The Engineering Applications Logbook

(Include a copy of these sheets at the start of your logbook.)

In a few years' time, once you have established yourself as a practising engineer, you will probably want to join the professional institution appropriate to your branch of engineering expertise. When you apply for membership, most institutions will require you to present a logbook recording your Engineering Applications work for purposes of exemptions and accreditation. It is much easier to produce it as you go along rather than to write it up as history several years later. The following pages show one way the various strands of your work can be brought together to make a comprehensive whole in the form of a loose-leaf folder that you can add to as the work is covered.

Since your logbook will become the complete record of your Engineering Applications experience and, as such, will be liable to be inspected not only by your lecturers but also by officials of your professional institution, it is essential that it is kept up to date and to the highest possible standard. Take care not to lose it during your course and to keep it safe once it is complete. The engineering institutions also require evidence of industrial training and experience. You could provide for this by adding sections to your logbook as your career develops or by starting a second volume recording your relevant post-graduate experiences.

Explanations

Contents

The title page shows that the logbook will comprise six main sections, each of which will, in turn, include a number of sub-divisions. An explanation of each section now follows.

Section 1 Experience checklist

This section is a cross-referenced and detailed contents list to show how each topic has been covered (L – Lecture; D – Demonstration; P – Project) and to indicate in which section/s of the logbook details may be found. The example given below has been taken from a student's logbook and shows that the topic of work holding in centre lathes was dealt with in the third lecture on machining and may be found in the logbook on the second page of notes taken at the time; it was demonstrated on an occasion recorded in the fourth sub-section of the demonstration section; it was practised in the manufacture of component 1 of project 2, component 4 of project 3 and component 5 of project 6 and so on.

	Typical configurations	*L*	*D*	*P*		
Centre lathe	Work holding	Ma3	D4	*P2/1*	P3/4	P6/5
	Facing	Ma3	D4	*P2/1*	P3/4	P6/5
	Parallel turning	Ma4	D4	*P2/1*	P3/4	P6/5
	Taper turning	Ma4	D4	*P2/1*	P3/4	P6/5

It is your responsibility to update the cross-references from day to day as you complete the work. Thus by the end of your course the completed tabulation will be a measure of the width and depth of coverage as well as a useful means of returning to a particular topic. Obviously you will need to put alphanumeric numbers on each page of your notes as you place them in the appropriate section of the logbook.

NOTE

IF THE EXPERIENCE CHECKLIST IS NOT FILLED IN TO A SATISFACTORY STANDARD THEN YOUR LOGBOOK WILL RECEIVE ZERO MARKS.

Section 2 Projects

The design and make projects, which are central to the implementation of the Engineering Applications Programme you have embarked upon, have been selected and defined in such a way as to provide as comprehensive an experience as possible within the time and other constraints prevailing.

Six or seven projects will be undertaken and all the paperwork associated with each (e.g. design calculations and drawings; process planning; test results) should be recorded in a dedicated sub-division of this section. Drawings are probably best folded up and placed in transparent loose-leaf envelopes or 'copy safes'.

Section 3 Lectures Manufacturing Technology

The manufacturing technology lectures you attend may or may not be closely associated with the Engineering Applications part of your course but in any event they will touch on the manufacturing requirements of the EA projects from time to time. Since Engineering Applications are concerned with the fabrication and use of materials as well as the application of engineering principles to the solution of practical problems, it is right that the paperwork associated with your manufacturing studies should be incorporated in your logbook.

Suggested sub-sections are:

C	Casting	J	Joining
Ma	Machining	B	Benchwork
F	Forming	P	Process Planning
Me	Metrology	H&S	Health & Safety
In	Industrial training		

You can use the capital letters to devise a lecture ad/or page numbering system to make foolproof cross-referencing system so that not only can each topic be easily found via the Experience Checklist but also related practical work will be immediately apparent.

Section 4 and 5 Lectures Engineering Materials and Engineering Drawing

What has been stated above for manufacturing technology lectures is equally true for these other two areas of study, so they too should feature in your logbook. As far as engineering materials lectures are concerned, you will use the knowledge you gain from them in such activities associated with the projects as materials selection, specifying material condition and heat treatment. It is likely, however, that your study of engineering materials will extend beyond the immediate requirements of the EA projects but will be required in design and other work later in your course. That is when the effort required to cross-reference it in your logbook will pay its biggest dividends. On the other hand, the general notes on drawing conventions, dimensioning, projections, surface development, interpenetrations, etc., which you arrange in the engineering drawing section ***(labelled 'Dr'),*** will be need frequently in the early stages of your work.

When extending your page numbering system to cover these sections, make sure that it does not duplicate any of the letters or symbols that you have already used for the manufacturing technology lectures.

Section 6 Demonstrations

Demonstrations may be given in those areas of manufacturing technology that are unsuited to hands-on experience. Perhaps because a high degree of skill is required or because the process is dangerous to the uninitiated or simply because the technique is not directly applicable to the projects: pouring molten metal into a casting mould is perhaps an activity that fits all three of these categories! In other cases, films or videos may be used to transport an appreciation of industrial processes or whatever into the classroom. When you write up each demonstration or video for inclusion in this section remember to cross-reference it to lecture material as well as textbooks.

For any other notes that are not covered by these 'Section' categories, you should use your ingenuity and create new sections as required, properly labelled and organised.

ENGINEERING APPLICATIONS LOGBOOK

Name: _____

Session: _____

Course: _____

CONTENTS

TO BE KEPT IN LOGBOOK UNTIL COMPLETE

STUDENT'S NAME ……..

Engineering Applications Logbook Inspection Record

Your tutor will circle the required improvements, mark your logbook and date the assessment.

↓ **TOPIC \ MARK →**			
Experience Checklist	**1, 2, 3, 4**	**1, 2, 3, 4**	**1, 2, 3, 4**
Projects	**5, 6, 7**	**5, 6, 7**	**5, 6, 7**
Manufacturing Technology and Engineering Materials	**8, 9**	**8, 9**	**8, 9**
Demonstrations	**10, 11**	**10, 11**	**10, 11**
Overall Impressions	**12, 13, 14**	**12, 13, 14**	**12, 13, 14**

1 Your cross-referencing system does not indicate in which sections each topic is to be found. Refer to the explanations section.
2 Your Experience Checklist is not up to date.
3 Your system of grouping topics requires the use of more coloured section dividers.
4 You will have to give some consideration as to how your cross-reference system will cope when you start your next folder.
5 General drawing notes that do not refer directly to a particular project are probably best put in a section of their own.
6 Have you noted and explained changes in design found to be necessary at manufacture?
7 Some project write-up(s) seems to be missing.
8 You should record and explain variations between planned procedures, times, etc., and those actually encountered in practice.
9 Some of your notes and handouts are missing.
10 The write-up of demonstrations is not sufficiently clear or detailed.
11 Some of the demonstrations witnessed have not been written up.
12 Coloured dividers should be positioned at the start of each section.
13 Your logbook is well presented.
14 Your logbook could be improved. Bear in mind layout, writing, lettering and spelling

Fabrication and joining						
		L	**D**	**P**		
Welding processes (solid phase)	Forge					
	Roll					
	Explosion					
	Diffusion					
Welding processes (fusion)	MMA.					
	MIG					
	TIG					
	Plasma					
	Sub.Arc					
	Gas					
	Oxy-acetylene					
	Flash-butt					
	Thermit					
	Electro-slag					
	Spot					
	Projection					
	Stud					
	Electron beam					
	Laser					
Welding technology	Weldability					
	Weld design					
	BSS symbols					
	Weld preps.					
	Distortion					
	Residual stress					
Brazing and soldering	Alloys					
	Fluxes					
	Joint design					
Weld inspection	Crack detection					
	Physical strength					
Mechanical joining	Screws					
	Bolts					
	Rivets					
	Seams					
	Shrink joints					
	Adhesive joints					
	Types of joint					
	Joint design					

Fabrication and joining (continued)						
		L	D	P		
Welding practice Oxy-acetylene	Operating safety					
	Positional welding					
	Tack welding					
	Fillet welding					
	Corner welding					
Welding practice MMA and TIG	Operating safety					
	AC and DC source					
	Electrode selection					
	Tack welding					
	Fillet welding					
	Corner welding					
Sheet metal work	Hand/bench shears					
	Guillotine					
	Bending					
	Flanging					
	Hemming					
	Forming					

Health and safety						
		L	D	P		
Statutory requirements	Factories Act 1961					
	Health & Safety at Work Act 1974					
	Protection of Eyes Regulations 1974					
Workshop procedures	First-aid procedures					
	Accident procedures					
	Fire –fighting procedures					
Personal protection	Protective clothing					
	Manual lifting techniques					
	Personal hygiene					

Engineering materials						
		L	**D**	**P**		
Physical metallurgy	Crystal structure					
	Dislocations and slip					
	Alloying					
	Phase diagrams					
Engineering metallurgy	Advanced properties					
	- toughness					
	- creep					
	- fatigue					
	- stress corrosion					
	- surface properties					
	Control of properties					
	- heat treatment					
	- surface treatment					
	- alloying effects					
Properties of materials	Mechanical properties					
	Hardness testing					
	Impact testing					
Corrosion	Wet and dry corrosion					
	Galvanic corrosion					
	Corrosion control					
	Avoiding corrosion					
Surface protection	Galvanizing					
	Sheradizing					
	Electroplating					
	Metal spraying					
	Chemical priming					
	Aesthetic considerations					
Polymer chemistry	Polymerization					
	Molecular weight					
	Cross linking					
	Environmental effects					
	Properties testing					
Other materials	Ceramics					
Non-ferrous metals	Copper					
	Copper alloys					
	Aluminium					
	Aluminium alloys					
	Magnesium					
	Magnesium alloys					

Engineering materials (continued)						
		L	D	P		
Non-ferrous metals (continued)	Nickel alloys					
	Chromium alloys					
	Titanium alloys					
Ferrous metals	Cast irons					
	White and grey irons					
	Alloy irons					
	Carbon – maganese steels					
	Low-alloy steels					
	Stainless steels					
	Special steels					
Engineering polymers	PTFE					
	ABS					
	MDPE					
	PVC					
	Phenolic resins					
	Composites					
	GRP					

Forming of metals						
		L	D	P		
Manufacturing properties	Stress and strain					
	Elasticity and plasticity					
	Plastic flow					
	Work hardening					
Metallurgical aspects	Hot and cold working					
	Residual stresses					
Forming processes	Open-die forging					
	Closed die forging					
	Stretch forming					
	Bending					
	Extrusion					
	Drawing					
	Spinning					

Material removal						
		L	**D**	**P**		
Cutting tools	Single point					
	Multi-point					
	Generating					
	Form					
	Nomenclature					
	Feeds and speeds					
	Coolants – selection					
	- use					
Material characteristics	Machinability					
	Continuous chips					
	Discontinuous chips					
	Built-up edge					
Machine tools	Surface generation					
	Basic features					
	Typical configurations					
Centre lathe	Work holding					
	Facing					
	Parallel turning					
	Taper turning					
	Centre drilling					
	Drilling					
	Tapping					
	Screw cutting					
	Knurling					
	Undercutting					
	Chamfering					
	Forming					
	Parting-off					
Capstan lathe	Pre-set tooling					
	Thread forming					
	Capstan operations					
Horizontal and vertical milling	Milling cutters					
	Cutter set-ups					
	Work holding					
	Speeds and feeds					
	Milling operations					
Horizontal and vertical Borers	Main operations					
	Tooling					

Material removal (continued)						
		L	**D**	**P**		
Pillar and radial drills	Tool holding					
	Work holding					
	Marking out					
	Drilling					
	Facing					
	Counter boring					
	Reaming					
	Tapping					
Fine finishing operations	Grinding					
	Honing					
	Superfinishing					
	Lapping					
	Burnishing					
Chemical removal	ECM					
Specialized machining	EDM					
	USM					
	Laser machining					

Fitting						
		L	**D**	**P**		
Marking-off	Rules					
	Scriber					
	Centre punch					
	Dividers					
	Scribing block					
	Square					
	Protractor					
	Surface plate					
Metal removal and fitting	Hack sawing					
	Power hack sawing					
	Band sawing					
	Chiselling					
	Filing					
	Drilling					
Thread forming	Tapping					
	Die-ing					

Planning for manufacture						
		L	**D**	**P**		
Process selection	Component analysis					
	Production sequence					
Process planning	Operations analysis					
	Sequencing operations					
	Machine tool selection					
	Cutting tool selection					
	Feeds and speeds selection					
	Workpiece holding					
	Inspection					

Communication and information systems						
		L	**D**	**P**		
Engineering drawing	Conventions and systems (BS308)					
	1st and 3rd angle projection					
	Dimensions and tolerances					
	Sectional views					
	Auxiliary views					
	Isometric projections					
	General arrangements					
	Assembly drawings					
	Parts lists					
	Detail drawings					
	Welded joints					
	Screw threads					
	Surface developments					
	Interpenetrations					
CAD/CAM	Computer graphics					
	Keyboard input					
	Plotter output					
	Manual NC programming					
	Computer-aided programming					
	NC program editing					
	Cutter location data					
	Post-processing					
Reports	Written reports					
	Oral reports and presentations					
	Use of visual aids					
	Use of projectors					

Casting						
		L	**D**	**P**		
Sand casting	Pattern design					
	Pattern allowances					
	Green sand					
	Core sand					
	Cores					
	Core boxes					
	Moulding					
	Cope and drag					
	Runners and risers					
	Inspection and NDT					
	Defects					
	Casting design					
	Design details					

Measurement						
		L	**D**	**P**		
Interchangeable manufacture	Limits and fits					
	BS4500					
Line standards	Rules and scales					
	Verniers					
	Vernier calipers					
End standards	Slip gauges					
	Feeler gauges					
	Length bars					
	Plug gauges					
	Gap gauges					
Straightness and flatness	Straight edges					
	Surface plates					
	Angle plates					
Comparators	Dial gauges					
	Micrometers					
	Mechanical comparators					
	Optical comparators					
	Pneumatic comparators					
	Electric comparators					
Angular measurement	Vernier protractor					
	Sine bar					

		L	D	P		

		L	D	P		