

**Mechanical Engineering Craft - National Technical
Certificate (NTC) and Advanced National Technical
Certificate (ANTC)**

Shaping, Planning and Slotting

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| PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN MECHANICAL ENGINEERING CRAFT PRACTICE | | | |
| MODULE: SHAPING, PLANNING AND SLOTING | | MODULE CODE: CME 16 | CONTACT HOURS: 7hrs/week |
| MODULE SPECIFICATION: PRACTICAL TASKS | | | |
| Week | General Objective 1.0: Understand The Working Principles Of Shaping Machines And To Operate The Machine To Produce Components Parts Of Machine. | | |
| | Specific Learning Outcome: | Teacher's Activities | Learning Resources: |
| 1-4 | <p>1.1 Identify the types of shaping machine and set up tools including:-</p> <ul style="list-style-type: none"> i. adjustment of tool height, ii. the length of strokes, iii. feed rate, etc. <p>1.2 Set and operate the shaper to produce various components applying safety precautions.</p> <p>1.3 Clean, oil and grease the shaping machine and adjust the slides.</p> | <ul style="list-style-type: none"> • Demonstrate to the students to practise till they become competent • Assess the students | <ul style="list-style-type: none"> • Shaping machine and accessories |
| General Objective 2.0: Understand The Working Principles Of Planning Machine And Apply Them In Producing Machine Parts | | | |
| Week | Specific Learning Objective: | Teachers Activities | Resources |
| 5-8 | <p>2.1 Adjust the length of stroke and mount work and tool correctly</p> <p>2.1 Carry out the planning operations observing safety precautions</p> <p>2.2 Clean, oil, grease and adjust the slides of the panning machine.</p> | <ul style="list-style-type: none"> • Demonstrate to the students to practise till they become competent • Assess the students | <ul style="list-style-type: none"> • Planning machine and its accessories |
| General Objective 3.0: Know The Various Types Of Slotting Machines And Use Safely To Produce Component Parts Of Machine | | | |
| NTC Assessment profile: Practical to take 60% of overall assessment | | | |

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MODULE SPECIFICATION: KNOWLEDGE REQUIREMENT

Week **General Objective 1.0: Understand The Working Principles Of Shaping Machines And Operate The Machines To Produce Component Parts Of The Machine**

| Week | Specific Learning Outcome: | Teacher's Activities | Learning Resources: |
|-------------|--|---|--|
| 1-3 | 1.1 Safety in the work place. 1.2 Identify the types of shaping machine. a. crank-type shaper b. hydraulic shaper 1.3 Describe the types of operations performed on the shaping machine: 1.4 Explain the principles of operation of a shaper 1.5 Describe the functions and constructional details of the main component of the machine. | <ul style="list-style-type: none"> • Describes the general requirements for the observance of safe practice. • General requirements: protecting self and other, alertness to danger, maintaining personal hygiene, safety to be observed when working with hazardous substances. Knowledge of emergency and hazard reporting. • Illustrate with good examples and make notes where necessary. • Assess the students | <ul style="list-style-type: none"> • Manuals on general safety practice, and accident reporting sheets. Safety campaign charts. • Pictorial diagrams of component parts on machine parts list. Video clip of running machine. • Observing and practicing operations demonstrated. • Exercises from recommended textbook. |

General Objective: 2.0: Calculate Cutting Speed And Feed

| Week | Specific Learning Objective: | Teachers Activities | Resources |
|-------------|--|--|--|
| 4 | 2.1 Explain the geometry of quick return motion 2.2 Calculate the working speed of a shaper $\text{cutting speed} = \frac{\text{length of stroke in meters}}{\text{time in minutes taking by the cutting speed}}$ or $\text{double stroke/mm} = \frac{S}{2 \times \text{length of job}}$ where S = surface speed Feed = distance the moves after each cutting stroke | <ul style="list-style-type: none"> • Solves problems for student to practise • Assess the students | <ul style="list-style-type: none"> • Notes of solved problems |

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MODULE SPECIFICATION: KNOWLEDGE REQUIREMENT

General Objective 3.0: Understand The Working Principles Of Planning Machine And Apply Them In Producing Machine Parts

| Week | Specific Learning Objective: | Teachers Activities | Resources |
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| 5-7 | 3.1 Identify the types and sizes of planners 3.2 State the functions of essential parts of the planning machine example, planner head, table, forward and reverse switches, etc 3.3 Explain the working principles of planning machine 3.4 List the tools and accessories used for planning | <ul style="list-style-type: none"> • Illustrate with good examples and make notes where necessary. • Assess the students | <ul style="list-style-type: none"> • Recommended textbook, chalkboard, lesson notes etc. |

General Objective 4.0: Calculate Speed And Feed

| Week | Specific Learning Objective: | Teachers Activities | Resources |
|-------------|--|--|---|
| 8 | 4.1 Calculate the working speed $\text{Average cutting} = \frac{\text{length of stroke in meters}}{\text{Time in minutes taken by the cutting stroke}}$ Or $\frac{S}{LL}$ where S = surface speed L = length of stroke in meters. | <ul style="list-style-type: none"> • Solve examples for the student to practise. • Assess the students | <ul style="list-style-type: none"> • Notes of solved problems. |

General Objective 5.0: Know The Various Types Of Slotting Machine Their Essential Parts And The Working Principles

| Week | Specific Learning Objective: | Teachers Activities | Resources |
|-------------|--|--|--|
| 9-12 | 5.1 Explain types and uses of slotting machine 5.2 Explain the essential component parts and accessories of slotting machine such as rotary table, ram, tool box. 5.3 Describe the functions and the constructional details of the components parts of the machine 5.4 Explain the geometry of "whitworth" quick return motion. 5.5 Calculate the working speed of slotting machine average cutting speed. 5.6 $\text{Average cutting speed} = \frac{\text{length of stroke in meters}}{\text{Time in minutes by the cutting stroke}}$ | <ul style="list-style-type: none"> • Illustrate with good examples and make notes where necessary. • Assess the students • Solve many problems for the students to practise and give assignment. • Assess the students | <ul style="list-style-type: none"> • Recommended textbooks, chalkboard, lesson notes etc. |

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**CONTACT
HOURS:**

MODULE SPECIFICATION: KNOWLEDGE REQUIREMENT

General Objective 5.0: Know The Various Types Of Slotting Machine Their Essential Parts And The Working Principles

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| 9-12 | Or Double stroke/mm = $\frac{S}{2 \times \text{length of job}}$ 5.6 Determine feed rate $F = f \times T \times N$ Where F = feed rate f = feed per tooth T = number of teeth and N = rpm of cutter | | |
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PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN MECHANICAL ENGINEERING CRAFT PRACTICE

Course: Mechanical Engineering Craft Practice

Module Code: CME 17 - DRILLING

Contact Hours: 8hr/wk

General Objectives On completion of this module the trainee should be able to:

1. Understand the working principles of a drilling machine and use it to drill holes on metals and other engineering materials
2. Understand the principles of seating and machine a seating on a hole.
3. Understand the principle of reaming and ream a hole on a drilling machine.
4. Understand the construction of radial or pillar drilling machines and their uses in drilling holes.
5. Determine the speed of drilling operation.

Practical competence: On completion of this module the trainee will demonstrate the following competences to a standard expected in industry.

1. Identify in the workshop different types of drills and describe their typical use common drills; taper and parallel shank twist drill, flat drill, centre drill, core drill, multi-fluted drill.
2. Demonstrate methods of work holding on drilling machine. Work holding devices: Machine vice, angle plate, indexing fixture (dividing head, dividing chuck) clamps
3. Select appropriate speeds and feeds on drilling machine suitable for various materials to perform, centre drill, drill through work piece and drill to a given depth, ream through work piece, using solid and expanding reamer, counter bore a hole, counter sink a hole, spot face round surface and rough surface. Drilling machines: Sensitive, pillar, radial, and portable drilling machines, turret drilling machine gang drilling machine.

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| Module: Drilling | | Module Code: CME 17 | Contact Hours 8hrs/wk |
| Module Specification: Practical Tasks | | | |
| Week | General Objective 1.0: Understand The Working Principles Of Drilling Machine And Use It To Drill Holes On Metals And Other Engineering Materials | | |
| | Specific Learning Outcome: | Teachers Activities | Resources |
| 1-3 | <p>1.1 Practical safety in the work place.</p> <p>1.2 Drill to specification applying the correct lubricant and observing the safety precautions:-</p> <p style="padding-left: 40px;">a. blind hole</p> <p style="padding-left: 40px;">b. holes on round work piece</p> <p style="padding-left: 40px;">c. locating and drilling center holes</p> <p>1.3 Grind drills to the correct angles.</p> | <ul style="list-style-type: none"> • Describe general requirements for safe practical: self and others protection, use of machinery guards, clothing, etc • Demonstrate skills of drilling and allow students to practise till they become competent. • Assess the students • Demonstrate to the students to practise till they become competent. • Assess the students | <ul style="list-style-type: none"> • Film show on safety, safety wears. • Drilling machine and its accessories • Real object in static and running positions. |
| General Objective 2.0: Understand the principle of seating and machine a seating on a hole. | | | |
| Week | Specific Learning Objective: | Teachers Activities | Resources |
| 4-6 | <p>2.1 Seating</p> <p>2.2 Set up tools for counter boring, counter sinking and facing operations</p> <p>2.3 Machine the seating as required for cheese head bolts or screw, counter sunk head screw etc (observe safety precautions)</p> | <ul style="list-style-type: none"> • Demonstrate skills in using the appropriate tools for counter sinking, counter boring etc and allow the students to practice till they become competent. • Assess the students • Explains the functions and constructional details of main component parts. • Demonstration of the operation of the slotted link mechanism. | <ul style="list-style-type: none"> • Counter boring tools, counter sinking tools • Spot facing tools. • Observation of moving and static component parts on shaping machine. • Simulation of slotted link mechanism on model. |

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| Module: Drilling | | Module Code: CME 17 | Contact Hours 8hrs/wk |
| Module Specification: Practical Tasks | | | |
| General Objective 3.0: Understand The Principles Of Reaming And Ream The Hole On Drilling Machine | | | |
| Week | Specific Learning Objective: | Teachers Activities | Resources |
| 7-9 | 3.1 Reamers and Reaming 3.2 Select a reamer and appropriate speed for reaming 3.3 Mount a reamer on a drill chuck 3.4 Ream a hole observing safety precautions 3.5 Clean, oil, grease and adjust slide on slotting machine. | <ul style="list-style-type: none"> • Demonstrate activities and allow the students to practise till they become competent • Assess the students. | <ul style="list-style-type: none"> • Reamers, parallel strips, chuck and key, set of twist drill, center drill, center punch and hammer. |
| General Objective 5.0: Understand The Construction Of Radial Or Pillar Drilling Machine And Their Uses In Drilling Hole | | | |
| Week | Specific Learning Objective: | Teachers Activities | Resources |
| 9-12 | 5.1 Pillar and Radial Drilling machine 5.2 Set the machine for drilling operation using the correct speed and feed 5.3 Drill, counter bore, spot face and tap in one setting using and radial drill machine. | <ul style="list-style-type: none"> • Demonstrate and allow the students to practice till they become competent • Assess the students | <ul style="list-style-type: none"> • Pillar and radial drilling machines and its accessories |
| NTC Assessment Profile: Practical take 60% of overall assessment | | | |