T Level Technical Qualification in Engineering and Manufacturing – Manufacturing, Processing and Control

8713-331 Fitting and Assembly Technologies

Grade standard exemplification material

Distinction - summer 2024

Version 1-0

Version and date	Change detail	Section	Question
v1-0 Oct 2024			

Contents

Introduction

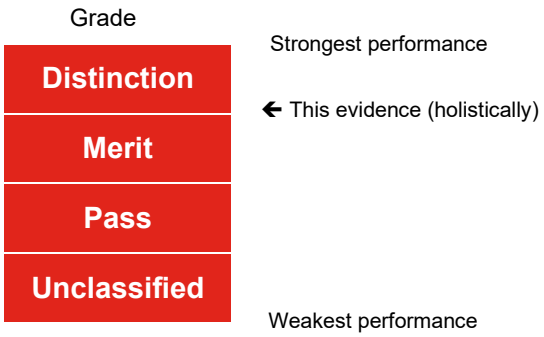
Summer 2024 Results

This document is aimed at providers and learners to help understand the standard that was required in the summer 2024 assessment series to achieve a distinction grade for the 8713-331 Fitting and Assembly Technologies Occupational Specialism (OS).

The grade standard exemplification evidence (Grade SEM) provided for the distinction grade displays the holistic standard required across the tasks to achieve the distinction grade boundary in the summer 2024 series.

The aim of these materials is to provide examples of knowledge, skills and understanding that attested to **one mark above** distinction competence in summer 2024. It is important to note that in live assessments a candidate's performance is very likely to exhibit a spikey profile and standard of performance will vary across tasks.

The Occupational Specialism is graded Distinction, Merit, Pass or Unclassified.



The distinction grade boundary is based on a synoptic mark across all tasks. The materials in this Grade SEM are separated into two sections as described below. Materials are presented against a number of tasks from the assignment.

Tasks

This section details the tasks that the candidate has been asked to carry out. What needs to be submitted for marking and any additional evidence required including any photograph/video evidence. Also referenced in this section are the assessment themes the candidates were marked against when completing the tasks within it. In addition, candidate evidence that has been included or not been included in this Grade SEM has been identified within this section.

In this Grade SEM there is candidate evidence from:

Task 1 Planning
Task 2 Production
Task 3A Quality review
Task 3B Evaluation and recording
Task 3C Handover

Candidate evidence

This section includes exemplars of candidate work, photographs of the work in production (or completed) and practical observation records of the assessment completed by centre assessors. This was evidence that was captured as part of the assessment and then internally marked by the centre assessor.

The Occupational Specialism brief and tasks can be downloaded from here.

Important things to note:

- We discussed the approach to standard setting/maintaining with Ofqual and the other awarding organisations before awarding this year. We have agreed to take account of the newness of qualifications in how we award this year to recognise that students and teachers are less familiar with the assessments (grading-arrangements-for-vtqsand-technical-qualifications-within-t-levels-in-the-academic-year-2023-to-2024), whilst also recognising the standards required for these qualifications.

- The evidence presented, as a whole, was **one mark** above the distinction grade. However, performance across the tasks may vary (i.e. some tasks completed to a higher/lower standard than distinction grade).

Grade descriptors

To achieve a distinction, a candidate will be able to:

Competently and thoroughly interpret technical information, applying technical skills to plan, assess risk and follow safe working methods to practical tasks and procedures to an exemplary standard in response to the requirements of the brief, producing an excellent quality of work that meets tolerances, regulations and standards.

Thoroughly prepare working area, mitigating potential risks prior to commencing tasks and consistently apply exemplary housekeeping techniques during tasks.

Demonstrate exemplary technical practical skills in cutting, shaping, fitting, drilling, assembly and commissioning activities that are in line with industry standards and meet the requirements of the brief.

Demonstrate exemplary ability to follow procedures to produce or maintain working components.

Demonstrate exemplary knowledge and understanding of the principles and processes required for fitting and assembly activities.

Work safely and make informed and appropriate use of tools, materials and equipment within the working environments for cutting, shaping, fitting, drilling, assembly and commissioning activities.

Identify causes and diagnose problems or common issues related to fitting and assembly and have a thorough understanding and the skills to be able resolve and rectify them.

Consistently and accurately use industry and technical terminology across different communication methods with full consideration of technical and non-technical audiences.

Task 1 Planning

Assessment number (eg 1234-033)	8713-331
Assessment title	Fitting and Assembly Technologies Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	1
Evidence title / description	Resource list with justifications Completed risk assessment Method statement with justifications Quality check sheet template
Date submitted by candidate	DD/MM/YY

Task 1

Assessment themes:

- Health and safety
- Planning and preparation
- Production
- Quality review and evaluation

You must:

- produce a resource list
- produce a risk assessment
- produce a method statement
- produce a quality check sheet (for use in task 3A)
- carry out calibration checks on measurement equipment

Additional evidence of your performance that must be captured for marking:
N/A

Candidate evidence

Bevel gauge

resource list

Materials and parts

Material or part	Quantity
3mm thick low carbon steel plate	1
3mm thick brass plate	1
M5 x 16 bolt	1
M5 wing nut	1
3mm aluminium rivets	3

Health and safety

Item
Overalls
Steel toe capped boots
Gloves
Safety goggles

Workshop resources

Resource	Quantity	Justification
Mop and bucket	1	For cleaning up large chemical of fluid spills
Dust pan and brush	1	For removing swarf or metal dust from a workspace
Paper towels	1 roll	For cleaning up smaller chemical or fluid spills
First aid kit	1	In case of minor injury
Waste bin	1	For putting swarf, offcuts or waste in

Technical information and documentation

Information or documentation	Quantity	Justification
Engineering drawings	1	So that you can understand the dimensions and see the layout of the part
Quality check sheet	1	To compare the dimensions and tolerances of the finished product to the required specification
Calibration certificates	1	To make sure that the measuring equipment has been calibrated recently
Risk assessment	1	To understand the hazards and risks of the workspace and to mitigate them

COSHH data sheets	1	To understand the handling of dangerous chemicals or substances

Tools and equipment

Tool or equipment	Quantity	Justification
Milling machine	1	For accurately removing material
Milling machine safety check sheet	1	To check that the mill is safe to operate
R8 collet	1	To hold a milling bit
5.2mm Slot drill	1	For drilling a slot in the workpiece
Pillar drill	1	To drill holes in material
Drill bit set	A range	For drilling specific sized holes
Countersinking bit	1	To countersink holes for rivets
Cutting compound or lubricant	1	For a better surface finish and to protect the drill bit when cutting
M5 tap	1	To thread the hole for the bolt
Tap wrench	1	To turn the tap
Machine vice	1	For holding the part in the drill
Jacobs chuck	1	To hold the drill bit for drilling
Chuck key	1	To do up the chuck
Hacksaw	1	For cutting the metal blanks down to size
A set of files	A range	To get a more accurate size and finish on the workpiece

Emery cloth	1 strip	To produce a final finish on the workpiece
Deburring tool	1	For removing burrs from machining
Bench vice	1	Fore holding the workpiece when sawing or filing
Soft vice jaws	2	to place in the vice so as not to ruin the finish on the workpiece
Centre punch	1	For marking where the centre of a hole will be
Ball peen hammer	1	To hit the centre punch
Riveter	1	To inert the rivets into the workpiece
Digital height gauge	1	To accurately measure the dimensions of the workpiece
Datum table	1	To accurately take measurements from
Radius gauge	1	For measuring any radii
Scribe	1	For marking out lines
Engineers blue	1	To allow for marked lines to show up more easily
Engineers square	1	To check edges are square
Vernier protractor	1	To measure angles
Dividers	1	To mark radii

Pen and paper	1	For writing down any notes, measurements or calculations
Calculator	1	For doing calculations

Bevel gauge

Risk assessment

Risk assessment for producing a bevel gauge

Hazard	Risk	Likelihood (with control measures)	Severity (with control measures)	Who it will affect	Persons reasonable for control measures
Milling machine	Entanglement	1	3	Mill operator, nearby persons	Operator, supervisor
	Electrocution	1	2	Mill operator, maintenance worker	Operator or maintenance worker, mill manufacturer
	Skin irritation, eye damage, blindness from coolant	1	2	Mill operator	Mill operator, technician
Pillar drill	Entanglement	1	2	Drill operator, nearby persons	Operator, supervisor
	Electrocution	1	2	Drill operator, maintenance worker	Operator or maintenance worker, drill manufacturer
Swarf	Cuts	1	1	Machine operator	Machine operator
	Burns	1	1	Machine operator	Machine operator
Hand tools	Cuts	1	2	User	User
Hand files	Skin abrasion	1	1	User	User

Tools or items on the floor	Trips or falls	1	1	Workshop users, technicians	Workshop users
Chemicals or lubricants on the floor	Slips or falls	1	1	Workshop users, technicians	Workshop users
Hammer	Bludgeoning	2	2	User	User
Vice	Crushing	1	2	User	User

Likelihood	Severity
1 (very unlikely)	1 (minor injury)
2 (unlikely)	2 (major injury)
3 (possible)	3 (loss of limb)
4 (likely)	4 (death)
5 (very likely)	5 (multiple deaths)

Bevel gauge

Method statement

Pre - production checks

Make sure that the work area is clear of any foreign objects or tools and that all tools are put back in their original places.

Clean up any swarf for metal dust from the work area and the machines then dispose of it.

Make sure all required tools are easily accessible and are in good condition. If they are not then ask for a replacement.

Make sure that any hacksaw blades are tightened up before usage.

Inspect machinery for any damage or ware. If any if found it must be reported.

Health and safety

Make sure that you are wearing all required PPE before entering the workshop.

If you are using a machine such as a pillar drill or milling machine, then make sure that you have read any manuals for the machine and that you understand how to use it safely.

After production

After production of the product is finished all tools should be put back where they were found and machinery should be cleaned and inspected.

Any tools or objects on the floor should be cleared up and any spillages of fluids or chemicals should be moped up.

Swarf and metal dust should be removed and disposed of.

Any paperwork such as the quality check sheet should be filled out.

Method statement for producing body 1 and 2

1. Start by marking a cutting 3 blanks of steel from the 3mm thick steel plate, 2 at 150mm in height and 1 at 130mm.
2. Taking one of the 150mm high blanks, deburr it then take it over to the datum table.
3. Using the Vernier height gauge mark a line 100mm up from the base of the workpiece then rotate it and mark the line in the same place on the other side.
4. Put some engineers blue on the marked lines so that they show up more easily.
5. Put the workpiece in a bench vice with some soft jaws fitted.
6. Begin cutting the workpiece down to size using a hacksaw making sure to leave at least a 1mm gap between where you are making the cut and the mark lines. This is so you can accurately file it down to size.
7. Begin filing the part down the line. Remember to periodically check the workpiece in the height gauge to make sure that the measurement is accurate.
8. Take the workpiece out of the vice.
9. Using the height gauge mark the centre line down the middle of the part.
10. Start by marking out the centre point for the top hole, mark a line that is 12.5mm drown from the top of the part using the height gauge.
11. Where this line intersects with the centre line is where the centre of the top hole will be.
12. Line up a centre punch on the intersection point then using a ball peen hammer, hit the centre punch so that it creates a divet in the material.
13. Start marking out the centre points for holes A, B and C.
14. Pick one of the holes to start with then set the height gauge so that it is at the height of the chosen hole from the base, then mark a line.
15. Set the height gauge to the distance from the side for the chosen hole.
16. Rotate the part 90º anticlockwise or clockwise then using the height gauge mark another line across the part.

17. Mark with a centre punch where the lines intersect. Then using a scribe, mark either A, B or C next to each hole.
18. Repeat steps 12 – 15 until the other 2 holes are marked.
19. To mark out the radius you will need to use the dividers. Set the dividers to 12.5mm apart then one point on the dividers in the mark for the centre of the top hole.
20. Mark a 90º arc on the part using the dividers on both sides of the centre line.
21. Put the workpiece in the vice.
22. Make straight cuts near the arc with a hacksaw.
23. Using a file, file down the radius by rocking the file in the opposite way to the arc. Use finer files until the line is reached. Make sure to check periodically wit ha radius gauge to check that it is accurate.
24. Repeat steps 2 – 7 and 17 - 20 to produce the second half of the body. Mark each half as either 1 or 2.
25. Check all square edges are square.

Method statement for producing the blade

1. Take the blank that was cut to 130mm high and mark a line of it using the height gauge at 95mm high.
2. Begin cutting the workpiece down to size using a hacksaw making sure to leave at least a 1mm gap between where you are making the cut and the mark lines. This is so you can accurately file it down to size.
3. Begin filing the part down the line. Remember to periodically check the workpiece in the height gauge to make sure that the measurement is accurate.
4. Using the height gauge mark the centre line down the middle of the part.
5. Mark a line across the workpiece that is 12.5mm down from the top then set the height gauge to 0 and measure down 52.5mm and mark another line across the workpiece.
6. Where both of these lines intersect the centre line mark it with a centre punch.
7. To mark out the radius you will need to use the dividers. Set the dividers to 12.5mm apart then one point on the dividers in the mark for the centre of the top hole.
8. Mark a 90º arc on the part using the dividers on both sides of the centre line.
9. Put the workpiece in the vice.
10. Make straight cuts near the arc with a hacksaw.
11. Using a file, file down the radius by rocking the file in the opposite way to the arc. Use finer files until the line is reached.
12. Take the workpiece out of the vice
13. Set up the pillar drill with the machine vice, parallels and a centre drill in the chuck that is smaller than 5.2mm.
14. Where the holes are centerpunched, drill a small hole into the surface of the material with the centre drill but don’t drill all the way through.
15. Change the drill bit over to a 5.2mm drill bit and drill a hole through each of the centre drilled holes, make sure to use cutting grease or lubricant when cutting.

16. Take the part over to the milling machine and set it up safely with an R8 collet that is the right size for a 5.2mm slot drill.
17. Put the workpiece in the machine vice with the parallels and start up the machine.
18. Plunge the slot drill into the pre – drilled hole then using the auto feed. Move the table along so that the slot drill is cutting towards the other predrilled hole. Once the other hole is reached, turn off the auto feed and turn off the mill.
19. Remove the workpiece and remove the tools from the mill then clean it up.
20. Remove any burn created from milling with a deburring tool.
21. Mark a line on the workpiece from the bottom left hand side that is at a 45^{o} angle.
22. Put the workpiece in the vice.
23. Using a hacksaw, cut down the line making sure to leave at least a 1mm gap between where you are making the cut and the mark lines.
24. Begin filing the part down the line.
25. Take the workpiece out of the vice.
26. Check all square edges are square.

Method statement for producing the divider

1. Mark an area of 30mm by 25mm on a 3mm thick plate of brass.
2. Put the workpiece in the vice.
3. Using a hacksaw, cut near the line making sure to leave at least a 1mm gap between where you are making the cut and the mark lines.
4. Begin filing the part down the line. Remember to periodically check the workpiece in the height gauge to make sure that the measurement is accurate.
5. Take the workpiece out of the vice.
6. Mark out where the holes will be then centerpunch them.
7. Begin drilling the holes using a centre drill first then using 3.2mm drill bit
8. From the top right-hand corner of the part mark a 45-degree angle line to goes down to the bottom left hand corner of the part.
9. Put the workpiece in the vice.
10. Using a hacksaw, cut near the line making sure to leave at least a 1mm gap between where you are making the cut and the mark lines.
11. File the edge down to size.
12. Take the workpiece out of the vice.
13. Check all square edges are square.

Method statement for drilling holes in body 1 and 2

1. Align both halves of the body in a machine vice in the pillar drill using parallels making sure that the body half that has the markings for the holes is on top.
2. Use a centre drill that is smaller than 3mm to drill some small holes in the spots that are marked A, B and C that don't go all the way through the part.
3. Change the drill bit over to a 3mm drill bit and drill the through the centre drilled holes making sure to go through both parts.
4. Centre drill the top hole then drill a 4.8mm hole using a 4.8mm drill bit in the chuck.
5. The reason for drilling through both halves is so that the holes on both halves line up.
6. Remove the one of the halves from the vice
7. Set the other half up in the vice so that it is flat.
8. Use a 5.2mm drill bit in the top hole then counter sink holes A, B and C so that the countersink is 3.2mm in diameter.
9. Put the other workpiece in the bench vice.
10. Put an M5 tap in the tap wrench then begin tapping the top hole on the workpiece, make sure to keep the tap level and perpendicular to the workpiece. Always turn the tap back a quarter after ¾ of a turn. Keep going until the tap is out the other end then remove it.
11. Put this workpiece back in the machine vice and countersink holes A, B and C to 3.2mm in diameter
12. Fit all the parts together with the supplied fixings and test the bevel gauge. If parts don't fit properly, check the dimensions and the tolerances then fill out the quality check sheet.

Bevel gauge

Quality check sheet

Quality check sheet for body 1

Dimension	Specified size	Actual size	Tolerance	Error	Measured with	Pass or fail
Width	25mm		+-0.25			
Height	100mm		+-0.25			
Top radius	R12.5		+-0.1			
Top hole	Dia 5.2		+-0.1			
Hole A, B and C	Dia 3.2 (with countersink)		+-0.1			

Quality check sheet for body 2

Dimension	Specified size	Actual size	Tolerance	Error	Measured with	Pass or fail
Width	25mm		+-0.25			
Height	100mm		+-0.25			
Top radius	R12.5		+-0.1			
Top hole	M5 (tapped)		+-0.1			
Hole A, B and C	Dia 3.2 (with countersink)		+-0.1			

Quality check sheet for blade

Dimension	Specified size	Actual size	Tolerance	Error	Measured with	Pass or fail
Width	25mm		+-0.25			
Height	95mm		+-0.25			
Top radius	R12.5		+-0.1			
Slot end diameter	Dia 5.2		+-0.1			
Slot height	52.5		+-0.1			
Bottom angle	45º		+-0.25			

Quality check sheet for divider

Dimension	Specified size	Actual size	Tolerance	Error	Measured with	Pass or fail
Width	25mm		+-0.25			
Height	30mm		+-0.25			
Hole A, B and C	Dia 3.2		+-0.1			

Task 2 Production

Assessment number (eg 1234-033)	8713-331
Assessment title	Fitting and Assembly Technologies Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	2
Evidence title / description	Functioning bevel gauge
Date submitted by candidate	DD/MM/YY

Task 2

Assessment themes:

- Health and safety
- Planning and preparation
- Production
- Quality review and evaluation

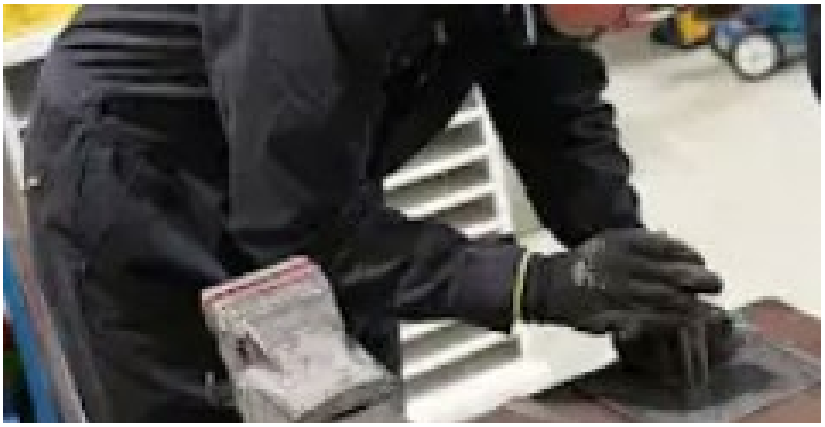
You must:

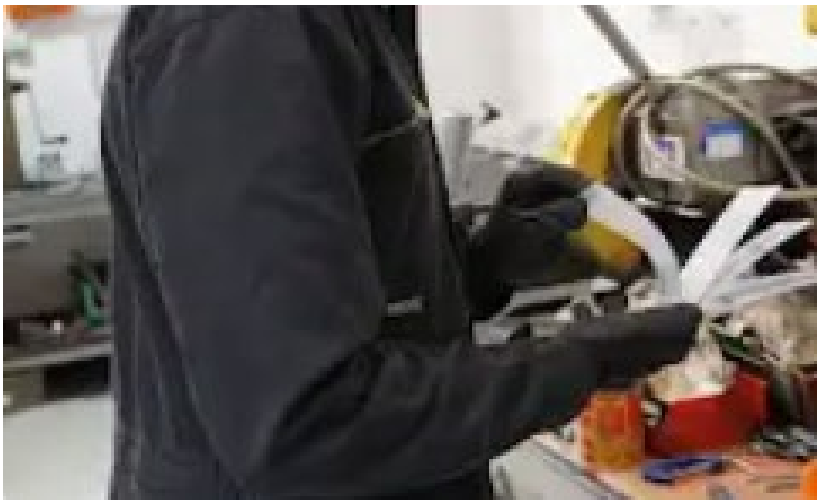
- prepare the work area
- produce the bevel gauge using both hand tools and workshop machinery to specification
- apply a suitable surface treatment to the finished components
- assemble the bevel gauge using the finished components
- reinstate the work area following the production of the bevel gauge.

Additional evidence of your performance that must be captured for marking:

- assessor observation to include:
    - checks carried out before, during and after production
    - work area prior to, during and on completion of tasks
    - preparation, application and usage of tools and equipment
    - application of hand skills
    - set up and use of workshop machinery.

Candidate evidence





Preparation/ Machines

Before using machines, The learner checked the safety stops and guards were checked for functionality and the isolators were correctly switched on prior to use and turned off following use. Clocking the vice , security of T bolts and machine speed and functionality were correctly checked before use on the pillar drill and milling machine.

Overall a thorough preparation was demonstrated

The learner used the pillar drill appropriately with the steel parts being correctly secured in the machine vice and suitable care was taken to double check alignment.

Production

The learner was dressed appropriately for the activity wearing correctly fitting overalls, the correct safety glasses, earplugs/defenders and steel toe capped boots.

The learner used the operation sheet and engineering drawings to assist in the manufacture of the component, all documentation was stored safely in a paper folder with the correct candidate identity information.

The learner started with measuring the material with a Vernier, checking for the calibration certificates to ensure the measuring instruments were accurate.

The learner marked out the length of the mild steel pieces using marking blue and a Vernier height gauge, [learner] marked out the radii by setting the callipers against the steel rule and scribing a centre point, then marked the radius on all components.He then proceeded to cut the radius on the pieces with a hacksaw by clamping them all together using a small G-Clamp and soft jaws in the vice. The learner used the Vernier calliper and radius gauges to continuously check the size of the component during the filing process.

The learner marked out the brass component and cut it to just over the size on the drawing.

The learner then drilled the required size holes in all the mild steel parts,the brass component and created a thread in the required mild steel piece.

The learner marked out the blade part ready for milling the slot on the milling machine. The DRO or manual dials were used on the milling machine to confirm and slot drill the required slot to size.

The learner did an un riveted/unbolted check on the parts and did a quality review on the parts that could not be accurately checked once assembled. All the parts were then assembled to a final finished product.

The learner used a fine file to finish the assembly, some 300 grit wet and dry paper to remove sharp edges and burrs from the component.

Task 3A Quality review

Assessment number (eg 1234-033)	8713-331
Assessment title	Fitting and Assembly Technologies Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	3A
Evidence title / description	Completed quality check sheet Marked out test piece
Date submitted by candidate	DD/MM/YY

Task 3A

Assessment themes:

- Planning and preparation
- Quality review and evaluation

You must:

- carry out a full quality inspection of the completed bevel gauge, recording findings using the quality check sheet
- mark out a 35-degree angle on a material test piece using the bevel gauge.

Additional evidence of your performance that must be captured for marking:

- completed bevel gauge
- assessor observations:
    - usage of measuring equipment
    - accuracy of angle marked out with measurements taken.

Candidate evidence

3A Quality Review

The learner correctly wore their PPE and confirmed the working area was clean and safe to use.

A visual inspection was carried out and all parts measured and recorded on the quality inspection sheet. This was completed prior to assembly to allow all parts to be measured. The measurements were checked against the working drawings and tolerances calculated to see which met and which didn't.

Most were met but there were a few that fell outside the given tolerance.These were all written on the quality check sheet.

The components were then assembled, rivets fitted, bolt & nut fitted and then further checks were carried out against the drawing. Again these were recorded on the quality check sheet.

Most were within tolerance but a couple fell just outside the tolerances given.

Some finishing was carried out once rivets fitted and this left an excellent finish on the external surfaces. A surface finish was applied to inhibit corrosion.

The item was tested by the candidate for full functionality. The bolt and nut locked the blade in place to allow marking out to be carried out accurately.

Recording of functionality is attached.

Quality check sheet for body 1

Dimension	Specified size (mm)	Actual size (mm)	Tolerance	Error (mm)	Measured with	Pass or fail
Width	25	24.9	+-0.25	-0.1	Height gauge	Pass
Height	100	99.88	+-0.25	-0.12	Height gauge	Pass
Top radius	R12.5	R12.5	+-0.1	0	Radius gauge	Pass
Top hole	Dia 5.2	Dia 5.12	+-0.1	-0.08	Vernier calliper	Pass
Holes A, B and C	Dia 3.2 (with countersink)	Dia 3.2	+-0.1	0	Vernier calliper	pass

Quality check sheet for body 2

Dimension	Specified size (mm)	Actual size (mm)	Tolerance	Error (mm)	Measured with	Pass or fail
Width	25	24.95	+-0.25	-0.05	Height gauge	Pass
Height	100	99.9	+-0.25	-0.1	Height gauge	Pass
Top radius	R12.5	R12.4	+-0.1	-0.1	Radius gauge	Pass
Top hole (tapped)	M5	M5	+-0.1	0	Vernier calliper	Pass
Holes A, B and C	Dia 3.2 (with countersink)	Dia 3.3	+-0.1	-0.1	Vernier calliper	pass

Quality check sheet for blade

Dimension	Specified size (mm)	Actual size (mm)	Tolerance	Error (mm)	Measured with	Pass or fail
Width	25	24.88	+-0.25	-0.12	Height gauge	Pass
Height	95	94.6	+-0.25	-0.4	Height gauge	Fail
Top radius	R12.5	R12.5	+-0.1	0	Radius gauge	Pass
Slot end diameter	Dia 5.2	Dia 5.4	+-0.1	+0.2	Vernier calliper	Fail
Slot height	52.5	52.29	+-0.1	-0.21	Vernier calliper	Fail
Bottom angle	45°	45°	+-0.25	0	Vernier protractor	pass

Quality check sheet for divider

Dimension	Specified size (mm)	Actual size (mm)	Tolerance	Error (mm)	Measured with	Pass or fail
Width	25	25	+-0.25	0	Height gauge	Pass
Height	30	29.33	+-0.25	-0.67	Height gauge	Fail
Holes A, B and C	Dia 3.2	3.3	+-0.1	+0.1	Vernier calliper	Pass

Most of the dimension conform to the specification and after testing the bevel gauge does work as required however some of them are out of tolerance which has led to some part not fitting together properly or requiring changes for better fitment.

Quality checks

The dimensions of this bevel gauge where checked with different items of measuring equipment to ensure that all dimesons of the part met the requirements or were in tolerance.

For any checks of the outer dimensions of the part I would put the parts on a datum table or surface, this would provide a flat and level surface to make sure that all the measurements take were as accurate as possible. These dimensions would be measured using a digital height gauge which provide an easy to read value as well as being able to measure very accurately.

For the holes I used a Vernier calliper to measure the diameters

Task 3B Evaluation and recording

Assessment number (eg 1234-033)	8713-331
Assessment title	Fitting and Assembly Technologies Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	3B
Evidence title / description	Quality inspection report
Date submitted by candidate	DD/MM/YY

Task 3B

Assessment themes:

- Quality review and evaluation

You must:

- produce a quality inspection report evaluating the production of their finished bevel gauge. The report should typically be 800 words. This must include:
  - finished sizes of components and confirmation the bevel gauge conforms to the dimensional requirements of the specification
  - an explanation of the quality checks undertaken and the reasons for their use
  - result of the marked test piece and functioning of the bevel gauge
  - a concessions list for every facet of the assembly that does not conform to the specification, reasons for occurrence and how to prevent reoccurrence
  - an evaluation of the fitness for purpose of the finished bevel gauge and method of production used with reasoning and justifications
  - any improvements or adaptions required to the bevel gauge, including any reasoning and justifications if adaptions or improvements are not required.

Additional evidence of your performance that must be captured for marking:

- completed bevel gauge
- marked test piece.

Candidate evidence

Bevel gauge

Quality inspection report

For my assessment I was asked to produce a bevel gauge and the documentation on how to produce it and the risks of the production.

After completion of the production of the bevel gauge I was asked to produce a quality check sheet which would have all the dimensions and tolerances of the part on and compare them to the drawing. To do this I used different items of measuring equipment to find the dimensions of the parts and check whether they were in tolerance or not.

Bevel gauge

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Quality check sheet for body 1

Dimension	Specified size (mm)	Actual size (mm)	Tolerance	Error (mm)	Measured with	Pass or fail
Width	25	24.9	+-0.25	-0.1	Height gauge	Pass
Height	100	99.88	+-0.25	-0.12	Height gauge	Pass
Top radius	R12.5	R12.5	+-0.1	0	Radius gauge	Pass
Top hole	Dia 5.2	Dia 5.12	+-0.1	-0.08	Vernier calliper	Pass
Holes A, B and C	Dia 3.2 (with countersink)	Dia 3.2	+-0.1	0	Vernier calliper	pass

Quality check sheet for body 2

Dimension	Specified size (mm)	Actual size (mm)	Tolerance	Error (mm)	Measured with	Pass or fail
Width	25	24.95	+-0.25	-0.05	Height gauge	Pass
Height	100	99.9	+-0.25	-0.1	Height gauge	Pass
Top radius	R12.5	R12.4	+-0.1	-0.1	Radius gauge	Pass
Top hole (tapped)	M5	M5	+-0.1	0	Vernier calliper	Pass
Holes A, B and C	Dia 3.2 (with countersink)	Dia 3.3	+-0.1	-0.1	Vernier calliper	pass

Quality check sheet for blade

Dimension	Specified size (mm)	Actual size (mm)	Tolerance	Error (mm)	Measured with	Pass or fail
Width	25	24.88	+-0.25	-0.12	Height gauge	Pass
Height	95	94.6	+-0.25	-0.4	Height gauge	Fail
Top radius	R12.5	R12.5	+-0.1	0	Radius gauge	Pass
Slot end diameter	Dia 5.2	Dia 5.4	+-0.1	+0.2	Vernier calliper	Fail
Slot height	52.5	52.29	+-0.1	-0.21	Vernier calliper	Fail
Bottom angle	45°	45°	+-0.25	0	Vernier protractor	pass

Quality check sheet for divider

Dimension	Specified size (mm)	Actual size (mm)	Tolerance	Error (mm)	Measured with	Pass or fail
Width	25	25	+-0.25	0	Height gauge	Pass
Height	30	29.33	+-0.25	-0.67	Height gauge	Fail
Holes A, B and C	Dia 3.2	3.3	+-0.1	+0.1	Vernier calliper	Pass

Most of the dimension conform to the specification and after testing the bevel gauge does work as required however some of the dimensions are out of tolerance which has led to some part not fitting together properly or requiring changes for better fitment.

Quality checks

The dimensions of this bevel gauge where checked with different items of measuring equipment to ensure that all dimesons of the part met the requirements or were in tolerance.

For any checks of the outer dimensions of the part I would put the parts on a datum table or surface, this would provide a flat and level surface to make sure that all the measurements take were as accurate as possible. These dimensions would be measured using a digital height gauge which provide an easy to read value as well as being able to measure very accurately. The external dimensions needed to be within tolerance so that they would line up but also so that any markings for internal dimensions such as holes would be accurate.

For the holes I used a Vernier calliper to measure the diameters. I used the Vernier calliper as it has a pair of outward facing jaws on the back that fit into the holes and give an accurate reading of the hole diameter. The dimensions for the hoes had to be accurate so that any rivets would fit in properly. They also needed to be accurate to that the thread for the bolt could be cut properly and that the bolt would thread in plus the holes in all the parts would line up.

Any angles cut were measured with a Vernier protractor before and after the cut. The angles had to be cut accurately so that they will line up together when the bevel gauge is fully assembled and not interfere.

Test result

For the test I had marked a line of a block of wood with a Vernier protractor then set the bevel gauge to the same angle as the protractor before using it to mark a line at the exact same angle on the wood. From my test I have concluded that the bevel gauge I have produced is able to be used to produce an accurate angled line. I can conclude this by checking it with a Vernier protractor and checking to see if the lines run parallel to each other across the wood.

Failures

4 out of the 19 measured dimensions were failed as they were not in tolerance and some of the holes would not line up. These dimensions were the:

- Height of the divider
- Holes in divider wouldn’t line up with holes in body (in tolerance)
- Slot end diameter in the blade
- Slot height in the blade
- Height of the blade

These dimensions were out of tolerance when measured and as a result, made the process of fitment harder to complete.

The holes in the divider wouldn’t line up with the holes in the body despite being in tolerance as both halves of the body had been drilled together but not the divider as it was made from a different material. This resulted in the rivets not fitting into the holes and as a result, they needed to be re-drilled with the body. To prevent this, I would in future drill the holes together through the divider and the body or drill the holes in the body then line the divider up in between the body halves then drill the holes using the pre-drilled holes in the body as a jig

The height of the divider was too short. This was likely caused by excessive filing of the part and infrequent measuring to check the dimensions. To prevent this, I would check the current dimension of the part more often and file more gently or use a finer file when I get near the required dimension.

The end diameter for the slot was too large. This was likely caused by excessive filing of the part and infrequent measuring to check the dimensions. To prevent this, I would check the current dimension of the part more often and file more gently or use a finer file when I get near the required dimension.

The slot height was too short. This was likely caused by in excessive filing of the part and infrequent measuring to check the dimensions. To prevent this, I would check the current dimension of the part more often and spend more time filing the slot or making it longer on the mill.

The height of the blade was too short. This was likely caused by excessive filing or use of the linisher and infrequent measuring to check the dimensions. To prevent this, I would check the current dimension of the part more often, only use the linisher to remove a large amount of material and file more gently or use a finer file when I get near the required dimension.

When I was making the bevel gauge I had to redo the blade as it was too short and had the wrong angle on the end. This was caused by excessive use of the linisher and not using a Vernier protractor for accurate measurements. to mitigate this, I would only use the linisher to remove larger amounts of material and measure and mark out angles using a Vernier protractor.

When tapping the hole to reduce a thread for the bolt the tap didn't go in fully straight and resulted in a slightly off thread. In future I would spend more time checking to see if the tap is perpendicular to the part when its going in.

Evaluation of fitness for purpose and method of production

After the testing I found that the bevel gauge I have produced is fit for use in production and for marking out accurate angles. The bevel gauge is designed to be used for marking out angles continuously along a part. This is done so that the angles can be marked out quickly with the requirement to constantly use a Vernier protractor for each angle. The first angle is marked out using the protector so that it is accurate. This produces a reference that the bevel gauge can be set to. Once set the bevel gauge can be placed anywhere on a part and the angle can be marked along the blade using a scribe.

Improvements and changes

There are some improvements or adaptations I would make to the bevel gauge or to the way I produced it,

1. Firstly, I would drill all the holes through all the parts in one go with them lined up and I would probably do it on the mill next time to improve the accuracy of the holes positioning.
2. Secondly, I would have spent more time checking dimensions and measuring to ensure that the tolerances were met or that the exact dimensions were met as this would have allowed for a better finish on the part and for any internal dimensions to be more accurate.
3. Thirdly, I would have spent more time making sure the parts were aligned when producing the top radiuses as that would lead to them having a nicer finish and lining up better when the bevel gauge is closed up.
4. Finally, I would spend more time putting a nicer finish on the part in order to make it look more presentable and to smoothen out any rough edges.

Task 3C Handover

Assessment number (eg 1234-033)	8713-331
Assessment title	Fitting and Assembly Technologies Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	3C
Evidence title / description	Assessor observation of handover meeting
Date submitted by candidate	DD/MM/YY

Task 3C

Assessment themes:

- Quality review and evaluation

You must:

- hold a meeting with the supervisor to complete handover procedures, including:
  - confirmation of work completed
  - overview of findings in quality inspection report
  - suggested improvements to design or production process
  - handover of finished bevel gauge, test piece and quality inspection report.

Additional evidence of your performance that must be captured for marking:

- handover materials consisting of:
  - completed bevel gauge (from Task 2)
  - marked test piece (from Task 3a)
  - quality inspection report (from Task 3b).

Candidate evidence

3C Handover

Candidate explained what they were given, e.g. working drawings. They suggested that their understanding from this enabled them to produce a suitable resource list, complete an appropriate risk assessment, a thorough method statement which they mostly followed and a quality check sheet which had suitable recordings on.

They showed and demonstrated their bevel gauge and explained some of the defects they had and elaborated on some of the improvements they could make if completed again speaking mostly using correct terminology.

Recording of the handover is attached.

Get in touch

The City & Guilds Quality team are here to answer any queries you may have regarding your T Level Technical Qualification delivery.

Should you require assistance, please contact us using the details below:

Monday - Friday | 08:30 - 17:00 GMT

T: 0300 303 53 52

E: **technicals.quality@cityandguilds.com**

W: **http://www.cityandguilds.com/tlevels**

Web chat available **here**.