TECH-LEVEL
ENGINEERING

Mechanical Systems H/507/6524
Report on the Examination

TVQ01019 and TVQ01016
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General Comments

Most students demonstrated at least a basic understanding of the unit's content. The most successful students tackled the assignment in an orderly and pragmatic way.

To achieve a pass, all the criteria for pass must be appropriately evidenced; to achieve a merit, all of the criteria for pass and merit must be appropriately evidenced; and to achieve a distinction, all of the criteria for pass, merit and distinction must be appropriately evidenced.

A significant proportion of students had indicated, within their portfolios, where the individual assessment criteria have been addressed; for example, by listing the relevant criteria number in the title. This is recommended as best practice.

Grading Criteria	Commentary
P1 Describe four different examples of mechanical systems, each of which transmits motion or force between different forms of motion.	This criterion was very well answered by this cohort of students, their examples included : gears, levers, piston and crank mechanisms etc. Many included images and text as a means of explanation – best practice.
P2 For a given design specification, design a mechanical system to meet the desired outcomes.	A good selection of designs was used for this presentation. Video evidence was provided by several centres on Flash Drives and DVDs – good practice.
P3 Outline all design considerations.	This criterion was well-answered with some sound engineering terminology used.
P4 Specify the components to be used in the mechanical system in order to meet a specified performance.	This cohort of learners appear quite knowledgeable around available components and their use. As in the last couple of presentations, many of the students presented their findings in tabular form – best practice.
P5 Select an appropriate electric motor to power the mechanical system.	This cohort of learners included appropriate choices for motors in their designs. Many of the learners inserted an image of their selected motor into their portfolios as evidence – best practice.
P6 Produce a general assembly diagram of your design, showing the mechanical components.	There were some excellent examples of general assemblies produced. Good use of hand drawn assemblies proved popular among this group of learners. As last year, there were some very good CAD presentations in this series also.
P7 Produce a production plan for your product that provides the correct sequence of operations and use of tools.	Some good production plans were inserted that were well-presented and accurate. The best ones were produced in tabular form with timings and dates inserted.
P8 Provide a risk assessment for the assembly process, identifying hazards, risks and control measures.	There were some very good, in-depth risk assessments produced by this cohort. It is clear some good teaching had taken place.
P9 Carry out assembly operations to the	Many of this cohort produced photographic /

appropriate standards and tolerances, including the correct use of relevant materials, equipment, tools, or products.	video evidence, which detailed the students' involvement with the assembly process. Great use of today's technology as a means of evidence gathering. P9 quite well-answered.
P10 Work safely at all times, complying with health and safety and other relevant legislation, regulations, guidelines and local rules or procedures.	Again, good use of photographic evidence, detailing use of: safety glasses, overalls, machine guards etc. Some of the centres presented witness statements, for their students written by their tutors, that fully corroborated the students' engagement with activities P9 and P10 – very good practice that should be adopted by all centres where practical.
P11 Select and use appropriate measurement methods to test the mechanical elements of the constructed system and record the results of the test in an appropriate format.	Many students used personally designed test record sheets as acceptable evidence – best practice. Use of photographic / video evidence could help here.
P12 Create a preventative maintenance schedule for a mechanical system.	Some good evidence was produced, by the learners, with realistic dates / timings; much of the work was presented in tabular form – best practice.
M1 For two different examples of mechanical systems, explain how the system changes the magnitude of the force or movement of the input.	As in June 2018, the best answers included the action of gears with explanations of increasing torque and / or changing speed. Many students included images in their explanations, c / w captions, explaining what the images represented – best practice.
M2 Explain the way in which the mechanical components within your mechanical system operate to provide the required outcome.	Good answers gave detailed descriptions of components and how the torque could be increased. Some students provided good calculations of gear ratios and input / output speeds – best practice.
M3 Identify those that are relevant to the design.	Here, the best project portfolios took the relevant design considerations and linked them to their own particular design and explained why they were their preferred choice.
M4 Explain why the chosen mechanical components are suitable for the application.	Good use of engineering terminology was key to the best responses here. For example, low density, corrosion resistance, ease of manufacture, strength, durability, ease of assembly etc. A well-answered section showing some good teaching had taken place.
M5 Justify the choice of electric motor for the assembled mechanical system.	A high proportion of the students answered this criterion well. Their explanations and presentations considered the requirements of their particular design (e.g. function, rpm, torque, cost, efficiency), in comparison to the other types of motor listed in the specification.
M6 Suggest improvements or modifications that could be made to the mechanical system	An engineering analysis was required here. For example, during the first trial use of their

you have constructed.	design, many of the students took readings / timings to use in a future analysis. Much of this data was used to help formulate a plan to improve a student's particular design – best practice as noted over the last couple of years.
M7 Justify the use of the selected measurement methods.	Many of this cohort handled this criterion well. Video and photographic evidence was used in many cases to evidence this and justify their selection of methods.
D1 For a mechanical system, justify the choice of mechanical systems used in the design, in terms of their operational capability.	The justification should be based around sound engineering principles, practice and methods. Many of the cohort did this in reference to their own particular design.
D2 Justify the choice of three of the chosen components and identify possible alternatives.	Justification should include comparisons of various components. A catalogue of advantages and disadvantages for the components would be a suitable method. A table of advantages / disadvantages is good practice and simple to evidence.
D3 Evaluate the mechanical system you have constructed, covering how well the system meets the given specification and how testing supported any improvements made.	A good account of the testing methods, of the students' devices, was in evidence here. Again, many of this cohort used video and photo evidence to present their findings as in previous presentations of this unit.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.