Pearson BTEC Sample Set Assignment Brief

Part A

Unit 3 – Product Design and Manufacture in Engineering

For use with:

Pearson BTEC International Level 3 qualifications in Engineering

Subsidiary Diploma / Foundation Diploma / Diploma / Extended Diploma

Advised preparation time	3 hours

For completion by the centre

Qualification (select as appropriate)	Subsidiary Diploma / Foundation Diploma / Diploma / Extended Diploma
Part B Set Assignment Date	TBC

Pearson BTEC

Instructions to Teachers/Tutors and/or Invigilators

The Pearson Set Assignment will be assessed internally by the centre using the unit Assessment Criteria detailed in the qualification specification. The assignment will be sampled by the Standards Verifier as part of the standards verification annual centre visit.

Part A Preparation

For this Part A Set Assignment

Learners should be issued with Part A no sooner than ten working days before undertaking Part B of the assignment.

Learners should complete their research independently in sessions monitored by the centre and must not be given guidance or feedback during this time. We advise learners spend 3 hours on this research.

Learners should make notes in preparation for Part B, we advise no more than 2 sides of A4 notes.

Instructions to Learners

Read the Part A Set Assignment Brief carefully.

Part A contains the information you need to prepare for the Part B Set Assignment.

You will be given 3 hours of preparation. Your tutor will advise you of the scheduled sessions for this work.

During these sessions you will prepare summary notes to support you during the assessment. It is advised your notes should:

- be individually and independently prepared by you
- contain a maximum of two sides of A4, either handwritten or typed

You should work independently and must not share your work with other learners.

Your notes will be checked and retained by your centre until the Part B Set Assignment. You will need to submit your notes along with the work completed in Part B, and an authentication sheet declaring the work is your own.

Part A Set Assignment Brief

A client has asked you, as a technician engineer, to redesign the stop for a manual arm access barrier, as it is not working effectively. The manual arm access barrier can be used to control, for example, vehicle access to a building site, car park or restricted areas within a warehouse.

You will research the design and manufacturing requirements that are relevant to the stop and its use. Your research should consider:

- how manual arm access barriers function
- existing designs for stops
- the manufacturing processes and technologies that are being used and possible
- alternatives
- the health and safety requirements for the product, user and manufacturing processes
- environmental considerations including sustainability
- material requirements and suitable material properties
- any other relevant factors, such as designing out risks to health and safety.

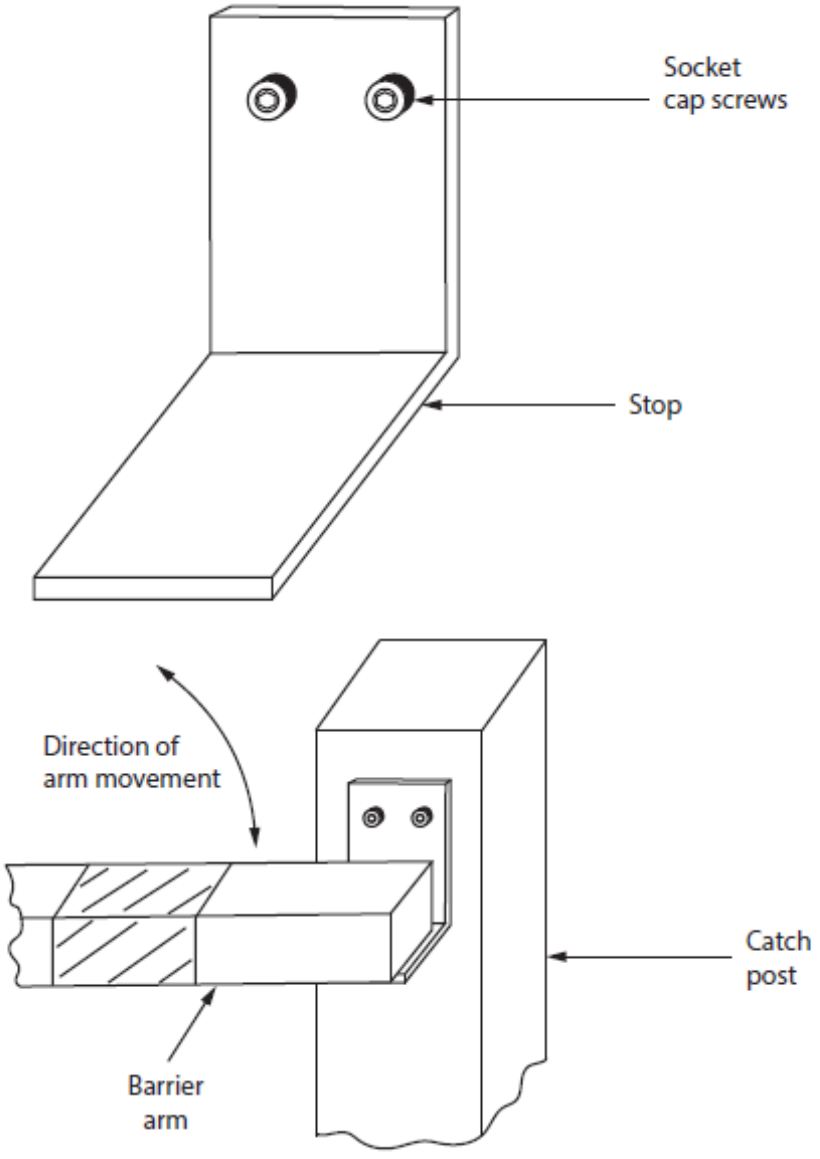
In Part B you will be given further information on the specific issues with the existing stop that will allow you to redesign the stop and evaluate your solution against the issues. Therefore, you should not undertake any design work during Part A (the research stage).

You will be able to take your individually prepared A4 notes from Part A into Part B of the Set Assignment.

Part A Set Assignment Information

The product is a stop for a manual arm access barrier. The barrier arm rests on the stop when in a horizontal position. The stop is attached to a catch post using two M8 socket cap screws. One stop is needed per manual arm access barrier and they are manufactured in batches of 1000.

Currently, the stop is cut from a length of medium carbon steel angle section and has a paint finish applied to it.



Stop Dimensions: L = 110 mm, W = 60 mm, H = 105 mm

Pearson BTEC Sample Set Assignment Brief

Part B Set Assignment

Unit 3 – Product Design and Manufacture in Engineering

For use with:

Pearson International BTEC Level 3 qualifications in Engineering

Subsidiary Diploma / Foundation Diploma / Diploma / Extended Diploma

Advised supervised hours	8 hours

For completion by the centre

Qualification (select as appropriate)	Subsidiary Diploma / Foundation Diploma / Diploma / Extended Diploma
Assessment date	TBC

Instructions to Teachers/Tutors and/or Invigilators

The Pearson Set Assignment will be assessed internally by the centre using the unit assessment criteria given in the qualification specification. The Set Assignment will be sampled by the Standards Verifier as part of the standards verification annual centre visit.

Learners should have their research/preparatory work with them (two sides of A4) as stated in Part A.

Conditions of supervision

The Pearson Set Assignment should be undertaken in conditions that assure the authenticity of outcome. This may require supervision.

We advise that the Pearson Set Assignment be completed in sessions that come to a total of 8 hours. The Pearson Set Assignment should not be shared with learners prior to the start of the assessment period. Teachers/tutors are responsible for security of the Pearson Set Assignment and materials.

Outcomes for Submission

One task booklet will need to be submitted by each learner, which includes the following tasks:

- an interpretation of the brief into operational requirements
- a range of (three or four) initial design ideas based on the client brief
- a modified product design with relevant design documentation
- a summative report that includes a rationale for, and appraisal of the final design solution

Learners must submit their own, independent work as detailed in the set assignment. Each learner must complete an authentication sheet.

Instructions to Learners

Read the Set Assignment Information carefully.

You will be asked to carry out specific activities using the information provided. You will be given a specific time period to complete the assignment. You must plan your time accordingly and be prepared to submit all the required evidence by the date specified.

You may use your research/preparatory work from Part A to complete the Part B Set Assignment.

Your task booklet from Part B will be submitted for assessment. Your research/preparatory notes from Part A are also submitted but not assessed.

You will complete the Part B Set Assignment and your work will be kept securely during any breaks taken.

For Part B, you must not use computers or the internet.

You must work independently throughout the assessment period and must not share your work with other learners.

Outcomes for submission

You will need to submit one task booklet on completion of the assessment period, which includes the following activities:

- an interpretation of the brief into operational requirements
- a range of (three or four) initial design ideas based on the client brief
- a modified product design with relevant design documentation
- a summative report that includes a rationale for, and appraisal of the final design solution

At all times you must work independently and must not share your work with other learners. You must complete an authentication sheet and submit this along with your task booklet.

Part A Set Assignment Brief and Set Assignment Information

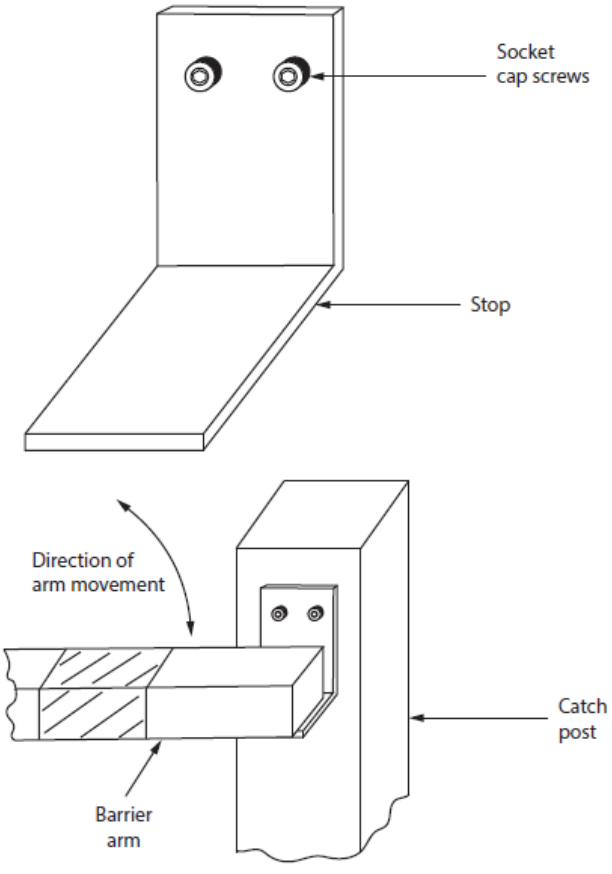
Part A Set Assignment Brief

A client has asked you, as a technician engineer, to redesign the stop for a manual arm access barrier, as it is not working effectively. The manual arm access barrier can be used to control, for example, vehicle access to a building site, car park or restricted areas within a warehouse.

Part A Set Assignment Information

The product is a stop for a manual arm access barrier. The barrier arm rests on the stop when in a horizontal position. The stop is attached to a catch post using two M8 socket cap screws. One stop is needed per manual arm access barrier and they are manufactured in batches of 1000.

Currently, the stop is cut from a length of medium carbon steel angle section and has a paint finish applied to it.



Stop Dimensions: L = 110 mm, W = 60 mm, H = 105 mm

Part B Set Assignment Information

For Part B, you are allowed to use your individually prepared A4 research notes from Part A to support you during the assessment period.

You are provided with detail drawings/images of the manual arm access barrier and the stop.

Client brief

The client is aware that the current design for the stop has several issues, but the redesign has been triggered by complaints from users of the manual arm access barrier. The complaints have all stated that the stop on the catch post is bending or fracturing in service, meaning that the barrier arm is not in a horizontal position when at rest.

The client believes that the source of the issues is that users are allowing the arm barrier to fall freely onto the stop, rather than controlling its descent with the handle. Redesign of the whole manual arm access barrier is not possible, so the client needs to provide all customers with a stop that can be easily retrofitted onto the existing catch post. The client had intended the life cycle of the stop to be 12 years.

The client needs you to identify when and under what conditions the stop bends or fractures before the end of the intended life cycle, and to design a solution that will reduce the likelihood of this happening. Only the stop can be redesigned.

Based on simulations and testing, the client has provided the following information in Table 1, which can be used to perform a statistical analysis of the in-service use of the stop.

The client has said that the alternative solution for the stop must also take into account the most efficient use of materials and manufacturing processes. You should optimise the design in terms of safety, form, sustainability and other factors. You also have an opportunity to reduce the issues with the existing design of the stop by considering equipment interfaces and retrofitting extra, low cost components.

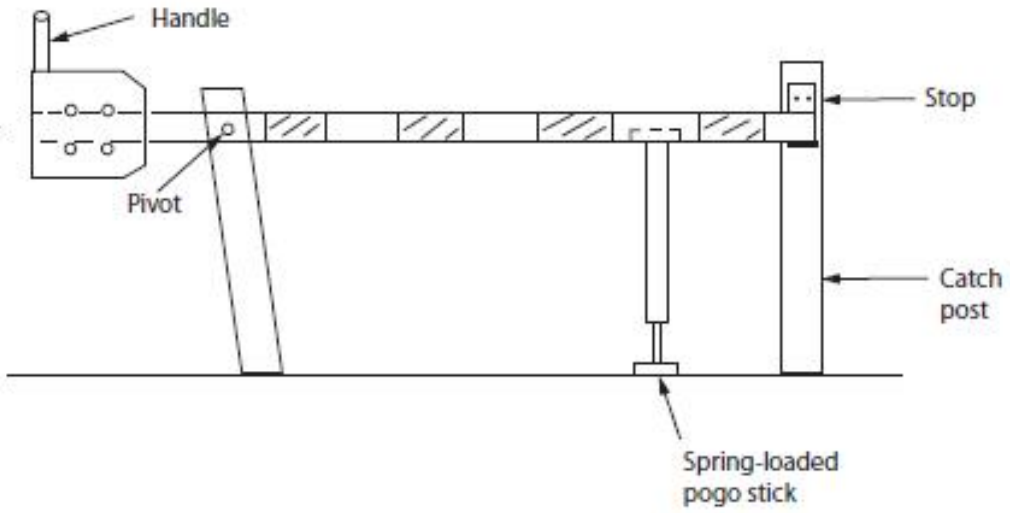
The stop must:

- Be able to be fitted to the existing catch post
- Be designed so that it lasts for the intended life cycle, even if the barrier arm is allowed to fall freely
- Not damage the barrier arm in any way
- Be capable of being manufactured in large batches.

Table 1 – Outcomes of simulations and testing on the existing stops

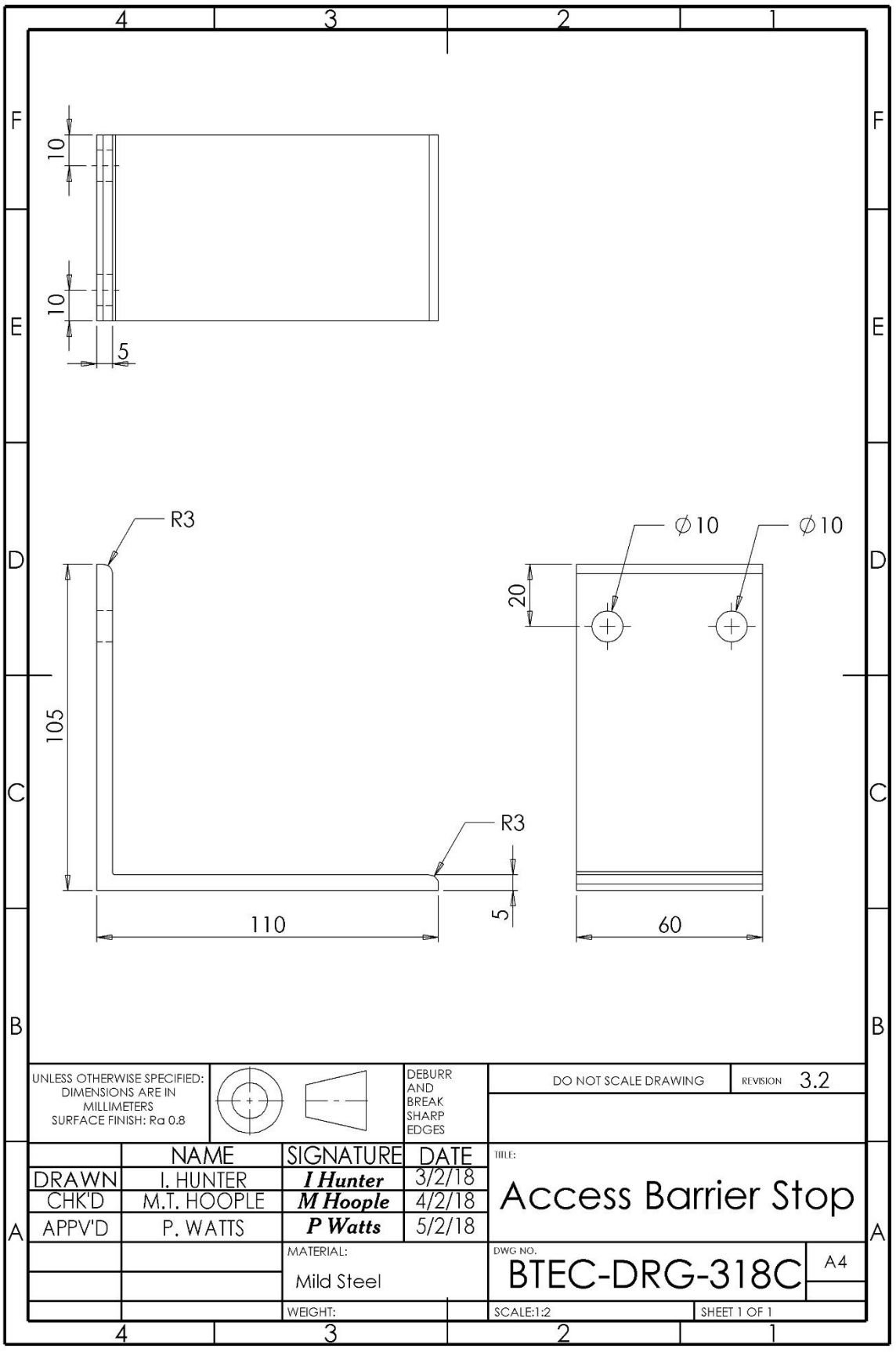
Stop	Spring-loaded pogo stick fitted	Manual arm access barrier situated inside or outside a building	Height of barrier arm at release of handle (m)	Impact force of barrier arm on stop (N)	Life cycle (years)							
					Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7	Test 8
A	Yes	Inside	1	40	12	11	13	12	10	11	11	12
B	Yes	Inside	2	75	11	12	11	10	11	11	12	9
C	No	Outside	3	118	6	7	8	9	8	6	9	7
D	Yes	Outside	4	123	9	8	6	8	7	7	6	9
E	No	Outside	4.5	220	3	5	4	3	6	4	4	5
F	Yes	Inside	5	245	7	5	4	6	4	5	5	6

Manual Arm Access Barrier



Overall Manual Arm Access Barrier Dimensions: L= 6 m, W= 0.35 m, H= 0.85 m

Access Barrier Stop


4
3
2
1
F
E
D
C
B
A
10
10
5
R3
105
110
R3
5
∅10
∅10
20
60
UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN
MILLIMETERS
SURFACE FINISH: Ra 0.8
DEBURR
AND
BREAK
SHARP
EDGES
DO NOT SCALE DRAWING
REVISION 3.2
NAME
SIGNATURE
DATE
DRAWN
I. HUNTER
I Hunter
3/2/18
CHK'D
M.T. HOOPLE
M Hoople
4/2/18
APPV'D
P. WATTS
P Watts
5/2/18
TITLE:
Access Barrier Stop
MATERIAL:
Mild Steel
DWG NO.
BTEC-DRG-318C
A4
WEIGHT:
SCALE:1:2
SHEET 1 OF 1

Part B Set Assignment

ACTIVITY 1
Interpret the client brief into operational requirements, to include: • conclusions from interpreting the numerical data • product requirements • opportunities and constraints • key health and safety, regulatory and sustainability factors.
This activity covers Learning Aim A and assessment/grading criteria: A.P1, A.P2, A.P3, A.M1, A.M2, A,D1

ACTIVITY 2a
Produce a range of (three or four) initial design ideas based on the client brief, to include: • sketches • annotations. The sketches and annotations must refer to: • existing products • the client brief and the operational requirements from Activity 1. • the reasons for the choice of idea to develop in Activity 2b.
ACTIVITY 2b
Develop a modified product design with relevant design documentation. The proposal must include: • a design solution (including a final drawing). The proposal must refer to: • choice of materials • choice of manufacturing processes • sustainability • safety • any other relevant factors.
This activity covers Learning Aim B and assessment/grading criteria: B.P4, B.P5, B.P6, B.P7, B.P8, B.P9, B.M3, B.M4, B.M5, B.M6, B.D2, B.D3, B.D4

ACTIVITY 3

Provide a summative report, to include:
• a rationale for why design solution is more effective than the original product
• an appraisal of:
  ○ the features and limitations of the final design solution
  ○ the constraints and further opportunities related to the final design solution

This activity covers Learning Aim C and assessment/grading criteria: C.P10, C.P11, C.M7, C.M8, C.D5