TAS Industrial Technology:
Major project transcript

(Duration 30 minutes 16 seconds)

Hello everyone and welcome to the HSC Hub. In this presentation, we'll be looking at the 2020 Industrial Technology Folio. I'd like to start by acknowledging that we are recording this presentation from the lands of the Darug people. I also acknowledge the traditional custodians of the various lands on which you all work today and pay respect to Elders past, present, and emerging, and extend that respect to other Aboriginal and Torres Strait Islander people joining us today.

After surveying TAS teachers across the state, the greatest need for extra support and clarification was determined to be the folio for the major project. This information provided is based mainly on the marker feedback over the last couple of years. And then we'll look at how the COVID-19 pandemic will affect this year's cohort. We will start off by looking at the changes within Industrial technology for 2020. Then we'll look at the documentation of the major project. We will address each of the marking criteria, examining how the COVID-19 may have an impact and how to maximize your marks. Then we'll finish off with a quick look at parts of the practical marking process that relate to the folio and how to address this.

So we'll start by looking at the changes for this year. There have been a number of modifications this year with major project in Industrial technology, but there are also a great deal of things that have remained the same. The major project hand in date has been extended until the 27th of August. Although this may not make up for all the time lost, it does provide students with some extra time and hopefully the other processes, that we'll cover in a moment, will make it as close to a normal year as possible. In order to help facilitate the marking of the folio, students can provide up to six extra images on a maximum of four A4 or two A3 pages to provide context for the markers. These must be positioned at the beginning of the folio, and may include simple annotations to explain what students are wanting the marker take notice of. These images can also include a rendered drawing of the intended final design, which may be beneficial if the project is incomplete. These pages will not be marked. They are just there to help the marker better visualize the project.

Students can also submit up to six minutes of multimedia inclusions to address specific folio marking criteria. You must make sure that the video addresses the marking criteria for the folio and not the project, as the NESA markers are only marking the folio, therefore it should not be used to showcase the final project. These will need to be submitted on a USB in either AVI, MOV, MP4, or MPEG formats. Although it is not specifically mentioned, it is a good idea to externally label the USB with your student number so that it can be easily identified as your work. Students will need to weigh up whether the time and effort required to create a multimedia inclusion is justified and whether it will be showing something not already featured in their folio. As I've already said, if it isn't demonstrating something to the markers beyond what has already been covered, then it is unlikely to garner any extra marks.

The marking guidelines have not changed, only who is administering them. NESA has decided that teachers are best placed to mark their own students' practical work. Teachers have been monitoring the progress of their students and know whether an individual would have been likely to do better had it not been for the impact of COVID-19. NESA is facilitating extra training for teachers to support this marking process and providing them with benchmark examples and extra support when necessary. This comes down to teacher professional judgment and their ability to be able to make the call on whether students have been disadvantaged in completing their project. If this is the case, the individual teacher can choose to provide an estimated mark based on the student's prior performance and the impact that COVID-19 pandemic has had on their progress. The mark provided by the teacher, regardless of whether it's an estimate is confidential and cannot be shared with the students. The folio, extra pictures, and any multimedia inclusion are all due at the same time as the project and will be sent off by the teacher for marking at a marking centre.

Next, we will have a look at the suggested way in which the project is to be documented. The Industrial Technology marking guidelines, available for download from the NESA website and also on their assessment and reporting in Industrial Technology Stage 6 page, lays out a series of areas to guide the documentation of the major project. They are suggested as areas for you to address in a design management and communication section of the project, i.e., the folio. However, these areas do not necessarily equate to one item each on the marking guidelines table that the HSC markers use. Some are combined in order to make the marking process more straightforward. Next, we'll have a look at how the two differ.

On the left is the list that we just looked at from NESA website. And on the right is an excerpt from the Industrial Technology major project marking guidelines, also from the NESA website, and used in a table form by the markers when assessing the student folios. As you can see, the order of the suggested areas of documentation differ slightly from the order in the marking guidelines table. This raises the question, which order is the best to choose. The answer is the students are not tied to either of these lists to set up their folios. However, by choosing other headings, you could potentially make it more difficult for the marker to find the information and to award the marks. If students want to present their folio in a different order or use different headings, then they need to justify their reasons for doing this.

Now, we will have a look at the marking criteria for each section of the folio in the order that they're listed on the marking guidelines table and consider what you need to do to achieve the highest marks. Statement of intent sets the scene for what you're going to do in your project. But it's more than just telling the person reading your folio what you're going to make. In order to get the maximum available marks, the marking criteria says that the statement of intent needs to clarify the intent of the project by explaining clearly what is to be achieved and why, this has been supported by the advice from the marking centre, which has remained constant over the last couple of years, that student should give a full picture of the intended project, outlining areas of research and the planned use of the project. Depending on the project and the focus area, this might include why the student is designing and or making it, how and where it will be used, the funds available for the project, what the student needs to research, what skills they'll need to develop, where they might source material, and even where they might find existing examples of their project, or if they don't exist, then items similar to their project.

The statement of intent needs to lay out the roadmap for action before that action is taken. It shouldn't therefore be written after the fact, where the student is recounting or reflecting on what they've done. Sometimes projects change completely, and the statement of intent needs to be rewritten. In which case, the same process of working out what needs to be done moving forward should be completed. However, if the changes are less significant yet still requiring modification of the initial intent, this should be covered in the appropriateness of design and design modification sections of the folio, where students will then have the opportunity to gain some extra marks in a different section. This is especially relevant in the current climate of the COVID-19 pandemic, where most of you would have had to make adjustments to your project or the processes you used.

Students should also consider including an actual picture of where or how the project will be used such as a space in the lounge room where the coffee table will be used. The block of land, where a house plan might go, or the mountain bikes that will be carried on a bike trailer. This will give the marker a better idea of how the final project will be used and potentially even why it's being done in the first place. The final point from the marking centre, which again has been consistent over the last couple of years, is to consider using a mind map to identify all the things that need to be researched, identified and justified, in order to support the statement of intent and provide students with a more organized approach at the start of their project. If students do all of these things, they will have an excellent foundation to build on.

The next two sections are the research and selection and justification of materials, components, processes, technologies, and resources. The marking criteria used by the markers deals with them as separate sections. But we have dealt with them here together as without sufficient research, it is nearly impossible to successfully justify the selection and use of anything. The marking criteria states that in order to get the maximum available marks for research, the students need to conduct and explain a wide range of relevant research, of appropriate materials, processes, technologies, and resources. Then they go on to say, the students need to justify the selection of appropriate materials, processes, technologies, and resources. The notes from the marking centre say that the students should undertake research relevant to the statement of intent and project, as opposed to presenting excess information. And this is where the mind map comes in. If students have created a mind map of what they need to find out in their statement of intent, and then they conduct the research to address what was identified in the mind map, then that research is going to be relevant to their project. For each piece of research presented, students need to supply enough information to allow them to justify that their final choice is appropriate for the selected project. On top of that, students need to ensure that any research carried out samples a wide variety of sources from suppliers, to shops, to magazines, to online retailers, and everything in between, only using the internet for your research while using COVID-19 as the excuse isn't going to get you any extra marks. As realistically, that research should have been completed before the pandemic hit. I've always told my students that the research that actually makes it into the folio is merely the tip of the iceberg. There is no way within the page limit for students to incorporate all of their research, but that doesn't mean they shouldn't do it. Instead, refine the research until you have the top three to five things, whether they be software for use in a multimedia project, the potential finishes in a timber project, or the choice of parts on an automotive project, what matters is that students provide the information for them that clearly links back to the statement of intent.

The marking centre notes also say that when students are looking at existing designs, products or objects, they should research similar items and then evaluate these in terms of their functionality and aesthetics. Students need to identify the features that they see as being positive or negative and explain their reasoning. This is not enough just to throw some images into the folio. They have to clearly relate back to the statement of intent and need to provide some feature, whether it be functional or aesthetic that will then be taken forward and used in the development of their ideas.

The final comment from the marking centre relates to the selection of materials and processes. Each of these needs to be identified and weighed against each other until their use in the project is justified providing sufficient quality, degree of difficulty, and range of skills to warrant giving the students maximum marks.

These next three sections could be tackled in a multitude of ways. They can either be done as one all-encompassing development of ideas section, broken up with subheadings, or as the marking guidelines documents suggest, and as shown on the left, it could be three separate sections, sketching and idea generation, prototyping, modelling and testing and developing production and working drawings. I shall however approach the three sections together as it should be noted that the marking guidelines table that the markers use, as shown on the right, deals with them as one section. [statement on slide reads “Development of ideas, sketching and idea generation, modelling and testing, production and working drawings]

The marking criteria states that in order to get the maximum available marks for these three sections, the students need to demonstrate very high level skills in sketching and idea generation, prototyping, modelling and testing, and in developing production and working drawings, as appropriate to the nature of their project. We'll look at exactly what that means later. The notes on the marking centre say that the student should ‘document the development of the project, including ongoing evaluation’. This is important not only for the record of production, but also from these early stages of the design process and while the student's choices are being made, whether it be the choice of doors versus drawers or the selection of a particular joint type or finish. The key point to note in sketching and idea generation is that idea generation doesn't have to be only sketching. Students can use concept boards, PMIs, mind maps, and other cognitive organizers to develop their ideas. Then they can do quick thumbnail sketches, developed sketches and even CAD drawings to further flesh out their ideas. Students can even use multiple CAD packages to generate their designs, such as maybe SketchUp or Tinkercad for the initial concepts, and then SolidWorks, Fusion 360, or Onshape for the developed ideas. This is not to say that SketchUp cannot be used for a final design, just that the others make the generation of working drawings much easier, and by using multiple packages with different features, you're helping to demonstrate the use of a range of presentation and ICT skills.

When it comes to prototyping, modelling and testing, the ways in which students approach and document this section can be many and varied. Depending on the focus area, different things will be more or less appropriate. However, some ways of communicating this section can be through the use of modules, jigs, practice joinery or components, test pieces or samples, working rods, templates, and even CAD modelling. Students have the opportunity to incorporate rapid prototyping technologies, such as CNC mills, 3D printers, and laser cutters where appropriate to do so and should consider and be able to justify their use rather than just being for the sake of it. If you struggle to visualize the scale of particular features of the project, then a model 3D printed or otherwise can provide an indication of how it will look. Students should ensure that the experimentation with materials, joints, finishes, renders and techniques are documented with evidence of their outcomes and justification of their selection. Realistically, in industry, the prototyping modelling and testing would go hand in hand with the selection and justification we’ve just covered and that is why they follow on from one another.

Finally, the development of production and working drawings. As I mentioned at the start, this will not be appropriate for all project types within Industrial Technology, but as well as the traditional dimensioned orthogonal drawing with details and specifications, students can also present storyboards, schematic diagrams, flowcharts, or other ways for them to communicate their final design in a manner appropriate to their focus area. With any working drawing, it is however important that the correct Australian standards are adhered to. And the work demonstrates that the student has a solid understanding of what they are and how to apply them.

The effect of COVID-19 on these sections will vary greatly depending on the type of project students are completing. Whatever the impact, make sure it's documented in the timeline, ongoing evaluations and through any modifications to the design that were necessary.

This next section is probably one of the biggest areas where students can gain marks as a result of the pandemic. The marking criteria states that in order to get the maximum available marks, students need to analyse and evaluate the relationships between design and modifications, if applicable, materials, components, and processes in development of the major project. The notes from the marking centre say that students should provide evidence of refinements and modification of designs and that they should explain and justify decisions made during the designing, modifying and planning stages of the major project. This year is unique, or at least hopefully it will be, where students have seen unprecedented disruptions to their learning and to the development of their major projects. As such, most students will have had to make some sort of modification or compromise to their project due to less access to workshops, time limitations, physical distancing requirements, sanitizing of tools and the list goes on. All of these should be analysed and evaluated here. For instance, what materials or components were no longer available due to supply interruptions? What was substituted and what effect has that had on the project? What processes had to change due to equipment or other things not being available? And what impact did that have? What have students done to modify their practices and get the project finished in the new time frame? And that leads us nicely into the next section.

The timeline is another area where students can potentially gain some extra marks. The marking criteria states that in order to get the maximum available marks, students need to develop, apply, and evaluate comprehensive and appropriate timeline plans. The notes from the marking centre say the student should manage time efficiently to incorporate the research and application of standards for the successful completion of a project. It is not enough to create a basic timeline and then follow it. Students need to create a timeline that factors in all of their other activities, what time they have in class, how much time they intend to allocate to their major project outside of school hours? What external factors beyond their control will have an impact such as exam periods, sports days, public holidays, and anything else they can think of? Of course, no student could have predicted the COVID-19 pandemic and it would not have factored into their initial planning, but it most definitely should factor into their evaluation of it. The most common timeline used is a Gantt chart. However, students can use whatever they think best helps with the planning of their project.

In order to demonstrate that there was planning and then life happened, students need to show the marker multiple timelines. These can be separate from one another or overlaid using different colours and a key to distinguish them. Students need to be able to clearly show their initial timeline, including the planning and the thought and reasoning that went into it as well as what actually happened and why, explain the delays or why things took less time and articulate what impact that had on the overall project. Students may even want to identify key dates such as when restriction started, when they were no longer allowed to do prac, when they could return to the workshop, when their materials or resources were originally supposed to arrive, and when they finally got there. There are many different ways that student’s can approach this, so long as they clearly show their initial planning and compare it with an explanation and evaluation of what happened, then there are definitely marks to be had.

The finance plan can be a tricky one. Who is paying for the project? Is it self-funded or is the bank of mum and dad chipping in? What is the budget and how did that number come about? These are all questions that need to be asked and answered. The marking criteria states that in order to get the maximum available marks, students need to develop, apply, and evaluate comprehensive and appropriate finance plans. The notes from the marking centre haven't mentioned finance plans as something that particularly needs improvement, or for that matter that has been done well. Students simply need to make sure that they develop a finance plan for their major project, which includes everything they would need to make it. This can seem easier for the focus areas of timber or metal as the final project is a tangible product that has value, ideally one which is worth more than the sum of its parts. With a project, like a set of plans for a house in graphics, this can be more abstract, but there are still costs involved, including the software you used, the computer peripherals, any other specific equipment and probably the biggest resource for these sorts of projects is time. This gives students the opportunity to identify the salary or hourly rate for the appropriate profession, and then apply that to the amount of time they spent developing the projects to its completely state. Students may want to develop a projected budget based on what they want to spend or what a similar product would cost to produce. But as the cost to produce a single item far outweighs the unit cost to produce a hundred or a thousand or even tens of thousands of them, this is unlikely to provide an accurate indication of the cost of the student's work. However, when pricing materials, students can find out the bulk prices and then use them to calculate their per unit cost, that would be closer to what will be used in industry to set that price and then compare this to their costs to produce their major project.

By developing and applying a finance plan that is both comprehensive and appropriate, students will be able to predict with a reasonable degree of accuracy, what the cost is to produce their project and where there are differences, they can identify the causes and explain the impact this has had. Here as with the timeline, the effect COVID-19 has had on supply chains was unpredictable for students and this too may have had an effect on the finance plan in terms of material available and the potential raise in price due to reduced supply and increased demand. All of these issues need to be addressed in a high-quality finance plan.

The production of the major project makes up a significant portion of the time available and as such, that is generally reflected in the portfolio. The marking criteria states that in order to achieve the maximum available marks, the student needs to clearly describe the management of the project, including a succinct record of the production of the project. The notes from the marking centre say that students should document the development of the project, including ongoing evaluation. This is an important point to note. It is not enough just to simply record what happened. Students need to analyse what happened and consider how they could improve and what they did to overcome problems. The marking centre feedback also says the student should provide detailed descriptions, together with photographic records of procedures including fault-finding, maintenance, applied industrial technologies, and processes. This is important because by using photos or screen captures, students are more clearly able to articulate what is going on and what the particular point is that they're trying to get across. Using images to document the process, reduces the need for more wordy explanations, and therefore makes it more succinct. This is also where students may want to use some of the six minutes of multimedia inclusions in the form of filming a particular process or creating a time lapse of an extended and complex portion of the production. Students need to weigh up whether the extra time and effort involved in creating such an inclusion is of greater benefit than some pictures and a written explanation of what is occurring.

Finally, the marking centre says that students need to remember to recognize any outsourcing, noting what part and why it was outsourced. For many projects, there may be no outsourcing necessary. However, not all schools will have access to the same equipment. And rather than making do and potentially doing a less professional job, that particular aspect can be outsourced to a business to do on the student's behalf. In some cases, the business will allow the student to photograph or film the process if it is explained to what is for and then that can be included in the folio. At the very least, the student should include before and after shot and justify why it was necessary.

Documenting work health and safety practices within the major project can be done in a couple of different ways. The marking criteria states that in order to achieve the maximum available marks, the student needs to demonstrate the use of a wide range of appropriate work health and safety and safe working practices through suitable documentation and evidence. Notes from the marking centre then say that students should apply work health and safety principles through successful design, construction, and work ethics. Some students embed the work health and safety practices within their folio, demonstrating through the photographic evidence and documentation for each section that they have adhered to safe working practices at all times. Others choose to have a dedicated section, to draw the markers attention to all the things that they've done from following work, health, and safety protocols and the use of personal protective equipment to the creation of risk assessments or consultation of material safety data sheets to inform the decision behind the choice of finishes. Others still do a combination of these so that it can be seen that work health and safety practices have been applied holistically throughout the project. There is no particular right or wrong way to approach this. So long as the student demonstrates a wide range of appropriate practices, including all of the control measures used to minimize the risk of harm to themselves and others, not just personal protective equipment.

It should also be noticed that everything documented in your folio should follow the correct work health and safety practices at all times. Just because an image isn't specifically being used to demonstrate it, doesn't mean it won't get seen or considered. If you've said that work health and safety practices were adhered to at all times yet several images of you show PPE or other safety precautions not in use, then the marker cannot overlook them.

Presentation skills and techniques, including ICT skills are another section that is easily embedded into every documentation practice. The marking criteria states that in order to achieve the maximum available marks, the student needs to demonstrate a wide range of presentation skills and techniques, including ICT skills, appropriate to the development of the major project. The notes from the marking centre then say students should review their project holistically to evaluate the range of skills that they've included in their project. In order to achieve the maximum marks, students need to design their folio. It's not enough to simply document the process and what has been done. They have to present it in a way that makes it easy to read, that is laid out in an intuitive manner and that follows a pattern or uses cues to guide the reader through the project. This doesn't happen by chance. Students need to decide on the font used, the colour scheme, the placement and wrapping of images, the inclusion of tables and graphs to convey information more clearly, and the list goes on. A great folio can demonstrate a wide range of presentation and ICT skills within the first couple of pages, whether you then have a section explaining the choices made and relating them back to the project is down to personal choice.

The marking criteria goes on to say the student should refrain from using social media, such as Facebook or Instagram as a means to presenting work or the record of production. This should also be the case for any multimedia inclusions prior to them being marked. Students should also refrain from the use of social media shorthand in any documentation of their project, unless it directly relates to the production of the project itself. And even then, students should consult their teacher to ensure it's appropriate.

The evaluation of the major project should be ongoing from the moment it begins in term four. The marking criteria states that in order to achieve the maximum available marks, the student needs to provide a critical evaluation of the major project, including in relation to the statement of intent, research, and planning. The notes from the marking centre then say that students should explain and justify decisions made during the designing, modifying, and planning stages of the major project and that they should be aware that the final evaluation should be directly related to the initial statement of intent, planning, and production. The conclusion should be a summary brought together through the ongoing reflections on project development.

Students need to incorporate ongoing evaluation in every aspect of the folio. How they do that is up to the individual. Some choose to integrate it, so the ongoing evaluation is just a part of each section. Others like to highlight it by including an ongoing evaluation heading at the end of each section, or in textbox, or given a different colour. As long as students find a way to evaluate the project on an ongoing basis, the way that they go about it is less important. At the end of the project, students need to provide one last evaluation that considers what they have achieved against what they set out to do. They need to look back at the statement of intent and critically evaluate whether what they've done can be seen as being a success. They need to consider the research carried out and the choices it informed and make a decision on whether they would do the same thing again. They need to consider how they plan the project and what got in the way, including COVID-19. They can evaluate the impact it has had on their project and effectively give them the opportunity to provide justification to the markers for why they deserve the highest marks.

Now, we will take a quick look at the overlap between the folio and practical marking. For the marking of the links between planning and production, the marking criteria states that in order to achieve the maximum available marks, the student needs to demonstrate that the completed project relates closely to what was intended. Close links between actual construction processes, management and thorough research and planning are evident and clearly articulated. In order to assess this, the markers will often compare the finished project to the design sketches, working drawings, record of production and a timeline or finance plan. This is where a well-laid out folio, which has been completed to a high level, and that accurately depicts what has occurred in the completion of your project can enhance your practical marks.

For the marking of the evidence of solution to problems in production sections, the marking criteria states that in order to achieve the maximum available marks, the student needs to demonstrate and critically evaluate how solutions to problems in major project production were addressed. Problems encountered during production will not necessarily be evident in your final project, so you should take photographs or make sketches of what they were and how you solved them. This could be a separate section, but it could also be included in the record of production as evidence of problem solved during production. By making sure this is evident, although technically not a section suggested in the folio, students are providing markers with the greatest opportunity as possible to find the marks. And will certainly not cost them any marks.

I would like to acknowledge the resources used to develop this presentation, the documentation from NESA, including the Industrial Technology syllabus, the marking guidelines, and the HSC marking feedback as part of the HSC exam packs. I would also like to acknowledge the advice and assistance of the TAS Advisor and the other Curriculum support project officers in the Learning and Teaching secondary team. Thank you for your time. And I wish you all, the best of luck with your projects and the rest of your HSC.

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