



**education**

Department:  
Education  
REPUBLIC OF SOUTH AFRICA

# **NATIONAL CERTIFICATES (VOCATIONAL)**

## **SUBJECT GUIDELINES**

### **ENGINEERING SYSTEMS**

#### **NQF LEVEL 2**

September 2007



## INTRODUCTION

### **A. What is Engineering Systems?**

Engineering Systems deals with the mechanical, electrical, electronic, hydraulic and pneumatic aspects of a system (e.g. various systems in a vehicle or machinery), including identifying, selecting and preparing components in terms of their operation, control and pre-operational maintenance. Calculations that are required are also included.

### **B. Why is Engineering Systems important in the Engineering and Related Design programme?**

Engineering Systems links the beginning of an engineering process and products in systems, using routine maintenance systems, decision-making approaches, work planning and priority setting, organisation and administration and condition monitoring.

### **C. The link between the Engineering Systems Learning Outcomes and the Critical and Developmental Outcomes**

Engineering Systems, as a subject:

- Develops students' problem-solving skills by requiring them to continually collect, analyse and evaluate data.
- Allows students to reflect and explore strategies to learn various ways of conducting pre-operational analyses of engineering systems.
- Instils and enhances team spirit by affirming the importance of team work.
- Teaches students effective communication and reporting methods using visual, mathematical, scientific and technological knowledge.
- Creates a sense of respect and responsibility towards the environment and the health and safety of fellow human beings.
- Stimulates students' interest in entrepreneurial careers.

### **D. Factors that contribute in the Engineering Systems Learning Outcomes**

- An effective Simulated Engineering Environment or a real engineering workplace where students can display their competencies
- Qualified and competent lecturers and assessors who not only aid and facilitate teaching, training and learning but who are also readily available to provide moral support
- Patience, self-discipline and the ability to work in a team
- Critical thinking and problem-solving skills to readily evaluate data systems and processes

# **ENGINEERING SYSTEMS – LEVEL 2**

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## **ANNEXURE A**

## 1 DURATION AND TUITION TIME

This is a one-year instructional programme comprising 200 teaching and learning hours. The subject may be offered on a part-time basis provided the student meets all the assessment requirements.

Students with special education needs (LSEN) must be catered for in a way that eliminates barriers to learning.

## 2 SUBJECT LEVEL FOCUS

The student should be able to identify and apply applicable methods and processes to various engineering systems.

## 3 ASSESSMENT REQUIREMENTS

### 3.1 Internal assessment (50 percent)

#### 3.1.1 Theoretical component

The theoretical component forms 40 percent of the internal assessment mark.

Internal assessment of the theoretical component in Engineering Systems Level 2 takes the form of observation, class questions, group work, informal group competitions with rewards, individual discussions with students, class, topic and semester tests and internal examinations. Lecturers can observe students when marking exercises from the previous day and asking class questions.

Assignments, case studies and tests can be completed at the end of a topic. Tests and internal examinations must form part of the internal assessment.

#### 3.1.2 Practical component

The practical component forms 60 percent of the internal assessment mark.

Practical components include applications and exercises. All practical components must be indicated in a Portfolio of Evidence (PoE).

Internal assessment of the practical component in Engineering Systems Level 2 takes the form of assignments, practical exercises, case studies and practical examinations in a workshop environment.

Students may complete practical exercises daily. Assignments and case studies can be completed at the end of a topic. Practical examinations can form part of internal practical assessment.

- **Some examples of practical assessments include, but are not limited to:**

- A. Presentations (lectures, demonstrations, group discussions and activities, practical work, observation, role-play, independent activity, synthesis and evaluation)
- B. Exhibitions by students
- C. Visits undertaken by students based on a structured assignment task
- D. Research
- E. Task performance in a “Structured Environment”

- **Definition of the term “Structured Environment”**

For the purposes of assessment, “Structured Environment” refers to a simulated workplace or workshop environment.

## • Evidence in practical assessments

All evidence pertaining to evaluation of practical work must be reflected in the students' Portfolio of Evidence (PoE). The tools and instruments constructed and used to conduct these assessments must be clear from the evidence contained in the Portfolio of Evidence (PoE).

### 3.1.3 Processing of internal assessment mark for the year

A year mark out of 100 is calculated by adding the marks of the theoretical component (60 percent) and the practical component (40 percent) of the internal continuous assessment (ICASS).

### 3.1.4 Moderation of internal assessment mark

Internal assessment is subjected to internal and external moderation procedures as set out in the *National Examinations Policy for FET College Programmes*.

## 3.2 External assessment (50 percent)

A National Examination is conducted annually in October or November by means of a paper(s) set and moderated externally. A practical component will also be assessed.

External assessment details and procedures are set out in the *Assessment Guidelines: Engineering Systems (Level 2)*.

## 4 WEIGHTED VALUES OF TOPICS

TOPICS	WEIGHTED VALUES
1. Engineering Systems and Their Applications	50
2. Equipment with Simple Control Systems	25
3. Routine Maintenance	25
<b>TOTAL</b>	<b>100</b>

## 5 CALCULATION OF FINAL MARK

Internal assessment mark: Student's mark/100 x 50 = a mark out of 50 (a)

Examination mark: Student's mark/100 x 50 = a mark out of 50 (b)

**Final mark: (a) + (b) = a mark out of 100**

All marks are systematically processed and accurately recorded to be available as hard copy evidence for, amongst others, reporting, moderation and verification purposes.

## 6 PASS REQUIREMENTS

The student must obtain at least fifty (50) percent in ICASS and fifty (50) percent in the examination.

## 7 SUBJECT AND LEARNING OUTCOMES

On the completion of Engineering Systems Level 2, the students should have covered the following topics:

Topic 1: Engineering Systems and Their Applications

Topic 2: Equipment with Simple Control Systems

Topic 3: Routine Maintenance

### 7.1 Topic1: Engineering Systems and Their Applications

**Subject Outcome 1:** Identify various engineering systems.

**Learning Outcomes:**

The student should be able to:

- Identify and discuss various engineering systems (electrical, electronic, mechanical, hydraulic, pneumatic, etc.).
- Identify and discuss the components of engineering systems and their functions.

**Subject Outcome 2:** Discuss safety measures relating to different engineering systems.

**Learning Outcomes:**

The student should be able to:

- Identify safety measures to be observed when dealing different engineering systems.
- Discuss the implications of non-adherence to safety measures as stipulated by the manufacturers.

**Subject Outcome 3:** Select engineering systems applications.

**Learning Outcomes:**

The student should be able to:

- Identify a variety of engineering systems applications (e.g. gear trains and brake system).
- Discuss the functions of each system's application.

**Subject Outcome 4:** Prepare engineering systems for operation.

**Learning Outcomes:**

The student should be able to:

- Prepare engineering systems applications for operation.
- Set up an engineering systems application for operation.

**Subject Outcome 5:** Do basic calculation on engineering systems.

**Learning Outcomes:**

The student should be able to:

- Define a variety of outputs for engineering systems.
- By means of simple calculations, determine a variety of outputs for each engineering system.

**Subject Outcome 6:** Maintain engineering systems.

**Learning Outcomes:**

The student should be able to:

- Identify consumables needed to maintain engineering systems applications.
- Care for engineering systems applications.

## 7.2 Topic 2: Equipment with Simple Control Systems

**Subject Outcome 1:** Identify equipment using simple control systems.

**Learning Outcomes:**

The student should be able to:

- Identify equipment with simple control systems.
- List the functions of equipment with simple control systems.

**Subject Outcome 2:** Discuss safety precautions to be observed when operating equipment with simple control systems.

**Learning Outcomes:**

The student should be able to:

- Discuss safety precautions to be observed when dealing with equipment with simple control systems.

- Discuss the implications of non-conformance with the manufacturer's specifications when operating equipment with simple control systems.

**Subject Outcome 3:** Set up and operate equipment with simple control systems.

**Learning Outcomes:**

The student should be able to:

- Draft a plan of operation.
- Adjust settings of, start and operate equipment.
- Monitor and adjust the process as required.

**Subject Outcome 4:** Maintain equipment with simple control systems.

**Learning Outcomes:**

The student should be able to:

- Care for and maintain equipment with simple control systems.
- Start the equipment after maintenance.
- Compile a post-maintenance report and submit it to the supervisor or assessor.

### 7.3 Topic 3: Routine Maintenance

**Subject Outcome 1:** Plan and prepare for routine maintenance.

**Learning Outcomes:**

The student should be able to:

- Plan a routine maintenance programme.
- Perform a pre-operational inspection on machinery or equipment.
- Prepare machinery or equipment for routine maintenance.

**Subject Outcome 2:** Perform routine maintenance

**Learning Outcomes:**

The student should be able to:

- Discuss safety precautions with regard to maintenance.
- Isolate machinery or equipment for routine maintenance.
- Perform routine maintenance.
- Start the machine or equipment.
- Write a post-maintenance report.

## 8 RESOURCE NEEDS FOR THE TEACHING OF ENGINEERING SYSTEMS – LEVEL 2

### 8.1 Physical resources

Building infrastructure, fixtures, networks, plant and machinery, for example:

- Storeroom
- Tool room
- Lecture room(s)
- Training area or work area
- Ablution facilities

### 8.2 Human resources

The lecturer for Engineering Fundamentals Level 2 must be:

- a subject matter expert,
- certificated as an assessor with the ETDP SETA,
- registered with an ETQA or SETA,



- a life-long student,
- in possession of an NQF Level 5 teaching qualification,
- conversant with outcomes-based methodologies, and
- skilled in facilitating learning programme development.

Lecturers must attend seminars and upgrading workshops to keep up-to-date with the latest developments in technology.

### **8.3 Other resources**

Consumables, individual tool and equipment requirements and learning materials and resources, for example:

- Literature and learning material which address tasks
- Learning materials on projection equipment
- Educational tours to relevant learning venues
- Educational and motivational talks from industry
- Visual and audio-visual material
- Workshop manuals and documentation for theoretical knowledge
- Models and demonstrations

Funds from the learning provider or funding bodies for the procurement of consumables, tools and equipment must be readily available to ensure the effective operation of a Simulated Environment where students are individually equipped with the necessary tools.

## ANNEXURE A: RESOURCE NEEDS FOR ENGINEERING SYSTEMS – LEVEL 2

Per every 20 students:

DESCRIPTION	TYPE	QUANTITY
		<b>LL = Number of students per machine MM = Number of items per machine</b>
Adaptor:		
Head stock – Dashin	Dead centre MT3-2	20MM x 20
Reducing sleeve	40XMT3 X Dia 40 ISO 40	3 MM x 3
Reducing plain	40xMT3 ISO 40	3 MM x 3
Reducing plain	40xMT2 ISO 40	3 MM x 3
Arbour:		
Facing – Rose cutter	R8 FMA32	2MM x 2
Facing – Rose cutter	R8 Spigot threaded	2MM x 2
Drill chuck	3MT-DIN B22	2MM x 2
Drill chuck – keyless	3MT-DIN B16	2MM x 2
Drill chuck	2MT-DIN B22	2MM x 2
Drill chuck	B16-R8	2MM x 2
Angle plate:	Series:	
Eron	E118 305 x 229	3MM x 3
Eron	E128 600 x 600	2MM x 2
Analyser	Gas	5LLx4
Anvil-blacksmith	90kg	1
Balancing wheel	Hoffman Geodyna	10LL x 2
Box spanner set	6mm Drive-Gedore	4
Box spanner set	12mm Drive Gedore	4
Boring:		
Head	Model BC3	2MM x 2
Buff-and-polisher machine	DIA 250 Wheel	1
Bender – pipe	Ram Dia 50mm Stroke length 140 mm	1
Band saw – vertical	FuHo VBS 16	3
Band saw – horizontal	GB 4025 Semi-Automatic	2
Chuck:		
Drilling	Porta Agip 1/16 -1/2	25MM x 25
Drilling	Validus 3-16mm	3
Drilling	B22 5-20mm	2
Milling	Clarkson Model SY 3405-R8	1MM x 1
Milling	Clarkson Model SY 3407-ISO 40	1MM x1
Charger (battery)	Hawkins 6/60G	10LL x 2
Centre:		
Dead	MT 3-2	20MM x 20
Dead	MT 4-3	20MM x 20
Clamping:		
Amco kit	M12x1,5	6MM x6
“G”	25mm Groz	10
“G”	50mm Groz	10
“G”	75mmGroz	10
“G”	150mm	10
Sash	1m (Heavy Duty)	8
Sash	1.5m (Heavy Duty)	8
Sash	2m (Heavy Duty)	4
Carver	75mm (medium throat)	10
Carver	150mm (medium throat)	6
Carver	200mm (medium throat)	6
Collets milling set	Dia 3-20mm R8	1MM x 1
Calliper:		
Jenny	150mm	10

DESCRIPTION	TYPE	QUANTITY
		<b>LL = Number of students per machine</b> <b>MM = Number of items per machine</b>
Inside	150mm	10
Cleaner (engine)	Wap Model DX 8005	10LL x2
Crane	Overhead (2 ton)	1
Compressor:		
Airline	270 L 5,5 HP 380 Volt 21,8CFM	2
Coil Spring	(With accessories)	4 pairs
Dividers:		
Spring bow	50mm	20
Spring bow	75mm	20
Spring bow	150mm	20
Drill:		
Sleeves	MT 2-1	25MM x 25
Sleeves	MT 3-2	25MM x 25
Sleeves	MT 4-3	2MM x 1
Sleeves	MT 3-2 R8	1MM x 1
Dividing head:		
Semi universal	Homge BS -1 (with accessories)	1MM x 4
Drilling machine:		
Radial	Mao-Ming Model K.M.R-700 DS	10LL x 2
Pedestal	Strands S-68	10LL x 2
Pedestal	200F (380 Volt)	20LL x 1
Hand	Metabo SB 650 / 2S	7LL x 3
Deburring:	Blade type:	
Tool	BS 1010	10
Tool	BS 1012	10
Tool	BS 2010	10
Tool	BS3010	10
Tool	BS 6010	10
Handel	NB 100	10
Electrical:		
Extension	7,5 Meters	2
Extension	15 Meters	4
Extension	30 Meters	20LL x 1
Extractor screw kit	Rigid Set No 10 No 35583	7LL x 3
Extractor:		
Tap	M3	5LL x 4
Tap	M4	5LL x 4
Tap	M5	5LL x 4
Tap	M6	5LL x 4
Tap	M7-8	5LL x 4
Tap	M9-10	5LL x 4
Tap	M12	5LL x 4
Gauge:		
Thread	Whitworth	5
Thread	Metric	5
Feeler	Omni 25 Blade	5
Slip	Mitutoyo MSG 1120	2
Telescopic	Series 155	20LL x 2
Surface	Base 82x63x25	5
Height	Dial Double Column 600mm	2
Dial magnetic base	Kanet MB-FX	4LL x 5
Grinder:		
Pedestal	Dia 250 Wheel Marpol CE 98	2
Pedestal	Dia 150 Wheel Marpol (MBG 200/380)	5
Angle	Metabo W7-115	4LL x 5
Angle	Metabo W?-230	7LL x 3

DESCRIPTION	TYPE	QUANTITY
		<b>LL = Number of students per machine</b> <b>MM = Number of items per machine</b>
Orbital (die)	Metabo GE 700	7LL x 3
Dresser	Diamond 0,5 Carat	2
Dresser	No 1 Dia 35 Wheel	2
Guillotine	Heli CS 7 x 2550	1
Gun:		
Grease	Cylinder pump action	2
Oil	Cylinder pump action	2
Spray	Devilbus gravity feed	2
Air	Blow off	5
Holder:		
Lathe tool	6x6mm cutter	2LL x 10
Lathe tool	8x8mm cutter	2LL x 10
Lathe tool	10x10mm cutter	2LL x 10
Lathe tool	12x12mm cutter	2LL x 10
Hammer:		
Dead blow	Dia 54mm Face	5
Dead blow	Dia 65 mm Face	5
Ball pein	500gram	10
Ball pein	900 gram	10
Club	2kg	2
Hack saw:		
Hand	300mm blade capacity	2LL x 10
Power machine	Model Carif 240	1
Hone	Amco Model 500	2
Harnesses	Safety	4 x 5
Helmet arc welding:		
Standard	Gardwell – Tufflite	5
Electronic	F 11 Protection 0-175 Amp	2
Inflator (tyre)	Vehicle	5LL x 4
Jack:		
Trolley	5 ton	5LL x 4
Bottle	3 ton	10LL x 2
Scissors	3 ton	10LL x 2
Pipes	N/A	10
Stands	3 ton	7LL x 3
Stands	5 ton	7LL x 3
Jumper cables	Vehicle	7LL x 3
Key set:		
Allen	Metric 1,5-20mm	5
Allen	Imperial 1/16"- 1/2"	2
Torx	Multi Splined T 10-T50	2
Knurling tool:		
Revolving head	Type 8143	20LL x 10
Swivel head	Type 8140	20LL x 10
Lathe:		
Machine	Dashin Prince Swing 160 mm Bed 1m	20LL x 20
Machine	Tezsan Model Cayirovo/G.E.B.Z.E.	7LL x 3
CNC lathe	Alpha Plus 400S	1
Ladder:		
Aluminium	1,5m	20LL x 1
Aluminium	6m	20LL x 1
Aluminium	9m	20LL x 1
Lead (light)	10 meter cord	4LL x 5
Line (chalk)	10 meter	2 LL x 10
Lifter:		

DESCRIPTION	TYPE	QUANTITY
		<b>LL = Number of students per machine</b> <b>MM = Number of items per machine</b>
Valve	Medium	4LL x 5
Valve	Large	4LL x 5
Lift:		
Car	4 post	20LL x 1
Car	2 post	10LL x 2
Media components:		
CPU	Diskette and CD writer	
	Stored programmes: Word Excel Cad	1LL x 20
Screen		1LL x 20
Keyboard	Colour tone	1LL x 20
Mouse		1LL x 20
Memory stick		10LL x 2
Diskette		1LL x 40
CD		1LL x 20
Printer		5LL x 4
Fax		7LL x 3
Photocopier		20LL x 1
Telephone		20LL x 1
Micrometer:	Mitutoyo:	
Outside	0 -25	20LL x 20
Outside	25 -50	20LL x 20
Outside	50-75	2LL x 10
Outside	75-100	2LL x 10
Depth	Series 129-111 0-100mm	4LL x 5
Inside	50-300 mm	4LL x 5
Milling machine:		
Pinnacle	Table 920x220 Model PK – 1 1/4M	10LL x 2
Universal	Table 1100x300 Model X6125 A	7LL x 3
Power transmissions:		
Clutches:	(Training models)	5LL x 4
Friction	(Training models)	5LL x 4
Centrifugal	(Training models)	5LL x 4
Hydraulic	(Training models)	5LL x 4
Chain Drives	(Training models)	5LL x 4
Belt Drives	(Training models)	5LL x 4
Gear Drives	(Training models)	5LL x 4
Couplings:	(Training models)	5LL x 4
Flexible	(Training models)	5LL x 4
Fixed	(Training models)	5LL x 4
Self Aligning	(Training models)	5LL x 4
Punch:		
Centre	100mm length	10LL x 20
Pin (set)	Dia 3 – 10mm	4LL x 5
Letter (set)	6mm	10LL x 2
Letter (set)	10mm	10LL x 2
Number (set)	6mm	10LL x 2
Number (set)	10mm	10LL x 2
Pliers:		
Combination	200mm	4LL x 5
Long Nose	200mm	4LL x 5
Side Cutters	200mm	4LL x 5
Circlip Outside	170mm bend	4LL x 5

DESCRIPTION	TYPE	QUANTITY
		<b>LL = Number of students per machine</b> <b>MM = Number of items per machine</b>
Circlip Outside	170mm Straight	4LL x 5
Circlip Inside	170mm Bend	4LL x 5
Circlip Inside	170mm Straight	4LL x 5
Puller Set	Sykes - Piacavant	7LL x 3
Press:		
Hydraulic	33 Tone	2
Eccentric	Dirinler CD/P300	1
Break	Heli PT 50 x 2500 + Accessories	1
Rollers:		
Pinch	Horizontal	1
Pinch	Vertical	1
Ruler:		
Steel	150mm	20LL x 20
Steel	300mm	20LL x 20
Steel	1000mm	10LL x 2
Repair kit	Tubeless tyre	10
Reamer set (adjustable)	Set P-45    B 4412    No 5028	10LL x 2
Slotting machine	TS – 200K	1
Square:		
Combination	Mitutoyo 300mm	4LLx5
Engineer	75mm	4LLx5
Engineer	180mm	4LLx5
Stock die and tap set	Metric Course    M6-M24	2
Stock die and tap set	Metric Fine        M6-M24	2
Stands	Mitutoyo    Magnetic	4LLx5
Scraper:		
Engineer	200mm	10LL x 20
Tape:		
	5 meter	20LL x 20
	10 meter	5LL x 4
Table:		
Steel	1220 x 610	15
Steel	1810 x 910	4LL x 5
Wood	750 x 450	1MM x34
Marking off	500400	2
Tester:		
Rockwell (hardness)	RHTC	2
Multi-tester	Fluke	5LL x 4
Battery	Vehicle	5LL x 4
Compression	Vehicle	5LL x 4
Training units:		
Hydraulic	(Standard)	3
Pneumatic	(Standard)	3
ART (motor display unit)	(Interior mechanism exposure)	2
Tool box (complete)	Geodore (Motor mechanics)	4LL x 5
Tool box (complete)	Boiler maker	4LL x 5
Tool post:		
Quick change	Type A	1MM x 20
Quick change	Type B	1MM x 2
Tyre changer	N/A	20LL x 1
Tirfors	N/A	4
Tail stock dial holder	N/A	4MM x 5
Vice:		
Magnetic	Walker Hagou BV Mod 20	1MM x 10
Machine	Swivel - 160 Jaw (6537)	5

DESCRIPTION	TYPE	QUANTITY
		<b>LL = Number of students per machine</b> <b>MM = Number of items per machine</b>
Drilling	150 Jaw GS-106A	3
Engineer	105mm	15
Engineer	150mm	5LL x 4
Grip	250mm	4LL x 5
Vernier:		
Calliper	150mm	4LL x 5
Calliper	200mm	4LL x 5
Calliper	300mm	4LL x 5
Calliper	Mitutoyo Absolute 500-151 CD-15C	1
Bevel protractor	BP300	10LL x 1
Wrench:		
Tapping	M 2-4.5	4LL x 5
Tapping	M 5-10	4LL x 5
Torque	10 -160 nm	4LL x 5
Welding units:		
Oxygen and Acetylene	Oxygen 9Kg, Acetylene 7Kg	7LL x 3
Arc	21-335 amps	5LL x 4
Profile cutting	N/A	7LL x 3
Straight line cutting	N/A	7LL x 3
Plasma cutting	N/A	7LL x 3
AC/DC	N/A	10LL x 2

**CONSUMABLE RESOURCE NEEDS FOR ENGINEERING SYSTEMS – LEVEL 2**

Per every 20 students:

DESCRIPTION	TYPE	QUANTITY
Bright mild steel:	Diameter:	6 metrelengths:
	10 mm	10
	16	10
	20	10
	32	5
	50	5
Blade:		
Bandsaw	M 42 8TPI 3150 x 25x 0.6	10 off
Hacksaw	Ultra bi hard 300x18 TPI	1 box (100)
Power saw	Starret Red Stripe 400x32x1.6	2 box (10)
Brush:		
File	Wire	10 off
Cleaning	Wire	5 off
Painting	15 mm	20 off
Painting	25 mm	20 off
Painting	50 mm	20 off
Cutters: Tungsten tipped	Lathe:	
TYPE:	10x10 P30 (B3)	
111	RH	30 off
113	RH	30 off
115	RH	30 off
116	RH	30 off
116	LH	20 off
117	RH	30 off
117	LH	20 off
127	RH	20 off
136	RH	30 off
166	RH	30 off
Cutters: Tungsten tipped	Lathe:	
TYPE:	20x20 P30 (B3)	
111	RH	5 off
113	RH	5 off
115	RH	5 off
116	RH	5 off
116	LH	5 off
117	RH	5 off
117	LH	5 off
127	RH	5 off
136	RH	5 off
166	RH	5 off
Cutters: Tungsten tipped	Lathe:	
TYPE:	20x20 K10 (C3)	
111	RH	5 off
113	RH	5 off
115	RH	5 off
116	RH	5 off
116	LH	5 off
117	RH	5 off
117	LH	5 off
127	RH	5 off
136	RH	5 off
166	RH	5 off



DESCRIPTION	TYPE	QUANTITY
Cutter: High speed steel		
Diameter:	Code:	
6 mm	6050070	10 off
8	6050110	10 off
10	6050140	10 off
Cutter: High speed steel		
Square:	Code:	
4 x 63 mm	6010025	20 off
5 x 63	6010034	20 off
6 x 100	6010070	20 off
8 x 100	6010110	20 off
10 x 100	6010140	20 off
12 x 100	6010170	20 off
16 x 100	6010200	20 off
20 x 160	6010256	20 off
Double bevel parting blade:	6440070	40 off
Cutter: High speed steel	Milling: 2 flute	
Diameter:	Length: Regular (Co8o)	
3 mm	Code:	
4	3480300	5 off
5	3480400	5 off
6	3480500	5 off
7	3480600	5 off
8	3480700	5 off
9	3480800	5 off
10	3480900	5 off
	3481000	5 off
Cutter: High speed steel	Milling: 4 flute	
Diameter:	Length: Regular (Co8o)	
3 mm	Code:	
4	3440300	5 off
5	3440400	5 off
6	3440500	5 off
7	3440600	5 off
8	3440700	5 off
9	3440800	5 off
10	3440900	5 off
	3441000	5 off
Detergent:		
Turpentine		5L x 3
Thinners		5L x 3
Paraffin		20L x 2
Dies tapping:		
Nuts (Coarse)	HSS:	
M3 x 0.5	5070300	6 off
M4 x 0.7	5070400	6 off
M5 x 0.8	5070500	6 off
M6 x 1.0	5070600	6 off
M8 x 1.25	5070800	6 off
M10 x 1.5	5071000	6 off
M12 x 1.75	5071200	6 off
Circular solid (Coarse)		
M3 x 0.5	5800300	4 off
M4 x 0.7	5800400	4 off
M5 x 0.8	5800500	4 off
M6 x 1.0	5800600	4 off
M8 x 1.25	5800800	4 off

DESCRIPTION	TYPE	QUANTITY
M10 x 1.5	5801000	4 off
M12 x 1.75	5801200	4 off
Jobber drills: Diameter range from 2 - 12 mm advancing in 0,1 mm increments	Straight shank Code: 112 HSS Co	6 sets
Drills: Diameter range from 13 - 30 mm advancing in 0,5 mm increments	Morse taper shank Chipbreaker Code: 2A1 HSS	2 sets
Drills: Diameter range from 31 - 50 mm advancing in 0,5 mm increments	Morse taper shank Chipbreaker Code: 2A1 HSS	1 set
Drill centre: Diameter: 2,5 x 6,3 mm	HSS: Code: 1390250	30 off
6,3 x 16 mm	1390630	10 off
Engineering marking blue	300 ml	10 off
Brazing flux	Oxygen and Acetylene	500 ml x 10 off
Files:		
Rectangular:	Barsted	10 off
	Medium	10 off
	Smooth	10 off
Square:	Barsted	10 off
	Medium	10 off
	Smooth	10 off
3 Cornered:	Barsted	10 off
	Medium	10 off
	Smooth	10 off
Round:	Barsted	10 off
	Medium	10 off
	Smooth	10 off
Half round:	Barsted	10 off
	Medium	10 off
	Smooth	10 off
Thread restorer:	Sykes Pickavant 015602	5 off
Grease	Shell Retinax EP2	20 Litre x 1 only
Grinding stone:	Diameter:	
Wheel (tungsten)	250 x 32 x 31,75 GC 60 J V	2 off
Wheel (Carborundum)	250 x 32 x 31,75 A 36 P5 V 13	3 off
Wheel (Carborundum)	150 x 32 x 31,75 A 36 P5 V	10 off
Angle (cutting)	125 x 6,3 x 22,23	10 off
Angle (grinding)	125 x 6, 3 x 22,23	10 off
Loctite	27 050 grms	3 off
Mutton cloth	400 grms	30 off
Oil (motor vehicle)	20W – 50	5 Litres x 3 off
Tellus (gearbox and feed boxes)	S 68	20 Litres x 2 off
Tonna (bedways and slides)	T 68	20 Litres x 2 off
Reamers:		
Hand		
Diameter:	HSS:	
10 mm	H7 – 7011000	2 off
12	H7 – 7011200	2 off
14	H7 – 7011400	2 off
15	H7 – 7011500	2 off
16	H7 – 7011600	2 off

DESCRIPTION	TYPE	QUANTITY	
17	H7 – 7011700	2 off	
18	H7 – 7011800	2 off	
19	H7 – 7011900	2 off	
20	H7 – 7012000	2 off	
21	H7 – 7012100	2 off	
22	H7 – 7012200	2 off	
23	H7 – 7012300	2 off	
24	H7 – 7012400	2 off	
Countersinks: Diameter:	Parallel shank 60 Degree HSS Code:		
6,3 mm	7610630	10 off	
8	7610800	10 off	
10	7611000	10 off	
12,5	7611250	10 off	
Steel:		6 metre lengths:	
Solid square (dimensions):			
8 x 8 mm	0,3 – 0,4% Carbon content	10 off	
10 x 10		10 off	
12 x 12		10 off	
16 x 16		10 off	
Square tubing (dimensions):			
12 x 12 mm	0,3 – 0,4% Carbon content	10 off	
16 x 16		10 off	
20 x 20		10 off	
24 x 24		10 off	
32 x 32		10 off	
50 x 50		5 off	
Rectangular (dimensions):			
20 x 5 mm	0,3 – 0,4% Carbon content	5 off	
25 x 5		5 off	
30 x 5		5 off	
50 x 5		5 off	
80 x 5		5 off	
100 x 5		5 off	
Round bar (diameter):			
6 mm	0,3 – 0,4% Carbon content	5 off	
8		5 off	
10		5 off	
12		5 off	
16		5 off	
20		5 off	
Plate (dimensions):			
2,440 x 1,220 x 0,5	0,3 – 0,4% Carbon content	5 off	
2,440 x 1,220 x 1,0		5 off	
2,440 x 1,220 x 1,5		5 off	
2,440 x 1,220 x 2,0		5 off	
2,440 x 1,220 x 3,0		5 off	
2,440 x 1,220 x 5,0		5 off	
2,440 x 1,220 x 8,0		3 off	
2,440 x 1,220 x 10,0		3 off	
Scriber (diameter) 3 mm		De-scaling pin	30 off
Sandpaper (emery tape)		Grade P100 (50 mm x 50 m)	2 off
Soap (hand)	Bingo 150g	50 off	
Threads:			
Tapping (Coarse):	HSS:		

DESCRIPTION	TYPE	QUANTITY
M3 x 0,5	Code: 5010300	6 off
M4 x 0,7	5010400	6 off
M5 x 0,8	5010500	6 off
M6 x 1,0	5010600	6 off
M8 x 1,25	5010800	6 off
M10 x 1,5	5011000	6 off
M12 x 1,75	5011200	6 off
Tapping lubricant:		
Steel	Dual Action #1	10 off
Aluminium	Dual Action #2	5 off
Welding:		
Arc		
Diameter rod:		
2 mm		5kg packets x 2
2,5		5kg packets x 2
3,125		5kg packets x 2
Gas (Brazing):		
1,8 mm	General Purpose	2kg x 1
2,8		2kg x 1
Gas (Welding):		
1,8 mm		2kg x 1
2,8		2kg x 1