

TRADE: TOOL, JIG AND DIE MAKER

MODULE	CODE	OBJECTIVES	CRITERIA
INDUCTION	ID1	Recall applicable sections of the Manpower Training Act (No 56, 1981) with special reference to discipline and legal responsibilities.	Pass a questionnaire with at least 80%.
	ID2	Recall terms and conditions of apprenticeship as Gazetted 26 July 1991.	Pass a questionnaire with at least 80%.
	ID3	Recall applicable grievance procedures.	Pass a questionnaire with at least 80%.
	ID4	Recall applicable disciplinary procedures.	Pass a questionnaire with at least 80%.
	ID5	Recall company rules and procedures.	Pass a questionnaire with at least 80%.
	ID6	Recall quality assurance procedures.	Correct according to company standards and procedures with a minimum of 5 questions and 100% pass.
SAFETY	SF1	Recall relevant regulations of the following Acts: (where applicable) <ul style="list-style-type: none"> – Occupational Health and Safety Act (No 85, 1993). – Minerals Act and Regulations (No 50, 1991). 	Pass a questionnaire with at least 80%.
	SF2	Attend a standard industrial safety course.	Obtain a recognised certificate.
	SF3	Recall all safety in welding and gas cutting.	All safety aspects correct according to accredited procedures.
	SF4	Attend a first aid course.	Obtain a recognised certificate 1st level.

MODULE	CODE	OBJECTIVES	CRITERIA
	SF5	Identify relevant colour coding and symbolic safety signs.	100% according to SABS 0140 and SABS 1186 publications.
HAND TOOLS	HT1	Identify measuring, checking, forming, cutting, marking and fastening tools and tooling aids.	Correctly identify all the tools and state all their physical characteristics.
	HT2	Use measuring, checking, forming, cutting, marking and fastening tools and tooling aids.	<ol style="list-style-type: none"> <u>Measuring and marking tools</u> - 1,0mm accumulative dimensional tolerances and 2° angular tolerance. <u>Checking tools</u> - 0,5mm dimensional tolerance. <u>Forming, cutting and marking tools</u> - correct application. All safety aspects adhered to.
	HT3	Maintain measuring, checking, forming, cutting, marking and fastening tools and tooling aids.	Tools in a safe and functional working condition.
	HT4	Use hand tools applicable to the trade.	<ol style="list-style-type: none"> All safety aspects adhered to. No tools or equipment is damaged. All tools and equipment are clean after use.
WORKSHOP TOOLS	WT1	Use fixed and portable drilling machines.	<ol style="list-style-type: none"> Correct speeds and feeds to be used. Holes to be within 0,5mm of centre. Correct cutting compounds to be used.
	WT2	Use fixed and portable grinding machines including replacing, setting, truing and ringing of wheels.	All prescribed safety standards applied.
	WT17	Operate pneumatic and/or electrical power tools.	<ol style="list-style-type: none"> All safety aspects adhered to. No damage to components and equipment.
	WT20	Use hand operated presses.	<ol style="list-style-type: none"> All safety aspects adhered to. No damage to components.

MODULE	CODE	OBJECTIVES	CRITERIA
	WT22	Dress a grinding wheel.	Wheel must be concentric.
MATERIALS	MA23	Recall the terms, definitions and use of materials pertaining to the trade.	Minimum of 15 questions with at least 80% pass.
	MA24	Recall the physical properties and characteristics of metals applicable to the trade.	Minimum of 15 questions with at least 80% pass.
	MA3	Identify ferrous and non-ferrous metals.	Each type of material correctly identified.
DRAWINGS AND SKETCHES	DS1	Recall terms and definitions pertaining to engineering drawings.	A test of minimum 15 questions to be set with a 100% pass mark against SABS 044 Part 1 and SABS 0111.
	DS2	Interpret relevant symbols, abbreviations and tolerances.	A test of minimum 20 questions to be set with a 100% pass mark against SABS 044, Part 2 and SABS 0111.
	DS7	Make free hand sketches including plan, front and side elevations.	<ol style="list-style-type: none"> To be legible and identifiable. All dimensions recorded to be 100% correct.
	DS8	Compile a material list from engineering drawings.	100% correct.
	DS9	Identify type of fits from engineering drawings.	100% correct according to ISO R286.
	DS10	Identify surface textures.	According to comparison scale.
MARKING OFF	MT9	Mark off projects for manufacturing using all standard marking off techniques.	<ol style="list-style-type: none"> According to drawing specifications. No double lines. All dimensions within 0,1mm.
HAND SKILLS	HS3	Sharpen drills.	Angles according to tables and application.
	HS5	Sharpen punches.	<ol style="list-style-type: none"> All safety aspects adhered to. Correct included angles according to application.

MODULE	CODE	OBJECTIVES	CRITERIA
	HS7	Sharpen marking off tools.	Marking edge to make single scribing lines.
	HS8	Manufacture a project using the following techniques and material: filing, sawing, drilling, tapping, reaming, Material: mild steel.	<ol style="list-style-type: none"> 1. All sizes within 0,05mm. 2. All surface flat and square. 3. Surface texture down to N9 according to comparison scale.
	HS15	Harden and temper a punch.	<ol style="list-style-type: none"> 1. Temperature and colour controlled according to specifications. 2. Temper to be correct for application.
	HS10	Sharpen single point machine cutting tools.	Angles according to tables for different materials.
ARC WELDING	AO1	Identify and set up AC and/or DC welding machines, equipment including starting up and shutting down procedures.	<ol style="list-style-type: none"> 1. Correct according to manufactures handbook. 2. All safety aspects adhered to.
	AO2	Differentiate between arc welding consumables.	Correct to manufacturers' specifications.
	AO3	Prepare material for arc welding.	<ol style="list-style-type: none"> 1. Correct according to company welding procedures and practises with regard to weld joint preparation, voltage, amperages and welding consumables. 2. All safety aspects adhered to.
	AO4	Arc weld workpieces incidental to the trade using manual arc welding techniques.	<ol style="list-style-type: none"> 1. Correct according to company quality control procedures. 2. All safety aspects adhered to.
GAS WELDING	GW10	Identify and set up oxygen-fuel gas welding equipment including light up, adjustment of gas pressures and shut down procedures.	<ol style="list-style-type: none"> 1. Correct according to manufacturers handbook. 2. All safety aspects adhered to. 3. Selection to correct size nozzles in relationship to material thickness correct according to manufacturers specifications.

MODULE	CODE	OBJECTIVES	CRITERIA
	GW11	Differentiate between gas welding consumables.	Correct according to manufacturers' specifications.
	GW12	Prepare material for gas welding.	<ol style="list-style-type: none"> 1. Correct to company gas welding procedures with regard to joint preparation including brazing and gas welding consumables. 2. All safety aspects adhered to.
	GW13	Gas weld workpieces incidental to the trade.	<ol style="list-style-type: none"> 1. Correct according to company quality control procedures. 2. All safety aspects adhered to.
GAS HEATING	GC1	Identify and assemble gas heating equipment, including light up and shut down procedures.	Correct method and procedure according to safety standards.
	GC2	Select nozzles and gas pressures for heating different materials of various thicknesses.	100% correct according to manufacturers charts.
	GC7	Heat and heat treat materials incidental to the trade.	Company quality standards on finish and with maximum 2mm deviation from line.
BASIC LIFTING TECHNIQUES	BG2	Recall overhead crane hand signals.	100% correct according to recognised code of practice.
	BG3	Demonstrate overhead crane hand signals.	100% correct according to recognised code of practice.
	BG4	Use the following equipment: <ul style="list-style-type: none"> – chain block : 2 ton max – coffer block : 2 ton max – shackles : 2 ton max – chain slings : 2,5 ton max – wire rope slings : 20mm diameter 	<ol style="list-style-type: none"> 1. Working load not to exceed equipment safe loading capacity. 2. Correct method of slinging. 3. No kinks in wire rope slings and chain slings. 4. No damage to equipment.

MODULE	CODE	OBJECTIVES	CRITERIA
MEASURING EQUIPMENT	MF1	Use a micrometer – outside – depth – inside	<ol style="list-style-type: none"> 1. All sizes within 0,05mm. 2. Standard holding technique to be maintained. 3. Correct zeroing method applied.
	MF2	Use a vernier - depth, inside and outside.	All sizes within 0,1mm.
	MF3	Use a tape measure and steel rule.	All sizes within 0,5mm.
	MF4	Use a caliper - inside and outside.	All sizes within 0,5mm.
	MF5	Use a machine level.	All sizes within 0,05mm per running meter.
	MF6	Use a vernier height gauge.	All sizes within 0,1mm.
	MF13	Use the following gauges: – telescopic – thread – feeler – dial – Johanson gauge blocks – sine bar	<ol style="list-style-type: none"> 1. All sizes for telescopic gauge to be within 0,05mm. 2. All other measurements to be 100% correct. 3. All sizes for gauge blocks and sine bar to be within 0,01mm.
CENTRE LATHE WORK	CL1	Carry out routine inspection on centre lathe.	<ol style="list-style-type: none"> 1. All safety aspects adhered to. 2. All slides must be oiled and cleaned. 3. Oil levels according to level marks. 4. No excessive slide clearance. 5. Toolpost and chuck spanners to fit properly.
	CL2	Compile a machining procedure.	Procedure to allow workpiece to be completed in a logical manner.
	CL3	Recall the parts of a centre lathe.	100% correct.

MODULE	CODE	OBJECTIVES	CRITERIA
	CL4	Set calibrated dials.	<ol style="list-style-type: none"> 1. Calibration and reading of dials 100% correct. 2. Method of angle setting on compound slide 100% correct.
	CL5	Set up a workpiece in a four-jaw chuck.	<ol style="list-style-type: none"> 1. Correct according to centre lines. 2. Correct according to outside diameter. 3. Correct according to inside diameter. 4. Square to face. 5. Correct according to eccentric lines.
	CL14	Identify types of cutting tools with reference to: <ol style="list-style-type: none"> (a) High speed toolbits. (b) Throw away bits (insert tungsten carbide) (c) Brazed tools 	100% correct according to application and angles for different materials.
	CL7	Turn an external parallel workpiece.	<ol style="list-style-type: none"> 1. All safety aspects adhered to. 2. No damage to components. 3. 100% correct to drawing specifications (ISO standards). 4. No burrs allowed on any surfaces. 5. Maximum surface texture according to N6 on the comparison scale. 6. All tolerances according to ISO R286. 7. Speeds and feeds according to type of material and tooling. 8. Correct centre height of specific tool and application. 9. Correct cutting compound used where applicable.

MODULE	CODE	OBJECTIVES	CRITERIA
	CL8	Turn an internal parallel workpiece.	<ol style="list-style-type: none"> 1. All safety aspects adhered to. 2. No damage to components. 3. 100% correct to drawing specifications (ISO standards). 4. No burrs allowed on any surfaces. 5. Maximum surface texture according to N6 on the comparison scale. 6. All tolerances according to ISO R286. 7. Speeds and feeds according to type of material and tooling. 8. Correct centre height of specific tool and application. 9. Correct drilling procedures used. 10. Correct cutting compound used where applicable.
	CL9	Turn the following internal and external threads: <ul style="list-style-type: none"> - "V" and acme - Left hand and right hand - Single and two-start 	<ol style="list-style-type: none"> 1. All safety aspects adhered to. 2. No damage to components. 3. 100% correct to drawing specifications (ISO standards) 4. No burrs allowed on any surfaces. 5. Maximum surface texture according to N6 on the comparison scale. 6. All tolerances according to ISO R286. 7. Speeds and feeds according to type of material and tooling. 8. Correct centre height of specific tool and application. 9. Pitch/lead 100% correct. 10. Thread angle 100% correct. 11. Calculations according to formulae. 12. Fits according to standard gauges. 13. Compound slide set correctly. 14. Correct cutting compound used where applicable.

MODULE	CODE	OBJECTIVES	CRITERIA
	CL15	Turn an external and internal taper using a compound slide.	<ol style="list-style-type: none"> 1. All safety aspects adhered to. 2. No damage to components. 3. 100% correct to drawing specifications(ISO standards). 4. No burrs allowed on any surfaces. 5. Maximum surface texture according to N6 on the comparison scale. 6. All tolerances according to ISO R286. 7. Speeds and feeds according to type of material and tooling. 8. Correct centre height of specific tool and application. 9. Calculation 100% correct. 10. Compound slide set 100% correct. 11. Taper fit on male and female to be correct. 12. Correct cutting compound used where applicable.
	CL11	Turn an external and internal radius.	<ol style="list-style-type: none"> 1. All safety aspects adhered to. 2. No damage to components. 3. 100% correct to drawing specifications (ISO standard). 4. No burrs allowed on any surfaces. 5. Maximum surface texture according to N6 on the comparison scale. 6. All tolerances according to ISO R286. 7. Speeds and feeds according to type of material and tooling. 8. Correct centre height of specific tool and application. 9. Form according to radius gauge. 10. Correct cutting compound used where applicable.

MODULE	CODE	OBJECTIVES	CRITERIA
	CL12	Turn a workpiece between centres.	<ol style="list-style-type: none"> 1. All safety aspects adhered to. 2. No damage to components. 3. 100% correct to drawing specifications (ISO standard). 4. No burrs allowed on any surfaces. 5. Maximum surface texture according to N6 on the comparison scale. 6. All tolerances according to ISO R286. 7. Speeds and feeds according to type of material and tooling. 8. Correct centre height of specific tool and application. 9. Correct method of clamping with a lathe carrier to be used. 10. Correct cutting compound used where applicable.
	CL16	Turn workpieces using fixed steadies.	<ol style="list-style-type: none"> 1. All safety aspects adhered to. 2. No damage to components. 3. 100% correct to drawing specifications (ISO standard) 4. No burrs allowed on any surfaces. 5. Maximum surface texture according to N6 on the comparison scale. 6. All tolerances according to ISO R286. 7. Speeds and feeds according to type of material and tooling. 8. Correct centre height of specific tool and application. 9. Correct cutting compound used where applicable.

MODULE	CODE	OBJECTIVES	CRITERIA
MILLING MACHINE WORK	MM1	Carry out routine inspection on milling machine.	<ol style="list-style-type: none"> 1. All safety aspects adhered to. 2. All slides must be oiled and cleaned. 3. Oil levels according to level marks. 4. No excessive slide clearance.
	MM2	Compile a machining procedure.	Procedure to allow workpiece to be completed in a logical manner.
	MM3	Recall the parts of a universal milling machine.	100% correct.
	MM4	Set calibrated dials.	<ol style="list-style-type: none"> 1. Calibration and reading of dials 100% correct. 2. Method on angle settings 100% correct.
	MM25	Set up workpiece in a dividing head and/or between centres.	<ol style="list-style-type: none"> 1. Centres of milling machine in line. 2. No damage to workpiece by carrier and firmly in position.
	MM26	Set up a workpiece on a rotary table.	<ol style="list-style-type: none"> 1. No damage to components. 2. Workpieces correctly and securely clamped.
	MM7	Set up a workpiece in a machine vice.	<ol style="list-style-type: none"> 1. No damage to components. 2. Workpiece correctly and securely clamped. 3. Vice correctly set up and secured. 4. Correct to outside surfaces. 5. Correct to inside surfaces. 6. Correct to face surfaces. 7. Correct clocking procedure used on vice and workpiece.
	MM27	Use a dividing head for indexing.	<ol style="list-style-type: none"> 1. Index calculations 100% correct. 2. Sector arm 100% correct. 3. Index plate selection 100% correct. 4. Gear selection 100% correct. 5. Gear assembly 100% correct.

MODULE	CODE	OBJECTIVES	CRITERIA
	MM9	Assemble milling arbors.	<ol style="list-style-type: none"> 1. No dirt contamination in components. 2. Arbor tightened correctly. 3. Collars and cutter positioned correctly. 4. Bearing steady position correct. 5. Bearing lubricated prior to start. 6. All clamp-nuts tightened.
	MM10	Mount a universal head.	<ol style="list-style-type: none"> 1. Angle setting 100% correct. 2. All clamp-nuts tightened.
	MM28	Identify high speed and tungsten cutting tools with reference to: <ol style="list-style-type: none"> I. Slot drills II. Side and face cutters III. End-mills IV. Slit-saws V. Ripping cutters VI. Face mills VII. Fly cutters 	<ol style="list-style-type: none"> 1. Type correct according to application.
	MM13	Cut a key.	<ol style="list-style-type: none"> 1. Correct tool position for specific tool and application. 2. Speed and feed according to type of material and tooling. 3. All tolerance according to ISO R286 standard. 4. All safety aspects adhered to. 5. No damage to components. 6. 100% correct to drawing specifications (ISO standard). 7. No burrs allowed on any surface. 8. Maximum surface texture down to N6 according to comparison scale.

MODULE	CODE	OBJECTIVES	CRITERIA
	MM14	Machine a hexagon.	<ol style="list-style-type: none"> 1. Correct tool position for specific tool and application. 2. Speed and feed according to type of material and tooling. 3. All tolerance according to ISO R286 standard. 4. All safety aspects adhered to. 5. No damage to components. 6. 100% correct to drawing specifications (ISO standard). 7. No burrs allowed on any surface. 8. Maximum surface texture down to N6 according to comparison scale. 9. Dividing head calculations correct.
	MM15	Machine a cube using a machine vice.	<ol style="list-style-type: none"> 1. Correct tool position for specific tool and application 2. Speed and feed according to type of material and tooling. 3. All tolerance according to ISO R286 standard. 4. All safety aspects adhered to. 5. No damage to components. 6. 100% correct to drawing specifications (ISO standard). 7. No burrs allowed on any surface. 8. Maximum surface texture down to N6 according to comparison scale. 9. Parallelism, squareness correct.

MODULE	CODE	OBJECTIVES	CRITERIA
	MM16	Drill equal spaced holes on PCD's.	<ol style="list-style-type: none"> 1. Correct tool position for specific tool and application. 2. Speed and feed according to type of material and tooling. 3. All tolerance according to ISO R286 standard. 4. All safety aspects adhered to. 5. No damage to components. 6. 100% correct to drawing specifications (ISO standard). 7. No burrs allowed on any surface. 8. Maximum surface texture down to N6 according to comparison scale. 9. Cutter correct on PCD. 10. Dividing head calculation 100% correct.
	MM17	Bore a hole.	<ol style="list-style-type: none"> 1. Correct tool position for specific tool and application. 2. Speed and feed according to type of material and tooling. 3. All tolerance according to ISO R286 standard. 4. All safety aspects adhered to. 5. No damage to components. 6. 100% correct to drawing specifications (ISO standard). 7. No burrs allowed on any surface. 8. Maximum surface texture down to N6 according to comparison scale. 9. Bring head set on centre position.
	MM20	Pitch holes according to co-ordinates.	Correct to drawings and tolerances.
	MM21	Drill ream and spot face.	Correct to drawing.
	MM22	Use digital read-out equipment on machines.	Manufacturing components to drawings 100% correct.

MODULE	CODE	OBJECTIVES	CRITERIA
SPARK EROSION	SE1	Use a spark erosion machine.	Correct according to manufacturers standards.
LAPPING AND POLISHING	LP1	Lap and polishing all types of internal and external surfaces.	Correct according to drawing specifications and a maximum surface texture according to N4 on the comparison scale.
GRINDING	GR1	Grind cylindrical surfaces.	<ol style="list-style-type: none"> 1. All safety aspects adhered to. 2. Correct according to drawing specifications. 3. Surface finish correct according to drawing specifications.
	GR2	Grind external and internal surfaces.	<ol style="list-style-type: none"> 1. All safety aspects adhered to. 2. Correct according to drawing specifications. 3. Surface finish correct according to drawing specifications.
	GR3	Grind plain and angular surfaces.	<ol style="list-style-type: none"> 1. All safety aspects adhered to. 2. Correct according to drawing specifications. 3. Surface finish correct according to drawing specifications.
	GR4	Grind tools.	<ol style="list-style-type: none"> 1. All safety aspects adhered to. 2. Correct according to drawing specifications. 3. Surface finish correct according to drawing specifications.
LOCKING DEVICES	KL4	Install the following locking devices - lock-nuts, dowels, lock-plates, split pins, split-cotters, taper pins and wire method.	All burrs and rough edges, ground smooth.
	KL6	Identify nuts and bolts.	100% correct.
	KL7	Tighten nuts and bolts.	<ol style="list-style-type: none"> 1. Torque to specified standard. 2. No damage to threads and bolt heads.

MODULE	CODE	OBJECTIVES	CRITERIA
HARDENING OF TOOLS AND/OR EQUIPMENT	HF8	Harden and temper components and workpieces.	<ol style="list-style-type: none"> 1. All safety aspects adhered to. 2. Temperature colour controlled according to specifications. 3. Temper to be correct for application. 4. Correct quenching method applied.
	HF9	Case harden and temper tools, components and workpieces.	<ol style="list-style-type: none"> 1. All safety aspects adhered to. 2. Temperature and colour controlled according to specifications. 3. Penetration and hardness correct according to drawing specification. 4. Correct compound used for application.
ASSEMBLIES	AS3	Identify the following types of fits on shafts and hole basis - clearance, transition, interference.	All tolerance within ISO standard hole basis system.
	AS4	Fit a boss to shaft with reference to clearance fit.	All tolerance within ISO standard hole basis system.
	AS5	Fit a boss to shaft with reference to transition fit.	All tolerance within ISO standard hole basis system.
	AS6	Fit a boss to shaft with reference to interference fit.	All tolerance within ISO standard basis system.
	AS8	Fit seals to components.	<ol style="list-style-type: none"> 1. No damage to components. 2. Sealing direction 100%.
	AS9	Assemble dies and tools.	Correct according to drawing specifications.

MODULE	CODE	OBJECTIVES	CRITERIA
<p>THEORETICAL TRAINING</p>		<p>A four subject pass is needed to obtain the N course. Mathematics and the relevant trade theory subject is compulsory. A further two relevant subjects must be chosen by the employer, college and apprentice in order to obtain the four subjects required for the course.</p>	<p>Obtain a four subject certificate or pass.</p> <p>Obtain a four subject certificate or pass.</p>
	<p>TT1</p>	<p>Mathematics N1 Relevant Trade Theory N1 Plus two relevant subjects N1</p>	
	<p>TT2</p>	<p>Mathematics N2 Relevant Trade Theory N2 Plus two relevant subjects N2</p> <p>“Should the apprentice have a qualification higher than that prescribed in the schedule, it must be ensured that the subjects are relevant to the trade in question, before a trade test date will be allocated.”</p>	
<p>ON THE JOB EXPERIENCE AND INDEPENDENT WORK</p>	<p>EX1</p>	<p>On the job experience and independent work should cover at least 80% of all modules to ensure as wide as possible field of experience and must take place under supervisory control.</p>	<p>All work done to be recorded with respect to performance levels.</p>