EXAMINERS' REPORTS

LEVEL 1 / LEVEL 2 AWARD IN ENGINEERING

SUMMER 2018

Grade boundary information for this subject is available on the WJEC public website at: https://www.wjecservices.co.uk/MarkToUMS/default.aspx?l=en

Online Results Analysis

WJEC provides information to examination centres via the WJEC secure website. This is restricted to centre staff only. Access is granted to centre staff by the Examinations Officer at the centre.

Annual Statistical Report

The annual Statistical Report (issued in the second half of the Autumn Term) gives overall outcomes of all examinations administered by WJEC.

WJEC

Level 1 / Level 2 Award in Engineering

Summer 2018

UNIT 1 AND 2

L1/L2 Engineering

General Comments

During this year's moderation, both Unit 1 and Unit 2 again displayed some excellent examples of work from a broad range of centres. It is encouraging to see so many centres now moving away from the board exemplar briefs and creating their own scenarios and briefs which best work for their candidates and available facilities. This has allowed centres to play to their individual strengths whilst still remaining within the level of control set on the assessment tasks. Centres are now far more familiar with the way in which the tasks are set, completed and assessed. I hope that this is a practice which expands further over the next year.

Again this year, there is a further improvement of the level of outcomes seen in many centres during the moderation of completed Units of the specification. The majority of centres are now fully familiar with both units, and as mentioned, a larger number of centres again this year are setting briefs which allow candidates to access the full range of assessment criteria. The majority of briefs undertaken were appropriate and again this year, a number of original and inventive products were seen during the moderation period.

There were still several centres who attempted to complete all of Unit 2 with a simple GANTT chart and a making outcome. It should be stressed that it is difficult for candidates to achieve the higher mark outcomes using this method alone. To achieve the Merit and Distinction levels in unit 2, details such as finishes, feed/speed rates etc, as well as an evaluation of outcome should be included.
The area of greatest concerns was the increase in the number of writing frames and templates used by a number of centres. This is considered as giving assistance to candidates' and in a small number of situations this year centres were moderated at lower outcomes as it was virtually impossible to distinguish between a Level 2 Pass and a Distinction. In this situation, outcomes were reduced accordingly. It is advisable that centres do not rely on templates as candidates are expected to develop their own method of presenting their individual outcomes. Moderation of next seasons submissions will be paying particular attention to the use of templates and writing frames.

There were also some excellent examples of centres which had allowed candidates to create their own presentation format for the work submitted, including digital submissions, which really emphasized strengths and outcomes in a far more consistent way.

Delivery Issues

Specification guidelines were followed closely in the main however there were a number of issues which centres should be aware of. These were mainly in the administration of the moderation process.

Administrative issues

Please would centres ensure that the following requirements are met for assessing and authenticating work.

A key issue this year was a small number of centres failing to meet the submission deadline which is posted on the WJEC key dates information. In some instances, submissions were over two weeks late. This is unfair as candidates may have access to extended time beyond the deadline which all other centres adhere too. In some of these instances, errors in submission resulted in very little time for moderators to process the submission in time for the subject awarding. Late submission may result in candidates work not being able to be moderated in time for awarding.

If a centre has any issues with meeting the set deadline, they must contact the subject officer to inform WJEC of a potential late submission.

The following points also require addressing:

1. Centres should ensure that a hard copy of the sample sheet (obtained from where grades are entered into the system on the WJEC website) is included with the sample work to be sent to the moderator. This is used in the moderation process to ensure that the centre has submitted the correct candidates for moderation.

2. Ensure that the centre sends the correct unit to the correct moderator. In a small number of instances, Unit 2 work was sent to a Unit 1 moderator. Please check moderator details before submitting. In addition, where the same moderator assesses both Unit 1 and Unit 2, centres should ensure that both samples are packaged separately and not simply included as one piece of work. They may however, be sent to the moderator as one package containing both separate units of work.

3. A small number of centres submitted samples which did not have candidate names on either the folder or mark record sheet. This makes moderation impossible and, in most cases,, an alternative sample or the full cohort will be required for moderation. This again may result in late awarding for candidates'

4. It is now only a very small number of centres which did not include any written annotation with the assessment sheets. The justification of the assessment criteria awarded to candidates by a centre is vital. This is an opportunity to support the AC’s awarded by giving some reasons. This helps the moderator agree with centre marks. Comments are more beneficial when detailed and not simply re quoting the assessment descriptors.

5. A particular weak area with some centres was the evidence for the unit 2 manufacturing stages. This is an issue which occurred the previous year where centres included either poor quality images or pictures that were simply too small to evidence sufficiently. This is particularly important on Merit and Distinction outcomes where the quality of manufacturing should be clearly visible. Pictures should focus on quality of finish, details etc.

6. A small number of centres are still producing excessive work which moderators felt was unlikely to have been completed in the prescribed time. Excessive testing or modeling for unit 1 is a typical example of this. It is important that centres adhere to the level of control and time frame for each unit of work.

7. Centres should ensure that a copy of the technical information given to pupils to manufacture their Unit 2 products is included in the moderation sample. There only needs to be one pack of information and it is not required that a pack is included with each candidates' work (unless annotated information has been added by the candidate)

Assessment of Units 1 & 2

Overall, centres again applied the assessment criteria consistently across all grade boundaries in both units of work. There were only a very small number of instances where assessment was deemed too generous and even fewer instances where a centre was considered to be too harsh.

This year also saw fewer submissions where centres had incorrectly marked assessment sheets. It was also noted that there were far fewer instances of centres making incorrect final grade calls although it would be worth taking this opportunity to remind centres that to achieve say a Merit award, a candidate must achieve a minimum of Merit in each assessment criteria. If a candidate achieves one Level 2 Pass, and all others are Merits, then the overall grade will be a Level 2 Pass

Commentary on Unit 1

Assessment Criteria 1.1, 1.2 and 1.3 focuses on features and function of engineered products. Candidates still have some weak areas here as they are not linking existing engineered products to the brief. A number of centres did address this section well by including pictorial references to either their sketch sheets with justifications for as to why this particular element would be suitable to address the problem etc. For example, a brief looking at cycle lights may have references on candidates'' sheets of how cycle pumps, bells and brake levers attach to bike frames etc. They may have references to other products such as scaffolding joints to show an understanding of alternative engineered products that meet their given brief.

Assessment Criteria 2.1 saw a big improvement in this section this year with candidates producing outcomes with far more detail and more to the expected standards for engineering drawing. Although not a requirement, CAD submissions were very strong in this AC and the ability to modify and alter, as well as produce isometric views, is clearly an advantage, especially to possibly weaker candidates'. There was also a range of well-produced hand drawn submissions for this assessment criteria. Again, for next year, it is important for centres to remember that to achieve a Merit or higher in this AC, it is expected that hidden detail, dimensions for linear, angular and radius sizes and an isometric drawing be present in the outcomes.

Assessment Criteria 2.2 evaluates the candidates' ability to communicate their design ideas in the form of drawings or sketches. This section was stronger this year with many centres clearly paying more attention to annotation and detail than in the previous year's submission. There is also a clear opportunity to include elements linking to AC's 1.1, 1.2 & 1.3 in this area, where candidates' show additional components which address areas of the

brief and the specification produced by the candidate. However, a small number of centres still produce weak outcomes in this AC, this can often lead to difficulties when candidates' attempt to transfer information to produce the outcomes to AC 2.1. More time in year 10 would possibly be the key to allowing candidates to build in confidence and ability for this part of the course. Annotation is also a key factor to ensure access to the higher performance bands.

Assessment Criteria 3.1 is still an area which requires development as there is a wide tendancy to rely mainly on the candidates'' original sketch, often just quite basic, rather than showing some development of the original idea. Again, references to other engineered products are needed to be able to access the Merit performance band. This section is another where candidates' can also address or reinforce work undertaken for AC's 1.1, 1.2 & 1.3. CAD remains a strong element here for many centres as it allows quick and varied iteration of the original idea, again however, candidates are not penalized for developing ideas in a more traditional sketched method.

Assessment Criteria 3.2 was again well done this year with many candidates' applying good reasoning to decisions made. This was again done is a variety of ways, using ranking systems or colour coding. Successful outcomes in this area have looked at various areas to apply evaluative statements including decisions made against the specification, the actual design ideas or a combination of the two. The key area to remember for this section is that for candidates' to be successful in the Merit and Distinction performance, candidates must give conclusions with justifications or reasons. These should then be applied to the outcome and be used to finalise the design of the product. In some folios, candidates evaluated a range of areas including suitability of other engineering products that meet the brief (AC 1.2)

Assessment Criteria 3.3 is an area which showed an improvement this year with many candidates' displaying specifications that were more relevant to the brief and which contained more achievable and measurable outcomes. However, this was also an AC where many centres gave candidates' a pre-populated sheet with key words to write specification details about. This created submissions where the AC from that centre became quite generic and difficult to award in the higher performance bands. Again, candidates should be allowed to determine their own specification points based on their work done in AC's 1.1, 1.2 & 1.3

Commentary on Unit 2

As a reminder from previous reports on Unit 2, it is important to remind centres that this unit focuses on the candidates'' ability to manufacture an outcome which is set by the centre. Each candidate must be given all necessary information in the form of technical/engineering drawings, data sheets and pictorial information prior to starting the unit. It is expected that all candidates produce the same outcome unless a number of options is available where centres may have more than one staff member delivering the Unit. Where more than one set of outcomes is available, it is vital that centres standardise the briefs and information to be provided to candidates', to ensure that each brief contains the same level of demand and rigor, and to ensure that candidates' producing one product are not disadvantaged by an over simplified product therefore limiting access to the higher performance bands.

Again, centres are reminded that briefs may be changed to accommodate staffing expertise and available facilities, but the task outcomes must not be changed and must follow that given in the specification. Briefs may be submitted to the WJEC to check suitability and to ensure that the product contains enough depth to allow candidates' to be successful in Unit 2

Assessment Criteria 1.1 & 1.2 was again undertaken quite well this year but there is still quite an over reliance by some centres, on using the GANTT chart to try and address a large number of assessment criteria. AC 1.1, which is a Distinction AC, must show a range of accurately interpreted information that the candidate has extracted from the information provided by the centre. More than just a list of tools and equipment is expected here to achieve the Merit and Distinction level. Centres should therefore again be reminded that candidates' need to obtain this detail from the information provided to them prior to the unit starting. It is important that the information you provide has all relevant data included, ie materials, cutting speeds data, finishes, thread details, dimensions and tolerances.

Candidates' displayed outcomes to this AC in a variety of ways including formal pages or as written annotation on the working drawings provided to them. Strong outcomes showed cutting speeds for materials used, drill sizes for tapping etc.

Assessment Criteria 2.1 was again well done this year with candidates identifying a range of resources linked to the making element. Many candidates linked this to both physical resources such as materials but also introduced PPE resources as well. This allowed further detail to be added which linked to various stages of the manufacturing process. In some cases, this was also linked well to information provided for AC 2.2

Assessment Criteria 2.2 was also well done in most centres but as discussed earlier, there is in some instances an over use of the GANTT chart method to try and address a range of assessment criteria. Candidates are advised to break down information as much as possible when looking at individual AC's, so over use of the GANTT chart can often lead to candidates' work becoming convoluted. Candidates' are far better including information on separate sections where applicable.

Centres should also avoid copious amounts of GANNT charts, keeping information concise and relevant. It also helps moderation if details are broken down into manufacturing stages to help clarify understanding and knowledge. This can be done easily by sequencing individual component parts.

Equipment and tooling is another area as well as links back to AC 2.1 where applicable

Assessment Criteria 3.1 & 3.2 were again done very well in the main with a wide range of outcomes being seen which challenged and stretched candidates' in the production of their final outcomes. Again, as mentioned, good photographic evidence is essential to accurately moderate this section and centres are requested to ensure that photo graphs clearly show the level of detail achieved in the outcome plus a range of assembled and disassembled shots with the candidate number evident.

Excellent examples were also seen again this year of candidates' working on their actual outcomes and detailing the pictures as a progressive diary of work. These could include use of PPE, tolerance checks using vernier calipers or micrometers etc. They can also form a part of evaluative work which can be credited to AC 4.2

Assessment Criteria 4.1 again showed many high-quality manufacturing outcomes in a number of areas and this can be attributed in many instances to centres now taking more ownership of their own briefs and playing to the strengths of their staff and facilities. Centres who are considering running their own briefs for the first time should ensure that they use at least eight of the processes identified in LO4 – AC4.1 This will ensure that candidates have sufficient technical skills to be able to access all performance bands depending on quality of outcome etc. As mentioned, clear photographic evidence helps confirm the processes during moderation if not obviously clear in the first instance.

Assessment Criteria 4.2 had some good examples with many centres. Again, many have moved away from the exemplar sheet shown in the teacher's guide etc., and have modified the work to be include pictures of tolerance tests, actual manufacturing being undertaken, sometimes showing errors and how they were resolved and also a general evaluation on outcomes of the making work.

To recap on Unit 2, a similar key point to last year which advises centres to ensure that photographic evidence provided for key stages of manufacture clearly justifies the performance band awarded. Please ensure that photographs of the final outcomes are clear and sufficiently large enough for moderators to make a verification on the quality of the outcome. Please could centres also ensure that candidate names, centre and candidate numbers are also in the pictures of the final work.

Finally, I would like to take this opportunity to again thank centres for their hard work and commitment to the specification. Although this report focuses on a smaller number of the shortcomings from the 2017 Engineering moderation, the process was again very positive for both centres and moderators. At a particularly stressful and difficult time of the year, with many different courses coming to conclusion at around the same time, it is very positive to see some of the excellent examples displayed in this year's moderation series. I hope the process of moderation remains positive in helping centres further develop and adapt their courses to best suite their candidates requirements. I look forward to moderating next year's outcomes

WJEC

Level 1 / Level 2 Award in Engineering

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UNIT 3

General Comments

Most candidates attempted all of the questions on the paper but, in a number of cases, there was evidence of candidates not having read questions carefully before answering. It is most important that candidates take the time to read through the question paper before attempting to answer questions, as this can help to ensure that basic errors are avoided. Detailed knowledge of volume calculation remains limited in many cases, as does a clear understanding of engineering drawing standards and conventions.

Question 1

(a) Most candidates scored well in this question by listing an advantage and a disadvantage of using the process of injection moulding.

(b) Responses to this question were varied. Some candidates scored highly in this question with good knowledge of material properties evident, correctly stating two appropriate reasons for the choice of material, such as aesthetic reasons and ease of shaping to manufacture.

(c) The majority of candidates were able to identify one of each type of polymer: one thermoplastic and one thermoset.

(d) This question was not well answered in most cases, with the majority of candidates unable to list a characteristic or property of acrylic, such as hardwearing, easily cleaned or transparent. In some cases, the classification of acrylic was listed. By not listing a characteristic or property of the material, it made it very difficult to score a mark for the explanation in the next part of the question.

(e) Responses to this question were disappointing, as a significant number of candidates missed the opportunity to comment on the aesthetic appearance of the tray, or the ease of manufacturing the part. The majority of candidates stated that the material 'did not rust', but the expectation was that they would have used 'resists corrosion'. Comments relating to rusting did not gain any marks. The purpose of this question was to test candidate's reasoning of using a specific material for a part.

(f) This question was quite well answered with candidates being able to identify both components. There was a small minority who identified the switch as a 'button'. While the picture was indeed a button switch, they needed to specify the word 'switch' to achieve the mark. 'Button' did not achieve a mark.

(g)(i) This question was answered very well. Candidates were able to suggest appropriate improvements that the designer could make, along with the benefits of the changes.

(g)(ii) Responses to this question were varied. A number of candidates were able to list four key design specification criteria for the plug. However, too many candidates simply

put one-word answers, such as ‘cost’ and ‘aesthetics’, failing to answer the question. The best answers were detailed, with a number of candidates being able to recall their knowledge from producing a specification in Unit 1.

(g)(iii) This question was to test candidates understanding of why urea formaldehyde is used to manufacture the plug casing. Most were able to state that it did not conduct electricity, or that it is a good electrical insulator. However, a large number struggled to identify a second valid reason, such as ‘it has a high tensile strength and high surface hardness.

Question 2

(a) It was pleasing to see that this question was answered very well by most candidates. The most popular responses including – allows user to do something else while the vacuum is working, no cables to trip over and easier to store.

(b) Again, it was pleasing to see that this question was answered very well by the majority of candidates, with popular responses being; cannot vacuum up the stairs, cannot vacuum into corners and the user has to charge it regularly.

(c) This question was generally not answered well at all. The vast majority of candidates failed to state two benefits to ‘the manufacturer’. A number of candidates repeated their answers from Q2a, which wasn’t the purpose of the question. Some candidates were able to comment on automated systems working in factories, assembling the vacuum cleaners.

(d) This question was well attempted by most candidates. However, once again, the question was not read properly and candidates made references to ‘the environment in the home’, as opposed to ‘outside, in the world’.

Question 3

(a)(i) The responses in this question were rather varied with many candidates lacking the safety knowledge and understanding of the purpose of the spring on the chuck key.

(a)(ii) This question was answered very well, with the majority of candidates being able to give at least two valid precautions that should be applied before the centre lathe is used. However, there were far too many candidates listing ’wear gloves’ as a precaution, and this response was not awarded a mark.

(b) The majority of candidates, who responded, calculated the surface area of the slot, gaining three marks. However, fewer successfully completed the calculation by multiplying the answer with the depth of the material. A small minority did not attempt to answer the question.

(c)(i) The majority of candidates successfully completed the side view, drawing the two holes on the upright and the hidden detail on the base. The plan/top view answers were far more varied. A small number of candidates drew the plan/top view on the wrong page, or not in line with the front view. The plan/top view should be drawn in line, and above the front view.

(c)(ii) The majority of candidates were able to draw at least one of the symbols, correctly. There weren't a lot of candidates who were able to draw both symbols correctly and in the right position/order.

(c)(iii) This question was looking at the candidate's ability to recall information they should have used during Unit 1. Answers could include: company name, title of drawing, scale and date. Most candidates were able to correctly name one piece of information. The number gaining the full 2 marks was significantly lower.

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