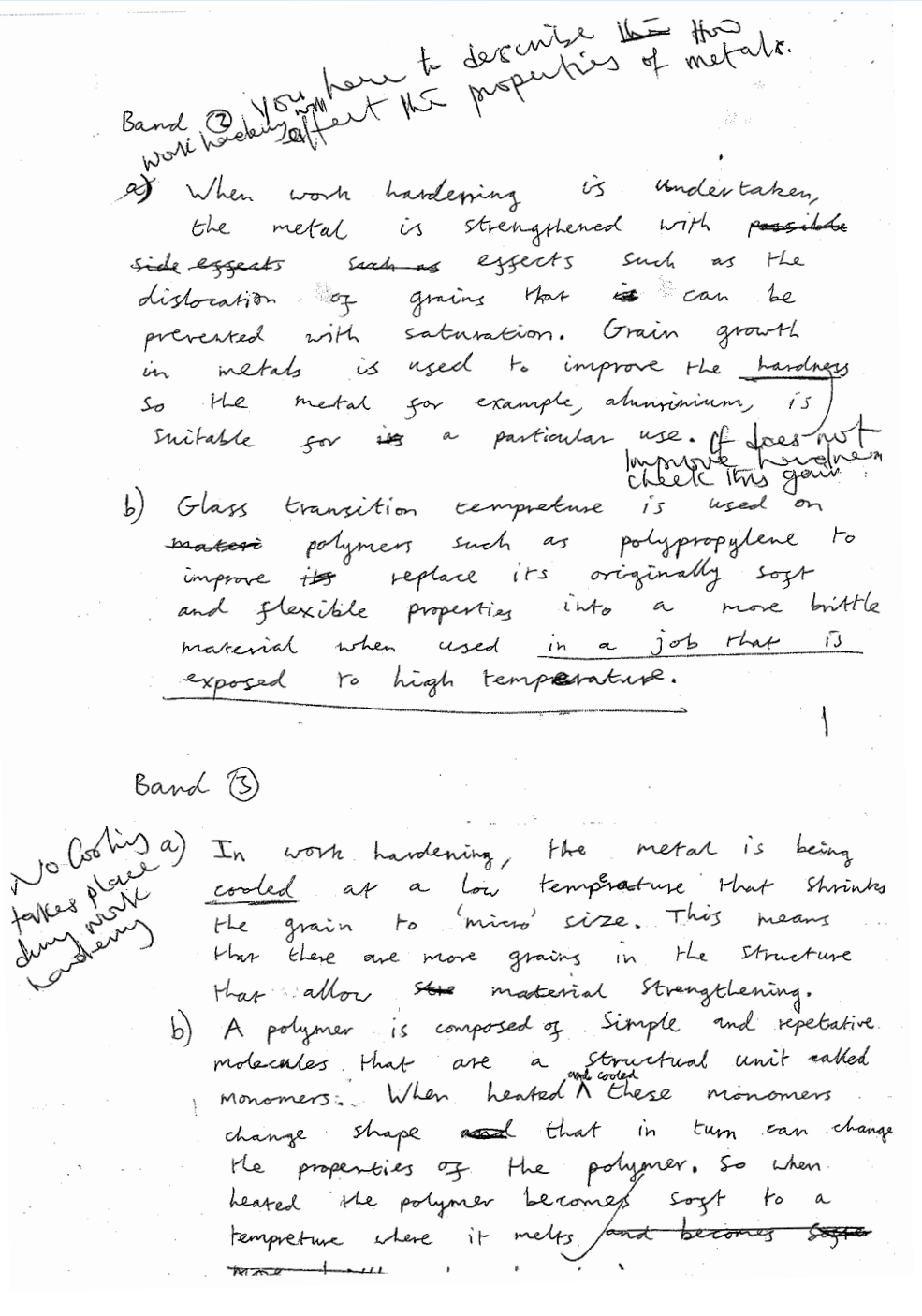
c) Glass transition ~~temperature~~ is the ~~temperature~~ temperature at which polymers become brittle on cooling and soft on heating. ~~This is to improve replace the normally soft and flexible structure of the polymer.~~

Mark Band 1
Work hardening has been described well, along with grain growth in metals and although the description of glass transition in polymers is limited full marks can be awarded from this mark band.

Mark Band 2
Discussion about changes to the properties is mentioned however there is confusion over changes in properties that occur. This does, however, mean that only one mark can be awarded from this mark band.

Mark Band 3
There is a response to the task addressing mark band 3 however there is confusion again and not enough detail to award any marks from this mark band.

LO3.1 Examples continued



Band (2) You have to describe how work hardening affect the properties of metals.

a) When work hardening is undertaken, the metal is strengthened with ~~possible side effects~~ ~~such as~~ effects such as the dislocation of grains that ~~is~~ can be prevented with saturation. Grain growth in metals is used to improve the hardness so the metal for example, aluminium, is suitable for ~~its~~ a particular use. It does not improve hardness check this grain

b) Glass transition temperature is used on ~~plastic~~ polymers such as polypropylene to improve ~~its~~ replace its originally soft and flexible properties into a more brittle material when used in a job that is exposed to high temperature.

Band (3)

No Cooling takes place during work hardening

a) In work hardening, the metal is being cooled at a low temperature that shrinks the grain to 'micro' size. This means that there are more grains in the structure that allow ~~the~~ material strengthening.

b) A polymer is composed of simple and repetative molecules that are a structural unit called monomers. When heated ^ and cooled these monomers change shape ~~and~~ that in turn can change the properties of the polymer. So when heated the polymer becomes soft to a temperature where it melts ~~and becomes soft~~

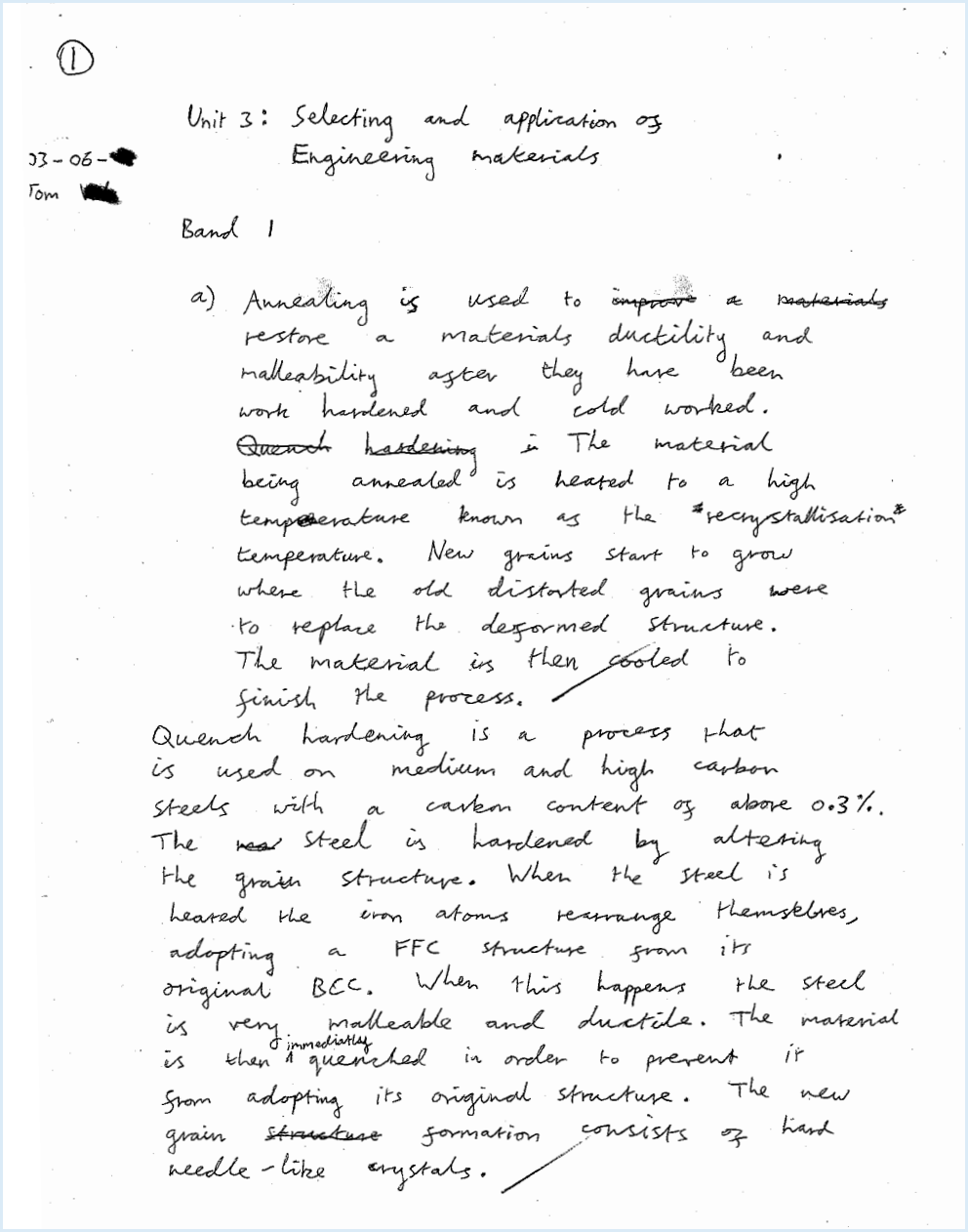
Mark Band 1
Work hardening has been described well, along with grain growth in metals and although the description of glass transition in polymers is limited full marks can be awarded from this mark band.

Mark Band 2
Discussion about changes to the properties is mentioned however there is confusion over changes in properties that occur. This does, however, mean that only one mark can be awarded from this mark band.

Mark Band 3
There is a response to the task addressing mark band 3 however there is confusion again and not enough detail to award any marks from this mark band.

LO3.2 Examples

Focus
Heat treatment



(1)

Unit 3: Selecting and application of Engineering materials

03-06-[redacted]
Tom [redacted]

Band 1

a) Annealing is used to ~~improve~~ a ~~materials~~ restore a materials ductility and malleability after they have been work hardened and cold worked. ~~Quench~~ ~~hardening~~ is The material being annealed is heated to a high ~~temperature~~ known as the *recrystallisation* temperature. New grains start to grow where the old distorted grains were to replace the deformed structure. The material is then cooled to finish the process.

Quench hardening is a process that is used on medium and high carbon steels with a carbon content of above 0.3%. The ~~near~~ steel is hardened by altering the grain structure. When the steel is heated the iron atoms rearrange themselves, adopting a FFC structure from its original BCC. When this happens the steel is very malleable and ductile. The material is then immediately quenched in order to prevent it from adopting its original structure. The new grain ~~structure~~ formation consists of hard needle-like crystals.

Mark Band 1
The work includes good differentiation across the range of treatment process so full marks can be awarded from this mark band.

Mark Band 2
Although the response against the task addressing mark band 2 does not fully meet the requirement some of the evidence presented for mark band 1 does include the materials and the property changes that occur. Both marks can therefore be awarded.

Mark Band 3
Structural changes have been stated particularly for the heat treatment of steels. To be awarded full marks full detail is required about structural changes during precipitation hardening.

LO3.2 Examples continued

(2)

Unit 3

23-06-[redacted]

Tom [redacted]

Tempering a material removes some of the hardness ~~and toughness~~ created by quench hardening and toughens the steel. Tempering requires the material to be re-heated to a temperature between 200°c and 600°c ~~and~~ and then quenched in either oil or water.

Case hardening is a process used to increase the hardness of a materials/metals outer surface whilst leaving the ~~inner~~ core in a ~~so~~ soft and tough ~~condi~~ state. To case harden, the material is soaked into a steel to apply an outer case that has a high carbon content. The depth of the case depends on how the material is soaked for. The material is then heated to alter the grain size in the core. The outer case is then quench hardened and tempered. ~~The resultant~~

Precipitation hardening is used to strengthen the material. To begin with, the material is heated to around 500° C. *Only Aluminium alloys ~~can~~ which contain copper or small amounts of magnesium can use this process. At 500°c, the copper atoms become fully absorbed into the aluminium crystal lattice structure. The material is quenched to retain the formation.

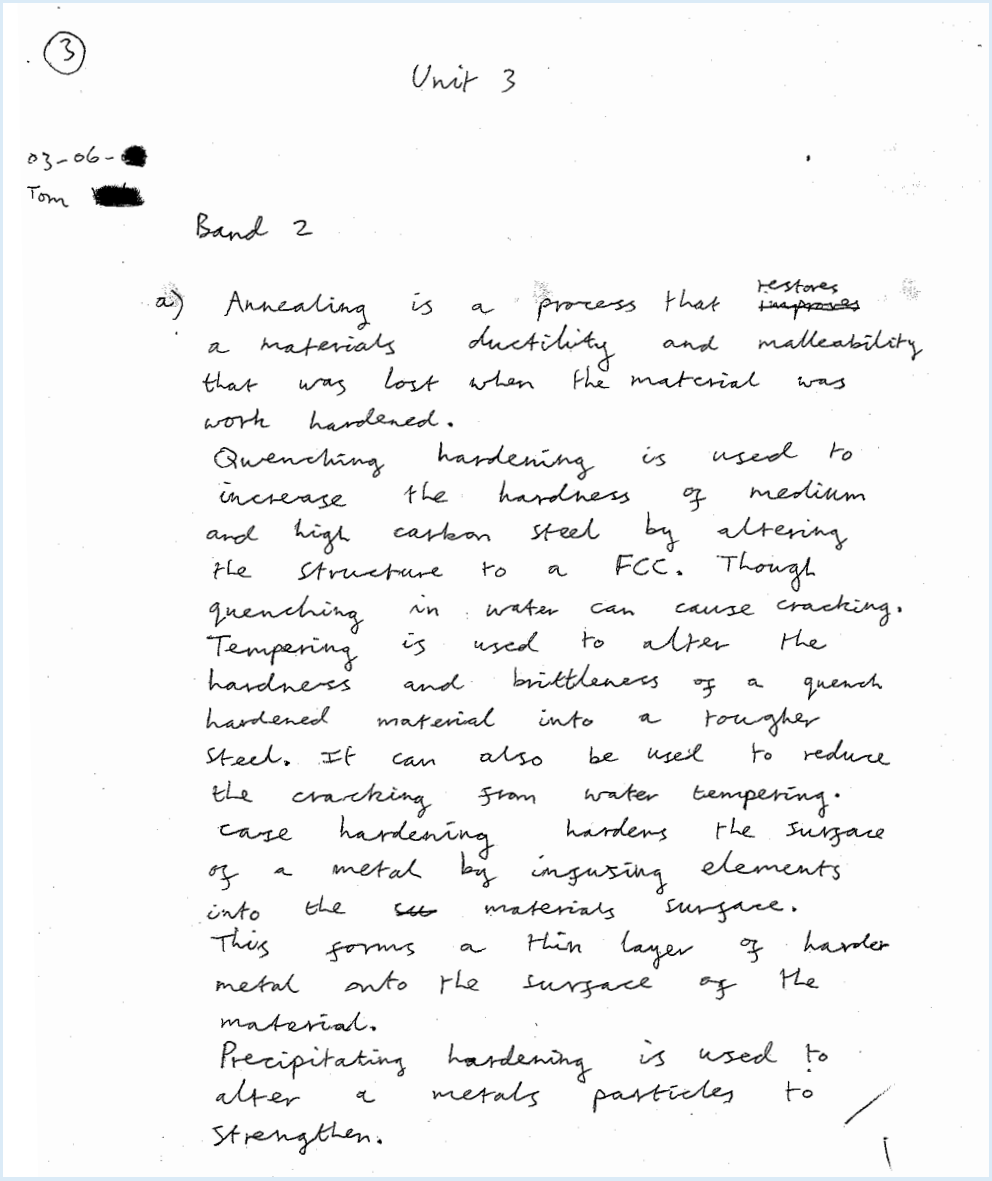
(H)

Mark Band 1
The work includes good differentiation across the range of treatment process so full marks can be awarded from this mark band.

Mark Band 2
Although the response against the task addressing mark band 2 does not fully meet the requirement some of the evidence presented for mark band 1 does include the materials and the property changes that occur. Both marks can therefore be awarded.

Mark Band 3
Structural changes have been stated particularly for the heat treatment of steels. To be awarded full marks full detail is required about structural changes during precipitation hardening.

LO3.2 Examples continued



(3)

Unit 3

03-06-[redacted]
Tom [redacted]

Band 2

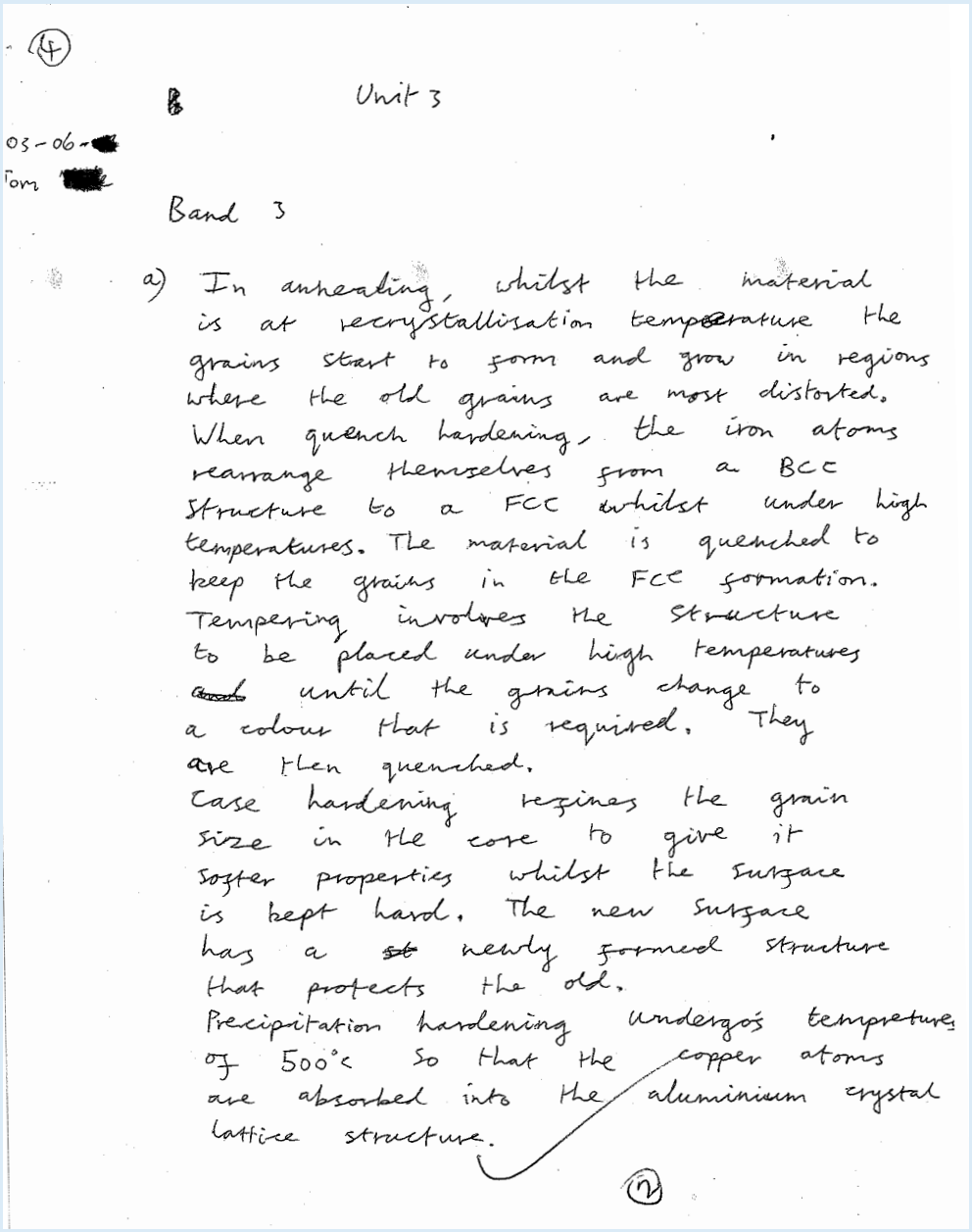
ai) Annealing is a process that ~~improves~~ restores a materials ductility and malleability that was lost when the material was work hardened.
Quenching hardening is used to increase the hardness of medium and high carbon steel by altering the structure to a FCC. Though quenching in water can cause cracking.
Tempering is used to alter the hardness and brittleness of a quench hardened material into a tougher steel. It can also be used to reduce the cracking from water tempering.
case hardening hardens the surface of a metal by ingusing elements into the ~~sss~~ materials surface.
This forms a thin layer of harder metal onto the surface of the material.
Precipitating hardening is used to alter a metals particles to strengthen.

Mark Band 1
The work includes good differentiation across the range of treatment process so full marks can be awarded from this mark band.

Mark Band 2
Although the response against the task addressing mark band 2 does not fully meet the requirement some of the evidence presented for mark band 1 does include the materials and the property changes that occur. Both marks can therefore be awarded.

Mark Band 3
Structural changes have been stated particularly for the heat treatment of steels. To be awarded full marks full detail is required about structural changes during precipitation hardening.

LO3.2 Examples continued



(4)

B Unit 3

03-06-[redacted]

Tom [redacted]

Band 3

a) In annealing, whilst the material is at recrystallisation temperature the grains start to form and grow in regions where the old grains are most distorted. When quench hardening, the iron atoms rearrange themselves from a BCC structure to a FCC whilst under high temperatures. The material is quenched to keep the grains in the FCC formation. Tempering involves the structure to be placed under high temperatures ~~and~~ until the grains change to a colour that is required. They are then quenched.
Case hardening refines the grain size in the core to give it softer properties whilst the surface is kept hard. The new surface has a ~~st~~ newly formed structure that protects the old.
Precipitation hardening undergos temprature of 500°c so that the copper atoms are absorbed into the aluminium crystal lattice structure.

(7)

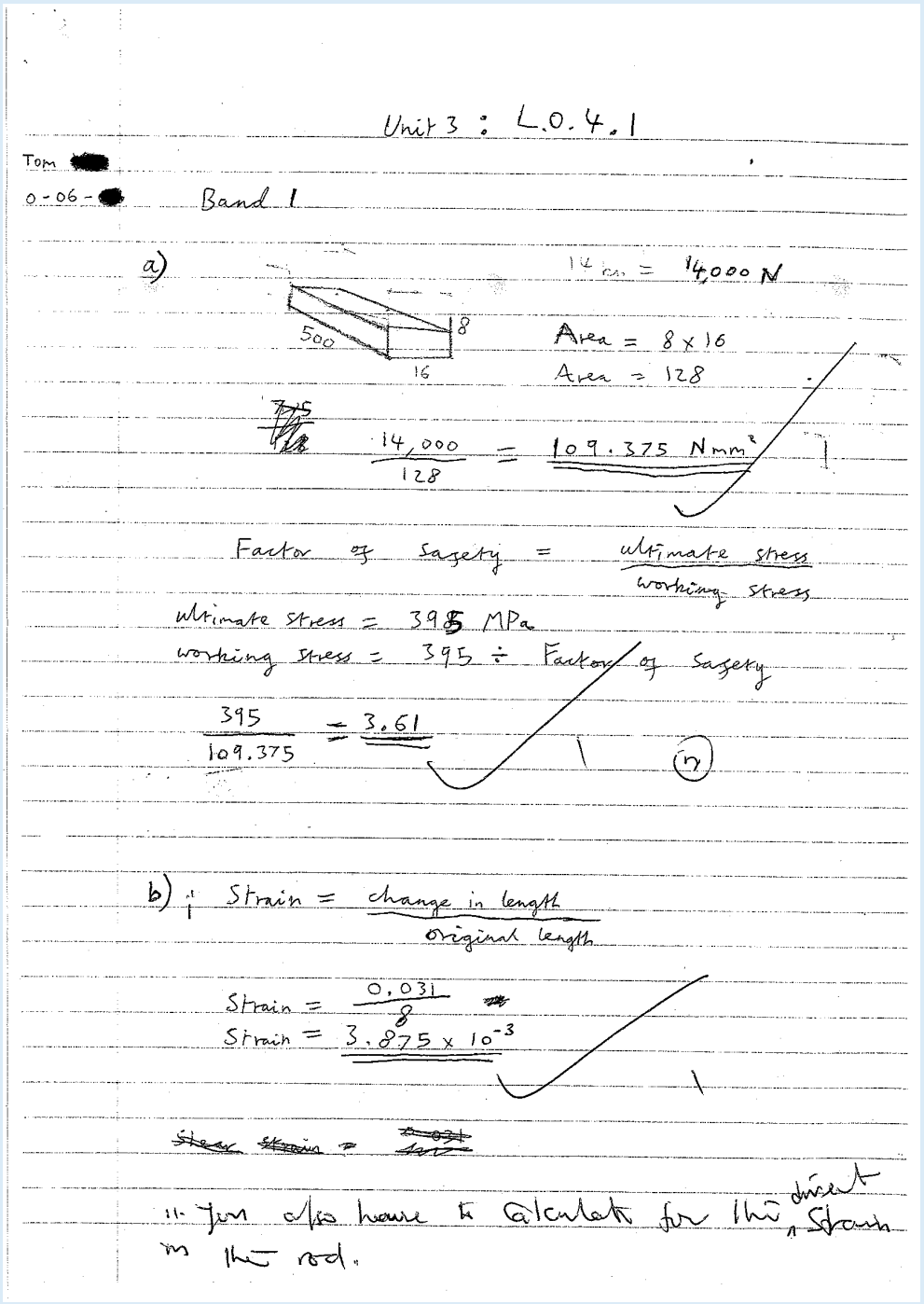
Mark Band 1
The work includes good differentiation across the range of treatment process so full marks can be awarded from this mark band.

Mark Band 2
Although the response against the task addressing mark band 2 does not fully meet the requirement some of the evidence presented for mark band 1 does include the materials and the property changes that occur. Both marks can therefore be awarded.

Mark Band 3
Structural changes have been stated particularly for the heat treatment of steels. To be awarded full marks full detail is required about structural changes during precipitation hardening.

LO4.1 Examples

Focus
Mechanical loading



Unit 3 : L.O.4.1

Tom [redacted]

0-06-[redacted] Band 1

a)

14 kN = 14,000 N

Area = 8 x 16

Area = 128

14,000 / 128 = 109.375 N mm²

Factor of Sagety = ultimate stress / working stress

ultimate stress = 395 MPa

working stress = 395 ÷ Factor of Sagety

395 / 109.375 = 3.61

(7)

b) Strain = change in length / original length

Strain = 0.031 / 8

Strain = 3.875 x 10⁻³

~~Shear strain = 0.031~~

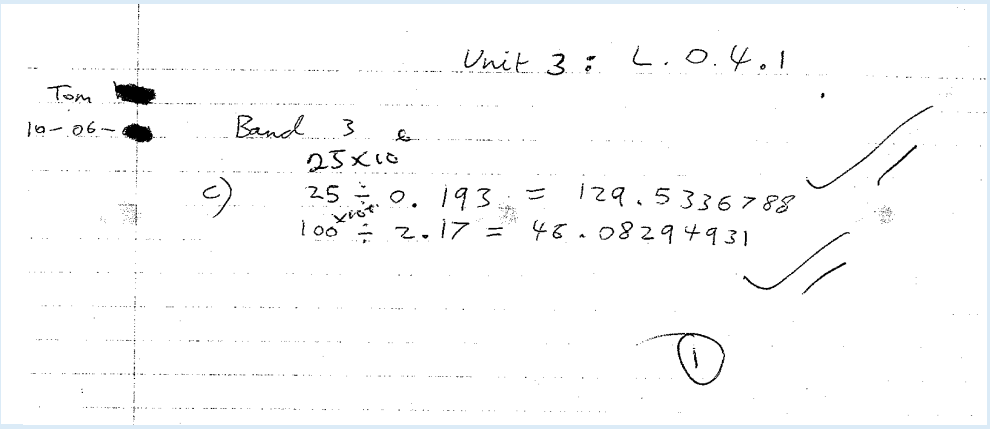
11. You also have to calculate for the direct Strain in the rod.

Mark Band 1
A range of calculations have been carried out. Only direct stress and FoS have been calculated so limited marks only are available from this mark band.

Mark Band 2
The calculations also include those some associated with strain. Shear strain has not been calculated so again limited marks only can be awarded from this mark band.

Mark Band 3
The modulus of elasticity and the shear modulus have been calculated so the full range of marks can be awarded from this mark band.

LO4.1 Examples continued



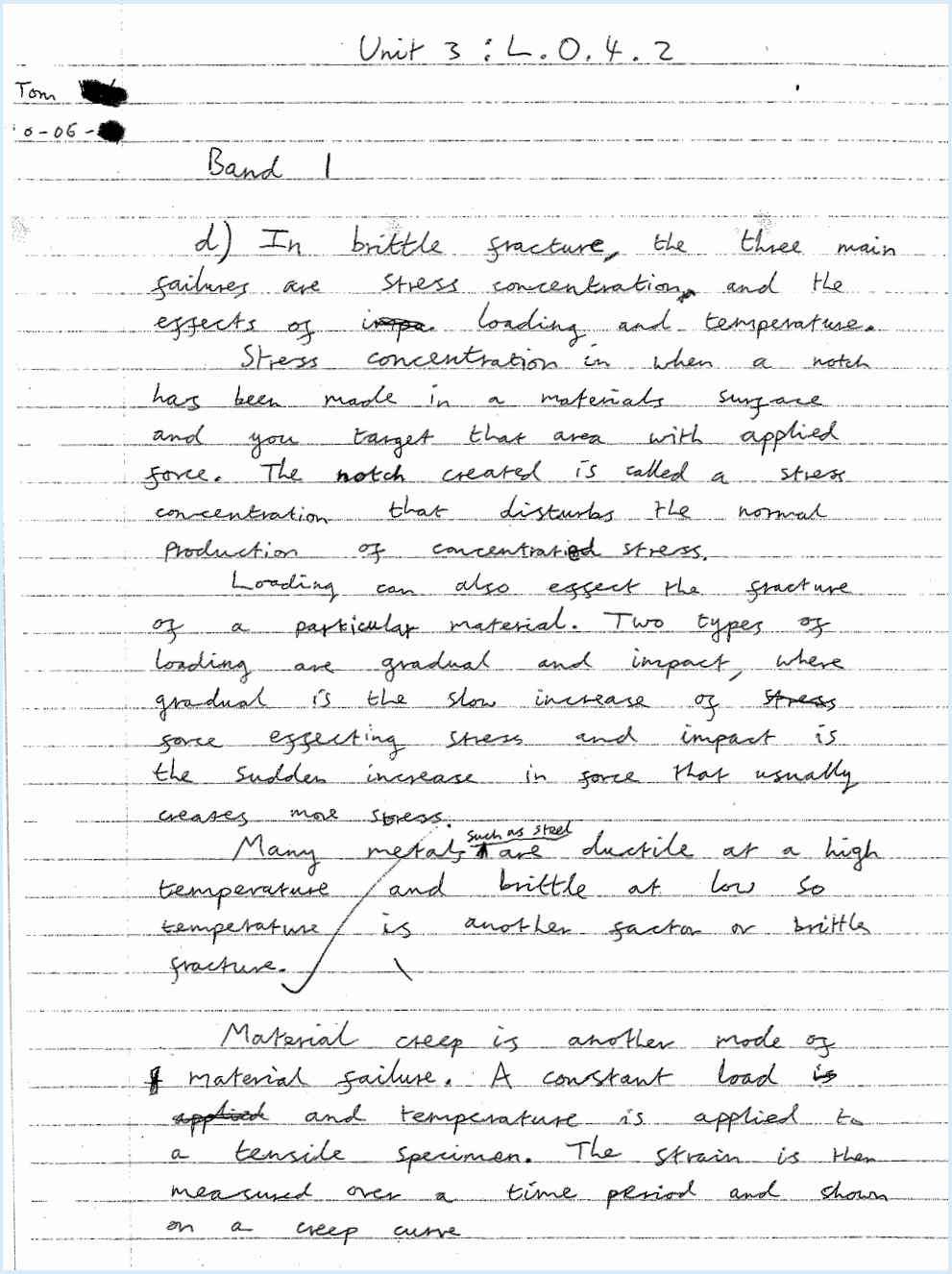
Mark Band 1
A range of calculations have been carried out. Only direct stress and FoS have been calculated so limited marks only are available from this mark band.

Mark Band 2
The calculations also include those some associated with strain. Shear strain has not been calculated so again limited marks only can be awarded from this mark band.

Mark Band 3
The modulus of elasticity and the shear modulus have been calculated so the full range of marks can be awarded from this mark band.

LO4.2 Examples

Focus
Modes of failure



Unit 3 : L.O.4.2

Tom [redacted]

[redacted]-06-[redacted]

Band 1

d) In brittle fracture, the three main failures are stress concentration and the effects of ~~impa~~ loading and temperature.

Stress concentration in when a notch has been made in a materials surface and you target that area with applied force. The notch created is called a stress concentration that disturbs the normal production of concentrated stress.

Loading can also effect the fracture of a particular material. Two types of loading are gradual and impact, where gradual is the slow increase of ~~stress~~ force effecting stress and impact is the sudden increase in force that usually creates more stress.

Many metals, such as steel are ductile at a high temperature and brittle at low so temperature is another factor or brittle fracture.

Material creep is another mode of material failure. A constant load ~~is applied~~ and temperature is applied to a tensile specimen. The strain is then measured over a time period and shown on a creep curve

Mark Band 1

There is a good description of each of three modes of failure which means all marks can be awarded from this mark band.

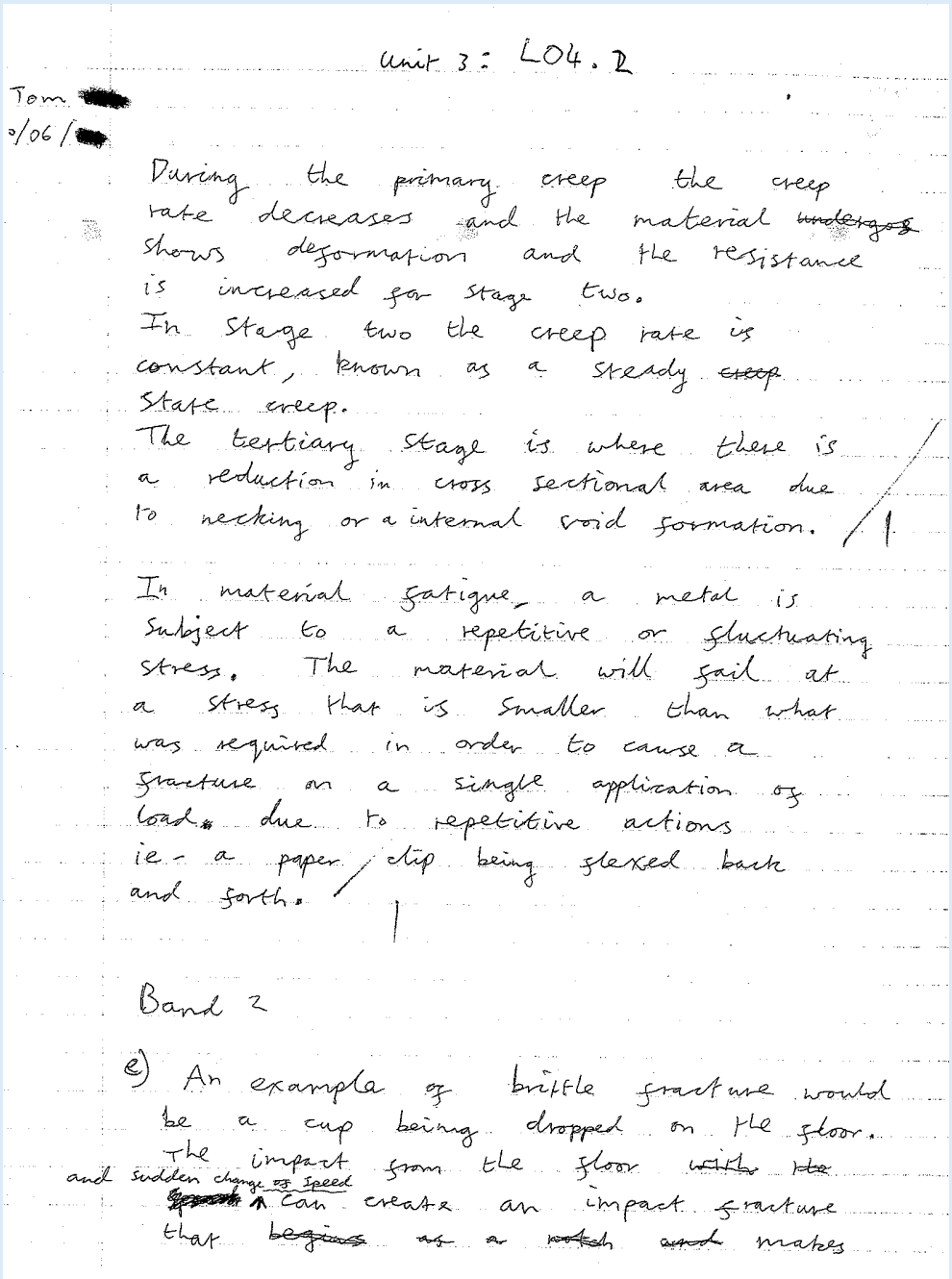
Mark Band 2

There is evidence to demonstrate that the learner knows about the causes of failure. The service conditions where these modes of failure are likely to happen are not very good engineering examples but they still show that the learner knows about modes of failure so full marks can be awarded from this mark band.

Mark Band 3

Although the examples given have relatively limited engineering application the evidence does support what the learner knows about modes of failure. This is particularly true for the cup being dropped.

LO4.2 Examples continued



Unit 3: LO4.2

Tom [redacted]
[redacted]/06/[redacted]

During the primary creep the creep rate decreases and the material ~~undergoes~~ shows deformation and the resistance is increased for stage two.
In stage two the creep rate is constant, known as a steady ~~creep~~ state creep.
The tertiary stage is where there is a reduction in cross sectional area due to necking or a internal void formation. /1

In material fatigue, a metal is subject to a repetitive or fluctuating stress. The material will fail at a stress that is smaller than what was required in order to cause a fracture on a single application of load. due to repetitive actions ie - a paper clip being flexed back and forth. /

Band 2

e) An example of brittle fracture would be a cup being dropped on the floor. The impact from the floor with the and sudden change of speed can create an impact fracture that ~~begins~~ as a ~~notch~~ and makes

Mark Band 1
There is a good description of each of three modes of failure which means all marks can be awarded from this mark band.

Mark Band 2
There is evidence to demonstrate that the learner knows about the causes of failure. The service conditions where these modes of failure are likely to happen are not very good engineering examples but they still show that the learner knows about modes of failure so full marks can be awarded from this mark band.

Mark Band 3
Although the examples given have relatively limited engineering application the evidence does support what the learner knows about modes of failure. This is particularly true for the cup being dropped.

LO4.2 Examples continued

Unit 3: LO4.2

Tom [redacted]

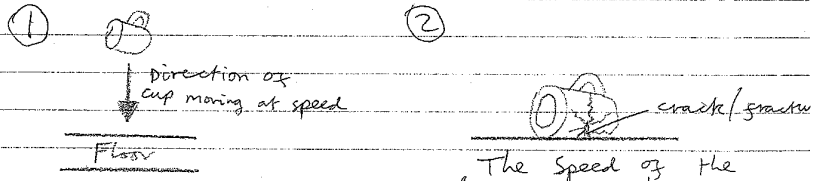
'6/06/[redacted]

a fracture or crack in the materials surface.

A product such as a paper clip is a good example of material fatigue. If a paper clip is flexed back and forth then the point that is under most pressure will fatigue and ~~eventually it~~ be put under ~~alot~~ stress. ~~it will~~ The paper clip will tire and the point will not be able to return to its original position and may even fracture.

Band 3

5)



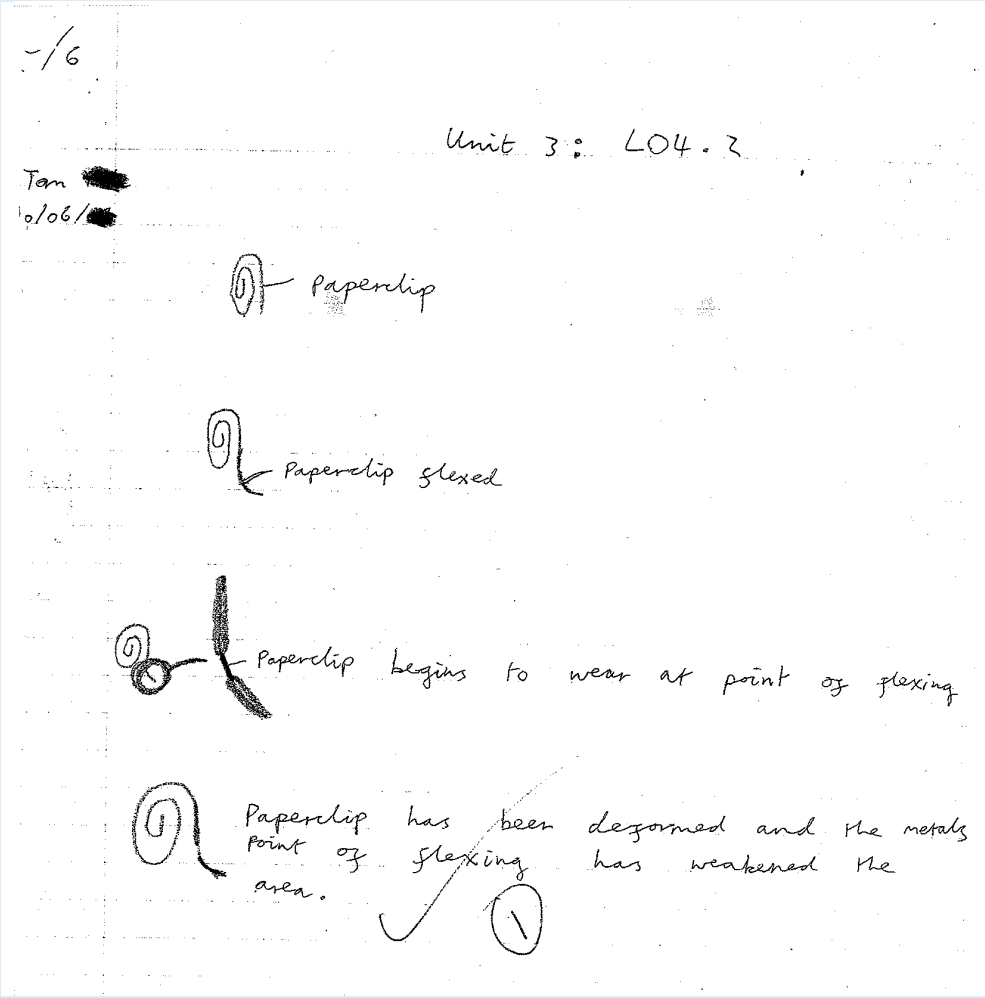
The speed of the drop and the hardness of the floor means there is alot of stress that is released onto the cups ~~glass~~ surface. The force the cup takes moves through the cup and is shown by cracks.

Mark Band 1
There is a good description of each of three modes of failure which means all marks can be awarded from this mark band.

Mark Band 2
There is evidence to demonstrate that the learner knows about the causes of failure. The service conditions where these modes of failure are likely to happen are not very good engineering examples but they still show that the learner knows about modes of failure so full marks can be awarded from this mark band.

Mark Band 3
Although the examples given have relatively limited engineering application the evidence does support what the learner knows about modes of failure. This is particularly true for the cup being dropped.

LO4.2 Examples continued



Mark Band 1
There is a good description of each of three modes of failure which means all marks can be awarded from this mark band.

Mark Band 2
There is evidence to demonstrate that the learner knows about the causes of failure. The service conditions where these modes of failure are likely to happen are not very good engineering examples but they still show that the learner knows about modes of failure so full marks can be awarded from this mark band.

Mark Band 3
Although the examples given have relatively limited engineering application the evidence does support what the learner knows about modes of failure. This is particularly true for the cup being dropped.

LO4.3 Examples

Focus
Material testing

Description

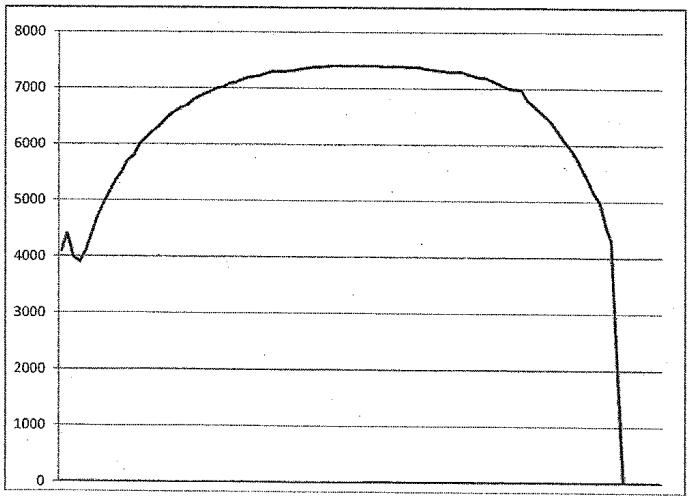
The Hounsfield test was formed in the engineering industry to help determine the mechanical and physical strength of raw materials that would generally become components of manufactured products. With the knowledge gained from these tests, material selection for a project is more effective and the final product is more suitable and effective for the job. The Hounsfield test measures tensile strength through the material undergoing stress and strain.

The test is usually done with a Hounsfield H20K-W which can test the strength and performance of-
Metals
Plastics
Rubber
Composites
Textiles
Packaging or paper
Adhesives

Industrial settings

In industry, many companies may buy a machine that uses the Hounsfield test or they may pay an organisation such as Hounsfield test limited to test a sample from a batch. The company Hounsfield test limited, design and manufacture testing equipment that is based around the Hounsfield test set up. The equipment is sold to material engineers and quality managers or kept by the company to offer companies a material testing service.

A Line graph to show the results of 0.2% normalized high carbon steel



Thomas [redacted] Material assessment 1/3

Mark Band 1

There is evidence to support the use of a tensile testing machine however there is no other evidence to show which non-destructive test was carried out so limited marks can be awarded for this mark band and assessment focus. Photographic evidence is always helpful but a learner observation record would consolidate what the learner did while carry out the testing.

Mark Band 2

A written report, as such, is not required as long as the evidence verifies the materials properties found with the use of appropriate data sources. In this case it is difficult to see where this was done. There are some calculations and a copy from a materials database but limited statements that verify the material.

Mark Band 3

Whilst there is a sub-title 'Industrial Settings' there is insufficient comments that relate to destructive and non-destructive test use to be awarded any marks from this mark band.

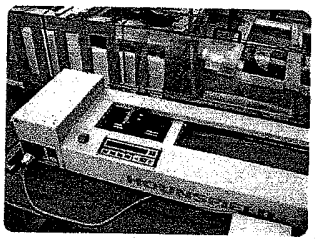
LO4.3 Examples continued

Assessment: Hounsfield test

At 4100 Newton's the material begins to be drawn out and reaches its elastic limit. The material continues to be drawn further out as the force increases to 5500 N. The material increases to a force of 7450 Newton's before the test specimen reaches its stress limit. Visible changes to the test specimen is the necking that decreases the cross sectional area.

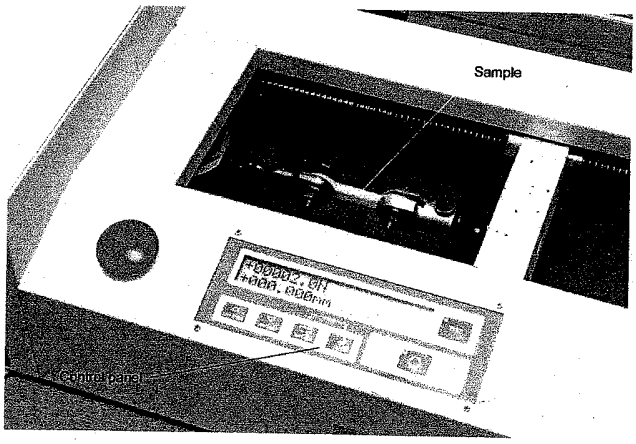
The force is decreased as the material becomes weaker and continues to neck further. By this time, small cavities have begun forming in the test specimen. The test specimen continues to be exerted to force and the cavities increase until 4900 Newton's, after this the cavities have reached the surface and created a fracture.

you have got to use your values you obtained from your test to write up your report



Left: A Hounsfield H20K-W

Below: A close up of a sample being tested in the H20K-W



Thomas [redacted] Material assessment 2/3

Mark Band 1

There is evidence to support the use of a tensile testing machine however there is no other evidence to show which non-destructive test was carried out so limited marks can be awarded for this mark band and assessment focus. Photographic evidence is always helpful but a learner observation record would consolidate what the learner did while carry out the testing.

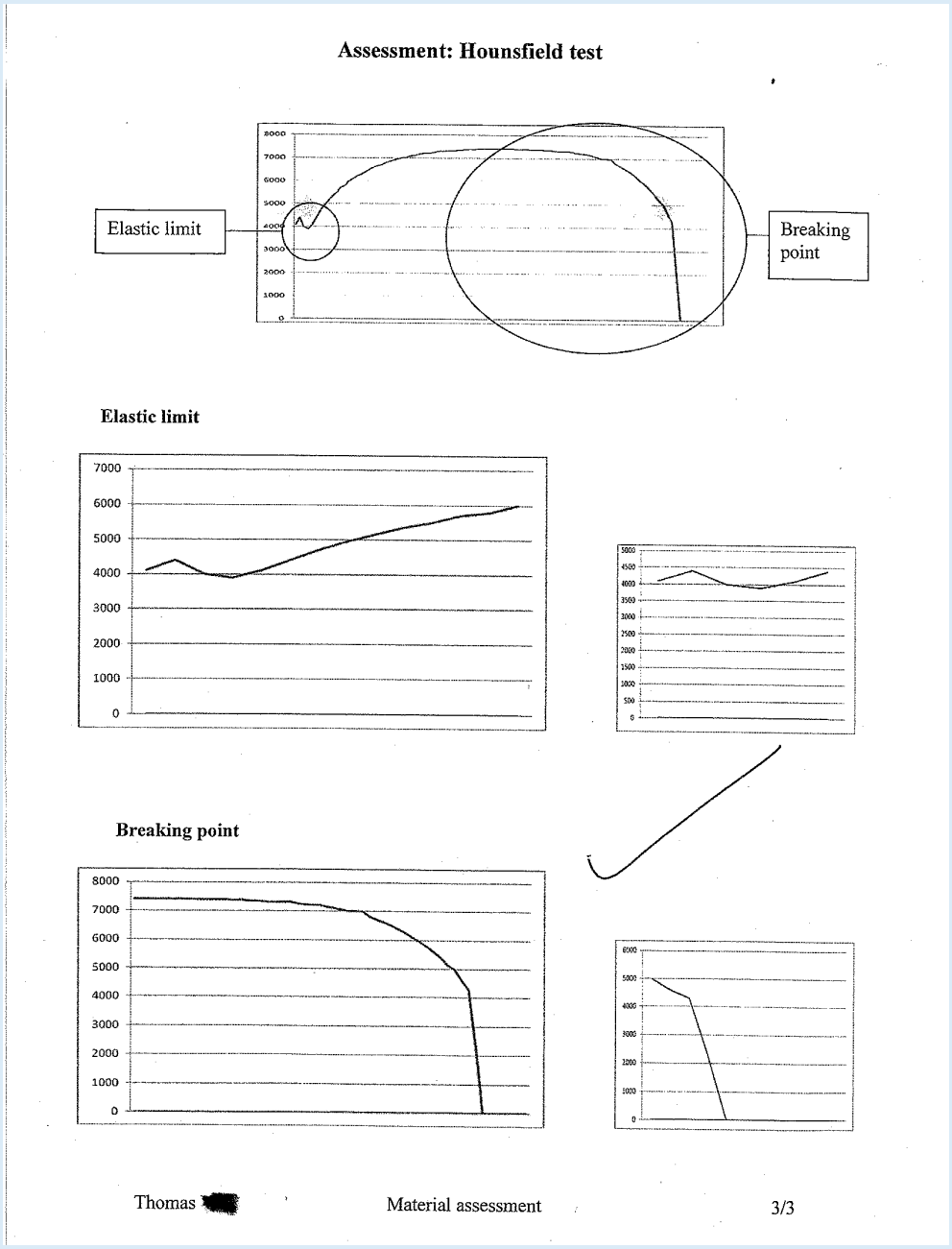
Mark Band 2

A written report, as such, is not required as long as the evidence verifies the materials properties found with the use of appropriate data sources. In this case it is difficult to see where this was done. There are some calculations and a copy from a materials database but limited statements that verify the material.

Mark Band 3

Whilst there is a sub-title 'Industrial Settings' there is insufficient comments that relate to destructive and non-destructive test use to be awarded any marks from this mark band.

LO4.3 Examples continued



Assessment: Hounsfield test

Elastic limit

Breaking point

Elastic limit

Breaking point

Thomas [redacted] Material assessment 3/3

Mark Band 1

There is evidence to support the use of a tensile testing machine however there is no other evidence to show which non-destructive test was carried out so limited marks can be awarded for this mark band and assessment focus. Photographic evidence is always helpful but a learner observation record would consolidate what the learner did while carry out the testing.

Mark Band 2

A written report, as such, is not required as long as the evidence verifies the materials properties found with the use of appropriate data sources. In this case it is difficult to see where this was done. There are some calculations and a copy from a materials database but limited statements that verify the material.

Mark Band 3

Whilst there is a sub-title 'Industrial Settings' there is insufficient comments that relate to destructive and non-destructive test use to be awarded any marks from this mark band.

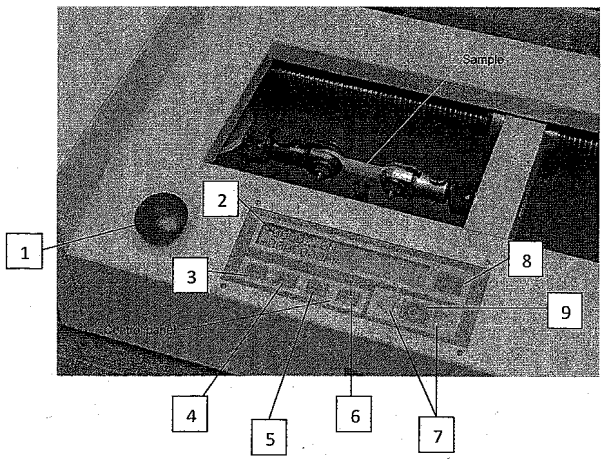
LO4.3 Examples continued

Assessment: Hounsfield test

Step by step

1) Turn on the Hounsfield H20K-W using the power switch on front left of machine.
2) Press stop button (in top right corner) until the light flashes. This initializes jog so you can move the jaws in a controlled manor.
3) Moved jaws using the directional buttons so that I could insert the test piece and clamp.
4) Pressed the jog button and commanded a slight load onto the test piece. Load applied shown on LCD display screen as 1000 N.
5) The initial load is set and all the scales are zero. Zero force, extension and aux.
6) Pressed the stop button and light in top corner light up constantly.
7) Pressed test button, the test number should show.
8) The stop and test buttons are illuminate and the LCD display reads less than 5. Pressed the right jog button.
9) The test piece is tested. Once it has broke I pressed stop.
10) A please print message shows on the LCD display, The Hounsfield machine is connected to a printer that prints the results in a graph.

good practice



Key

1. Emergency stop
2. LCD display
3. Zero force
4. Zero extension
5. Zero aux.
6. Print
7. Directional
8. Test
9. Stop

Thomas [redacted] Material assessment 1

Mark Band 1

There is evidence to support the use of a tensile testing machine however there is no other evidence to show which non-destructive test was carried out so limited marks can be awarded for this mark band and assessment focus. Photographic evidence is always helpful but a learner observation record would consolidate what the learner did while carry out the testing.

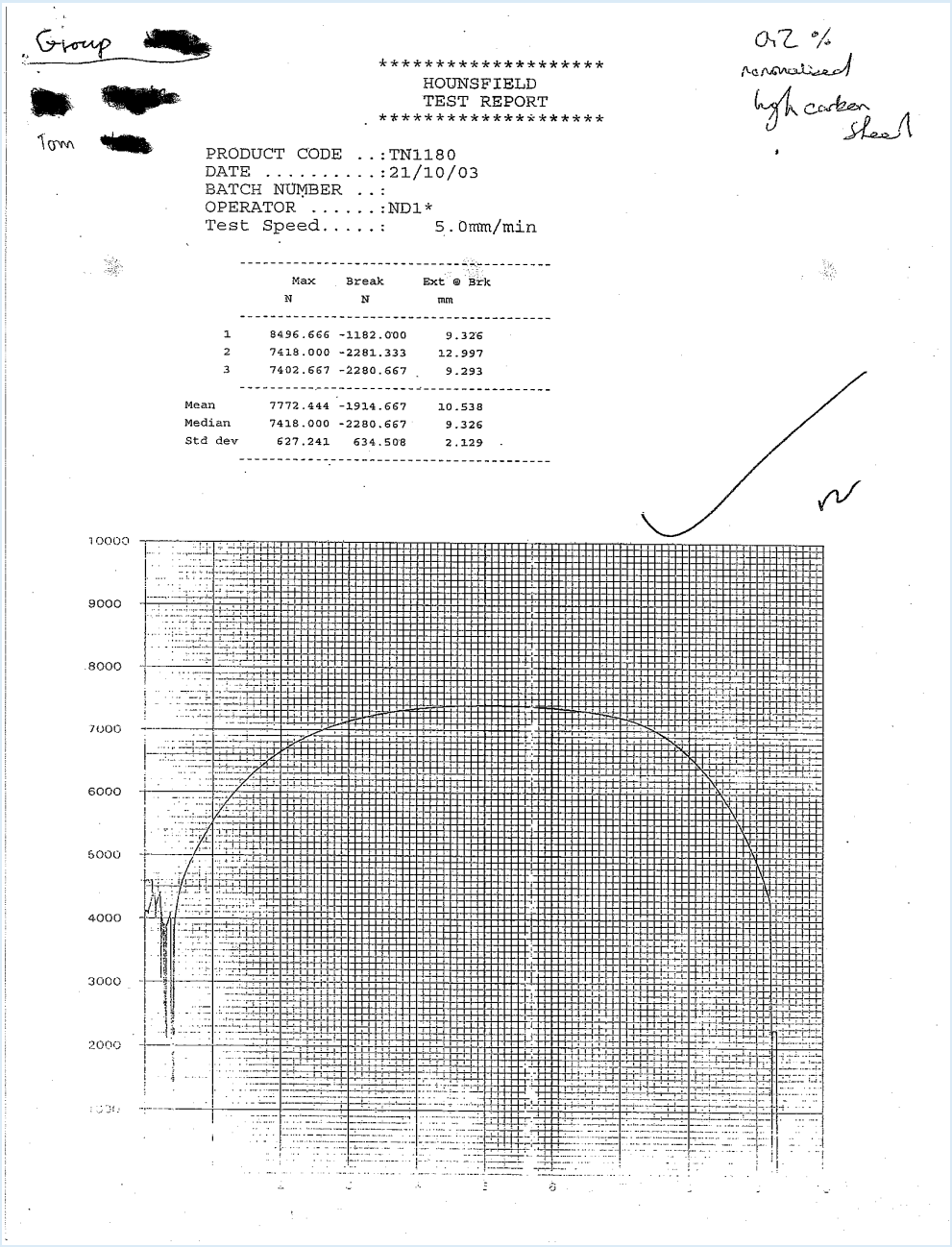
Mark Band 2

A written report, as such, is not required as long as the evidence verifies the materials properties found with the use of appropriate data sources. In this case it is difficult to see where this was done. There are some calculations and a copy from a materials database but limited statements that verify the material.

Mark Band 3

Whilst there is a sub-title 'Industrial Settings' there is insufficient comments that relate to destructive and non-destructive test use to be awarded any marks from this mark band.

LO4.3 Examples continued



Group [redacted]

[redacted]

Tom [redacted]

0.2 % normalised high carbon steel

****
HOUNSFIELD
TEST REPORT
****

PRODUCT CODE ..:TN1180
DATE .....:21/10/03
BATCH NUMBER ..:
OPERATOR .....:ND1*
Test Speed.....: 5.0mm/min

	Max N	Break N	Ext @ Brk mm
1	8496.666	-1182.000	9.326
2	7418.000	-2281.333	12.997
3	7402.667	-2280.667	9.293
Mean	7772.444	-1914.667	10.538
Median	7418.000	-2280.667	9.326
Std dev	627.241	634.508	2.129

Mark Band 1

There is evidence to support the use of a tensile testing machine however there is no other evidence to show which non-destructive test was carried out so limited marks can be awarded for this mark band and assessment focus. Photographic evidence is always helpful but a learner observation record would consolidate what the learner did while carry out the testing.

Mark Band 2

A written report, as such, is not required as long as the evidence verifies the materials properties found with the use of appropriate data sources. In this case it is difficult to see where this was done. There are some calculations and a copy from a materials database but limited statements that verify the material.

Mark Band 3

Whilst there is a sub-title 'Industrial Settings' there is insufficient comments that relate to destructive and non-destructive test use to be awarded any marks from this mark band.

LO4.3 Examples continued

Mark Band 1
There is evidence to support the use of a tensile testing machine however there is no other evidence to show which non-destructive test was carried out so limited marks can be awarded for this mark band and assessment focus. Photographic evidence is always helpful but a learner observation record would consolidate what the learner did while carry out the testing.

Mark Band 2
A written report, as such, is not required as long as the evidence verifies the materials properties found with the use of appropriate data sources. In this case it is difficult to see where this was done. There are some calculations and a copy from a materials database but limited statements that verify the material.

Mark Band 3
Whilst there is a sub-title 'Industrial Settings' there is insufficient comments that relate to destructive and non-destructive test use to be awarded any marks from this mark band.

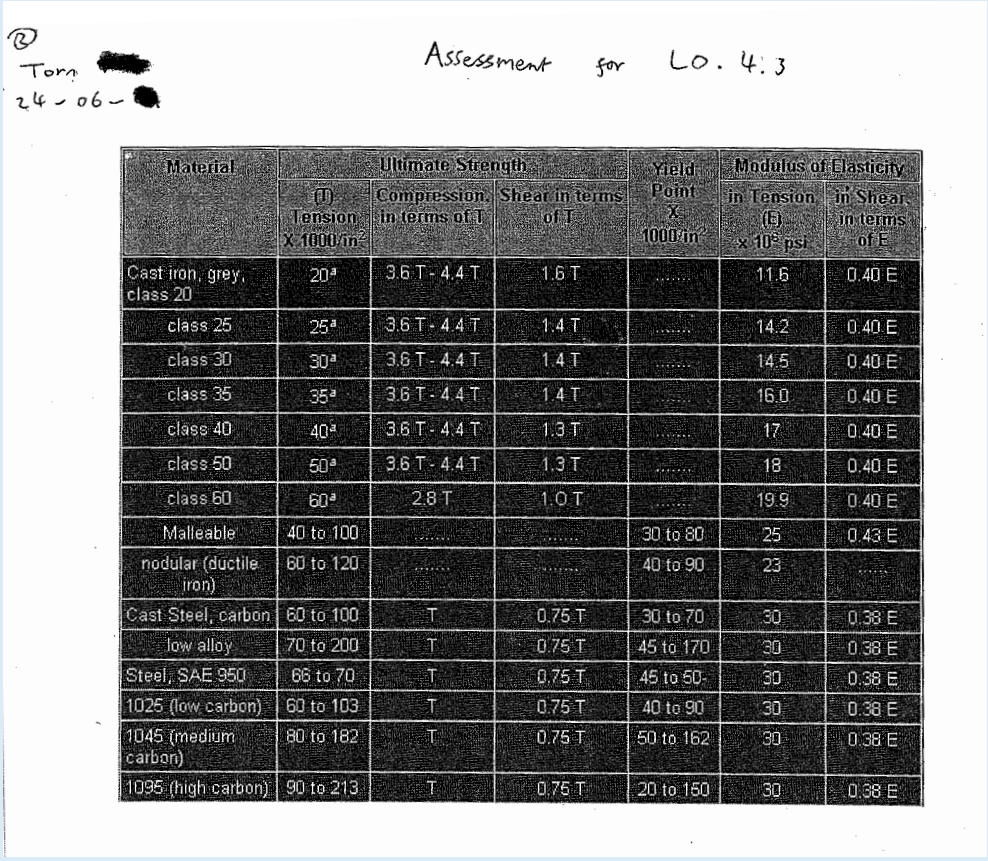
LO4.3 Examples continued

Mark Band 1
There is evidence to support the use of a tensile testing machine however there is no other evidence to show which non-destructive test was carried out so limited marks can be awarded for this mark band and assessment focus. Photographic evidence is always helpful but a learner observation record would consolidate what the learner did while carry out the testing.

Mark Band 2
A written report, as such, is not required as long as the evidence verifies the materials properties found with the use of appropriate data sources. In this case it is difficult to see where this was done. There are some calculations and a copy from a materials database but limited statements that verify the material.

Mark Band 3
Whilst there is a sub-title 'Industrial Settings' there is insufficient comments that relate to destructive and non-destructive test use to be awarded any marks from this mark band.

LO4.3 Examples continued



Tom [redacted]
24-06-[redacted]

Assessment for LO. 4.3

Material	Ultimate Strength			Yield Point X 1000/in²	Modulus of Elasticity	
	(T) Tension X 1000/in²	Compression in terms of T	Shear in terms of T		in Tension (E) x 10⁶ psi	in Shear in terms of E
Cast iron, grey, class 20	20[a]	3.6 T - 4.4 T	1.6 T	.....	11.6	0.40 E
class 25	25[a]	3.6 T - 4.4 T	1.4 T	.....	14.2	0.40 E
class 30	30[a]	3.6 T - 4.4 T	1.4 T	.....	14.5	0.40 E
class 35	35[a]	3.6 T - 4.4 T	1.4 T	.....	16.0	0.40 E
class 40	40[a]	3.6 T - 4.4 T	1.3 T	.....	17	0.40 E
class 50	50[a]	3.6 T - 4.4 T	1.3 T	.....	18	0.40 E
class 60	60[a]	2.8 T	1.0 T	.....	19.9	0.40 E
Malleable	40 to 100	.....	.....	30 to 80	25	0.43 E
nodular (ductile iron)	60 to 120	.....	.....	40 to 90	23	.....
Cast Steel, carbon	60 to 100	T	0.75 T	30 to 70	30	0.38 E
low alloy	70 to 200	T	0.75 T	45 to 170	30	0.38 E
Steel, SAE 950	66 to 70	T	0.75 T	45 to 50	30	0.38 E
1025 (low carbon)	60 to 103	T	0.75 T	40 to 90	30	0.38 E
1045 (medium carbon)	80 to 182	T	0.75 T	50 to 162	30	0.38 E
1095 (high carbon)	90 to 213	T	0.75 T	20 to 150	30	0.38 E

Mark Band 1

There is evidence to support the use of a tensile testing machine however there is no other evidence to show which non-destructive test was carried out so limited marks can be awarded for this mark band and assessment focus. Photographic evidence is always helpful but a learner observation record would consolidate what the learner did while carry out the testing.

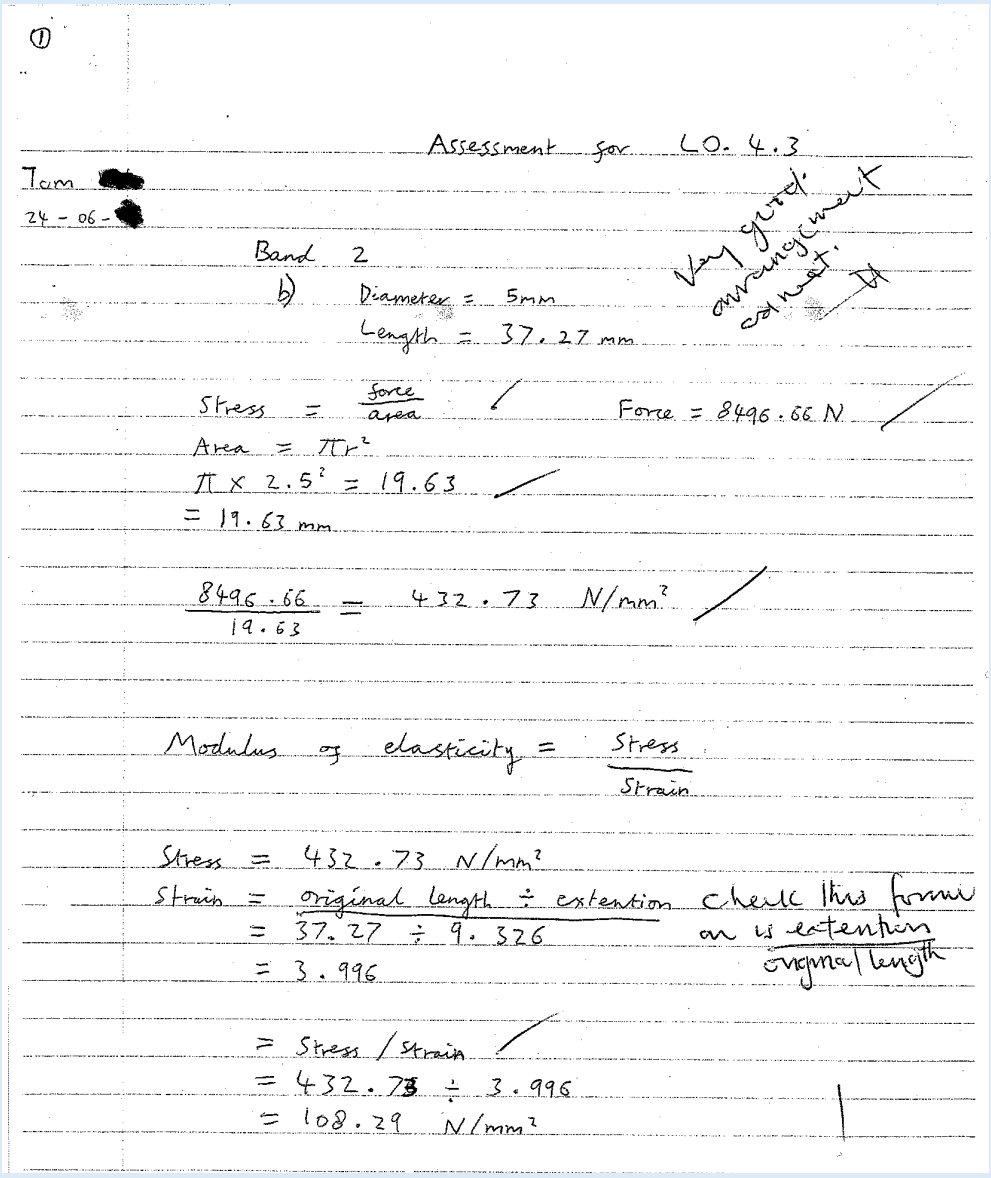
Mark Band 2

A written report, as such, is not required as long as the evidence verifies the materials properties found with the use of appropriate data sources. In this case it is difficult to see where this was done. There are some calculations and a copy from a materials database but limited statements that verify the material.

Mark Band 3

Whilst there is a sub-title 'Industrial Settings' there is insufficient comments that relate to destructive and non-destructive test use to be awarded any marks from this mark band.

LO4.3 Examples continued



① Assessment for LO. 4.3

Tom [redacted]

24 - 06 - [redacted]

Band 2

b) Diameter = 5mm

Length = 37.27 mm

Very good arrangement of text.

Stress = force / area ✓ Force = 8496.66 N ✓

Area = πr^2

$\pi \times 2.5^2 = 19.63$ ✓

= 19.63 mm

$\frac{8496.66}{19.63} = 432.73$ N/mm² ✓

Modulus of elasticity = Stress / Strain

Stress = 432.73 N/mm²

Strain = original length ÷ extention = 37.27 ÷ 9.326 = 3.996 check this formula as is extention / original length

= Stress / Strain ✓

= 432.73 ÷ 3.996

= 108.29 N/mm²

Mark Band 1

There is evidence to support the use of a tensile testing machine however there is no other evidence to show which non-destructive test was carried out so limited marks can be awarded for this mark band and assessment focus. Photographic evidence is always helpful but a learner observation record would consolidate what the learner did while carry out the testing.

Mark Band 2

A written report, as such, is not required as long as the evidence verifies the materials properties found with the use of appropriate data sources. In this case it is difficult to see where this was done. There are some calculations and a copy from a materials database but limited statements that verify the material.

Mark Band 3

Whilst there is a sub-title 'Industrial Settings' there is insufficient comments that relate to destructive and non-destructive test use to be awarded any marks from this mark band.

This learner has been able to achieve well due to the way the centre has presented what the learner needs to do. The assignment tasks have been taken from the Tutor Support Materials (TSM). Centres must always contextualise any assessment instruments to ensure they are appropriate and fit for purpose, for example in this case the information sources in the task for LO.2.2. Tasks in the TSM are a minimum starting point and should be built on to give the detail required by each assessment focus.