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DIES AND MOULDS MAKER

TRAINER GUIDE

National Vocational Certificate Level 4

Version 1 - August, 2019

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Introduction

Competence-based training helps to bridge the gap between what is taught in training and what tasks will be performed on the job. Training trainees to perform actual job functions helps to ensure that future front-line workers have the skills, knowledge and abilities required to perform their jobs properly, safely and effectively. In addition to competence-based training, assessment based on the performance of actual work competencies helps to ensure that:

- trainees are performing their work tasks as safely as possible
- performance gaps are recognized prior to serious incidents
- training can be implemented to improve competence.

There are significant benefits to competence-based training:

1. **Cost effectiveness**

   Since training activities and assessments in a competence-based approach are goal-oriented, trainers focus on clearly defined areas of skills, knowledge and understanding that their own industry has defined in the competence standards. At the same time, trainees are more motivated to learn when they realize the benefits of improved performance.

2. **Efficiency**

   The transfer gap between the training environment and working on the job is reduced substantially in a competence-based approach. This is because training and assessment are relevant to what needs to be done on the job. As a result, it takes less time for trainees to become competent in the required areas. This, in turn, contributes to improved efficiency where training and assessment are concerned.

3. **Increased productivity**

   When trainees become competent in the competence standards that their own industry has defined, when they know what the performance expectations are and receive recognition for their abilities through successful assessments, they are likely to be more motivated and experience higher job satisfaction. The result is improved productivity for organizations. The communication and constructive feedback between future employers and employees will improve as a result of a competence-based approach, which can also increase productivity.

4. **Reduced risk**

   Using a competence-based approach to training, development, and assessment, employers are able to create project teams of people with complementary skills. A trainee's record of the skills, knowledge and understanding relating to the competence standards they have achieved can be used by a future employer to identify and provide further relevant training and assessment for new skills areas. Competence standards can shape employee development and promotional paths within an organization and give employees the opportunity to learn more competencies beyond their roles. It can also provide organizations with greater ability to scale and flex as needed, thereby reducing the risk they face.

5. **Increased customer satisfaction**

   Employees who have been trained and assessed using a competence-based approach are, by the definition of the relevant competence standards, able to perform the required tasks associated with a job. The knock-on effect is that, in service-related industries, they are able to provide high service levels, thereby increasing customer satisfaction. In production or manufacturing industries, they are able to work closely to industry standards in a more effective and efficient way.

Lesson plans

This manual provides a series of lesson plans that will guide delivery of each module for the Dies & Molds maker qualification. It is important for trainers to be flexible and be ready to adapt lesson plans to suit the context of the subject and the needs of their trainees.

Good teachers acknowledge that CBT means each and every trainee in the class learns at a different speed. The good teacher is prepared to throw aside the day's lesson plan and do something different (and unplanned) for the class even if it means 'writing' a lesson plan for each trainee to match their learning pace for that day or week.

Learning by doing is different from learning theory and then applying it. To learn to do something, trainees need someone looking over their shoulder saying 'it's not quite like that, it's like this', 'you do it like this because …', or even 'tell me why you chose to do it like this?'.

In this way, trainees learn that theoretical knowledge is meaningless if it is not seen in the context of what they are doing. In other words, if a trainee doesn't know why they do something, they will not do it competently (skills underpinned by knowledge = competent performer).

This is how a dies & molds maker acquires a practical grasp of the standards expected. It's not by learning it in theory, but because those standards are acquired through correction by people who show what the standards are, and correct the trainee where they do not meet those standards, and where they repeat it correction until they have internalised those standards.

Demonstration of skill

Demonstration or modeling a skill is a powerful tool, which is used, in vocational training. The instructions for trainers for demonstration are as under:

a) Read the procedure mentioned in the Trainer Guide for the relevant Learning Unit before demonstration.
b) Arrange all tools, equipment and consumable material, which are required for demonstration of a skill.
c) Practice the skill before demonstration to trainees, if possible.
d) Introduce the skill to trainees clearly at the commencement of demonstration.
e) Explain how the skill relates to the skill(s) already acquired and describe the expected results or show the objects to trainees.
f) Carry out demonstration in a way that can be seen by all trainees.
g) Use the same tools and materials that the learner will be using.
h) Go through EACH of the steps involved in performing the skill.
i) Go SLOWLY - describe each step as it is completed.
j) Encourage the learners to move around and watch what you are doing from a number of different angles.

k) Identify critical or complex steps, or steps that involve safety precautions to be followed.
l) Explain theoretical knowledge where applicable and ask questions to trainees to test their understanding.
m) Try to involve the learners: Ask them questions about why they think the process may work that way.
n) Repeat critical steps in demonstration, if required.
o) Summarize the demonstration by asking questions to trainees.

Involvement in the process (actively seeing) is important at this stage. When you work on getting involved, getting people to participate, you make them a part of what is happening. Questions for clarification or explanation are important throughout the demonstration. It is up to the learners to ask questions about things they do not understand, but it is also important for trainers to seek out and elicit questions from learners. A trainer may need to do repeated demonstrations of difficult or complex skills.

Overview of the program

Course: Dies & Molds Makers Level 4	**Total Course Duration:** 6 months
Course Overview:	
The purpose of the Dies and Molds Maker course is to engage young people with a programme of development that will provide them with the knowledge, skills and understanding to start this career in Pakistan. Upon completion of the Dies and Molds maker qualification, students will be ready to join the workforce with a healthy number of options in the production, manufacturing and light engineering sector. The core purpose of this qualification is to produce employable Dies & Molds maker who could perform relevant operations according to national and international standards. In addition, this qualification will prepare unemployable youth to be employed in the light engineering and manufacturing sector.	

Module	Learning Unit	Duration
Module 1: **Aim:**	**LU1:** **LU2:** **LU3:** **LU4:** **LU5:** **LU6:**	
Module 2: Finalize Dies and Mold **Aim:** This standard defines the advanced knowledge, skills and understanding needed to finalize dies & molds and inspect dies & molds as per standard procedure	**LU1:** Interpret drawing and sketches **LU2:** Carryout final assembly according to the sequence **LU3:** Perform die spotting **LU4:** Perform polishing **LU5:** Verify all functions of dies and molds **LU6:** Perform tool trail **LU7:** Inspect dies and molds before delivery **LU8:** Demonstrate safe working practice & house keeping	
Module 3: Fabricate a Die	**LU1:** Interpret drawing **LU2:** Carryout machining process of die components	150 hours

Module	Learning Unit	Duration
Aim: This standard defines the competence is required to manufacture the die according to the Tool Design. Can be manufactured all die parts according to machining competency. The understand knowledge of material & tool Design	**LU3:** Carryout assembly of die **LU4:** Perform inspection	
Module 4: Fabricate a Mold **Aim:** This standard defines the competence is required to manufacture the Mold according to the Tool Design. It will make the candidate able to manufacture all mold parts according to machining competency and understand knowledge of Material & Tool Design.	**LU1:** Interpret drawing **LU2:** Carryout machining process of mold component **LU3:** Carryout assembly of mold **LU4:** Perform inspection	220 hours
Module 5: Carryout maintenance of Dies and Mold **Aim:** This standard defines the knowledge, skills and understanding needed to perform maintenance of dies & molds	**LU1:** Prepare maintenance plan **LU2:** Perform preventive maintenance **LU3:** Perform shutdown / breakdown maintenance	120 hours

FORMAT FOR LESSON PLAN			
Module 2: Finalize dies & molds			
Learning Unit: Interpret drawing & sketches			
Methods	Key Notes	Media	Time
	The tools, material and techniques used for interpret drawing & sketches		
	Introduction		
	This session will introduce learners to the tools, techniques and material used for interpret drawing & sketches, using presentation, demonstration, question and answer, and practical skills development.		
	Main Body		
	• **Mold design details:** o Mold base/ mold shoe. o Ejector system. o Feeding system (Runners & Gates types). o Cavity and Punch. o Cooling system **Die design details:** o Die base. o Punch and die. o Stock guiding system o Striping system o Sheet control system (beads and blank holder).		
	Conclusion		
	To conclude the session, review the tools, techniques and material used for interpreting drawing & sketches. Give learners the opportunity to ask questions.		
	<u>Assessment</u> Question and answer, discussion groups with feedback, observation of practice skills development		
			Total time:

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Module-1

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Trainer's guidelines

Module 1: 071500975 Finalize Dies & Molds			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU1: Interpret drawing & sketches	Deliver an illustrated presentation on how to interpret drawing of dies & molds. Ensure you address the importance of the following points: • **Mold design details:** o Mold base/ mold shoe. o Ejector system. o Feeding system (Runners & Gates types). o Cavity and Punch. o Cooling system o Undercut (split molds) • **Die design details:** o Die base. o Punch and die. o Stock guiding system o Striping system o Sheet control system (beads and blank holder). o Ejector system of components Prepare either: • A flip chart • A PowerPoint slide • A handout …showing key topics for interpret drawing & sketches. Learners need to work in small groups discussing the	Class room / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Die and mold assembly assembly drawing

Module 1: 071500975 Finalize Dies & Molds			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified. Then ask the next group to share the main points they have recorded for the second key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Learners must be able to practice and develop their knowledge and skills relating to die & mold design. Ensure that learners have the opportunity to ask questions to support their understanding. Demonstrate how to extract information from drawing for the students and ensure that students must observe and learn the process Allocate each trainee a task to interpret a particular information from the given drawing		

Module 1: 071500975 Finalize Dies & Molds			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU2: Carryout final assembly according to the sequence	Deliver an illustrated presentation about carry out final assembly according to the sequence. Ensure that the presentation focuses on the following key points • Sequence of fitting a mold • Sequence of fitting a die • Details about guiding system • Details about ejection system, stripper & feeding system In the end of the presentation include some multiple choice questions for the feedback of students After the presentation take the students to the workshop and show them how to assemble a simple die or mold and ensure that all students can clearly observe the sequence and method of fitting Encourage them to ask the questions. Allocate each trainee a task to perform assembly of different components for a die or mold and continue monitor that each students has properly understood the method and performed the required job Enable learners to practice using the appropriate tools and equipment for carrying out assembly & disassembly in a controlled environment.	Class room / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Dies and mold assembly Hoist crane Screw driver set Spanner set Allen key set Fitting bench Fasteners Clamping devices Touching color Wax /plasticine Feeler gauge Hammer Mallet File set Needle file set Pin grinder

Module 1: 071500975 Finalize Dies & Molds			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU3: Perform die spotting	Deliver an illustrated presentation about perform die spotting. Ensure that the presentation focuses on the following key points: • basic components of tool • Know the method of mounting and clamping the tool on a die spotting machine • Knowledge of bearing faces • Method of die spotting After the presentation divide the class into two or more groups. Assign a key topic to each group. Learners need to work in their groups discussing the topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record their points. Ask the group to share the main points they have recorded. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified. Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics. After the activity demonstrate the complete procedure of die spotting in front of all students. Ask students to observe all the process Learners must be able to practice and develop their knowledge and skills relating to die spotting in an appropriate practical setting.	Class room / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Die spotting machine Hoist crane Screw driver set Spanner set Allen key set Fitting bench Fasteners Clamping devices Touching color Feeler gauge Mallet File set Needle file set Pin grinder

Module 1: 071500975 Finalize Dies & Molds			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU4:Perform polishing	Deliver an illustrated presentation about performing polishing. Ensure that the presentation focuses on the following key points: • Surface finishing grades and unit • Polishing aids and techniques • Abrasive grit size concept • Method of protecting surfaces not required to polish • Safe procedure of polishing After the presentation divide the class into two or more groups. Assign a key topic to each group. Learners need to work in their groups discussing the topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record their points. Ask the group to share the main points they have recorded. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified. Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics. After the activity demonstrate the complete procedure of polishing in front of all students. Ask students to observe all the process. Learners must be able to practice and develop their	Class room / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Oil stone Polishing sticks Polishing abrasive Polishing paste Polishing kit Polishing machine Emery papers

Module 1: 071500975 Finalize Dies & Molds			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	knowledge and skills relating to perform polishing in an appropriate practical setting.		
LU5: Verify all functions of dies & molds	Begin this session with an illustrated presentation on verifying all functions of dies & molds. Ensure that the presentation addresses the following points: • Attributes of a die and mold guiding system • Methods of maintaining mold temperature. **Methods:** cooling channels, heaters etc. • Types of gates and runners. • Types of punches or moving parts. **Types:** inserts, hydraulic punches, sliders, undercut, inclined pillars, dog legs etc. After presentation, take the students in workshop and make them to identify different systems & their functions of dies & molds Demonstrate them how to check & verify the functions Arrange a question and answer session to clarify trainees understanding. To prepare for the practical sessions, allocate each trainee a simple die or mold and ask them to demonstrate how to verify the functions as demonstrated Check that each trainee understands their task. After the practical sessions are complete, lead a feedback session. Ask learners to complete a self-assessment form on	Class room / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Simple die Simple molds with external punches & sliders

Module 1: 071500975 Finalize Dies & Molds			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	their ability to verify the functions of dies & molds Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions		
LU6: Perform tool trial	Deliver an illustrated presentation about how to perform tool trial. Ensure that the presentation focuses on the following key points: • Types of molding machines. **Types:** horizontal and vertical injection machines, blow molding machine, hand molding machine • Types of die press **Types:** mechanical, hydraulic. • Material handling devices i.e. tool trolley, chain hoist, stacker etc. • Method of loading a mold on injection molding machine • Method of connecting external attachments i.e. cooling system, heating system, hydraulic cores etc. • Types of materials used for trial purpose of a mold. • Knowledge of troubleshooting • Knowledge of adjusting machine parameters i.e. clamping force, material melting temperature, injection pressure etc. In the end of the presentation include some multiple choice questions for the feedback of students	Class room / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Injection molding machines Blow molding machine Blow mold Injection mold Press tool Mechanical press Hydraulic press

Module 1: 071500975 Finalize Dies & Molds			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	After the presentation take the students to the workshop and demonstrate them how to perform tool trial and ask trainees individually to repeat the task Continue monitor that each students has properly understood the method and performed the required job		

Module 1: 071500975 Finalize Dies & Molds			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU7: Inspect dies & molds before delivery	Deliver an illustrated presentation about inspection of dies & molds before final delivery to the customer. Ensure that the presentation focuses on the following key points: • Check points for a finalized die and mold before delivery for production or client. • Importance of safety / holding strips • lifting provision in a mold • Description of locating ring / shank size. • Description of ejector rod provision • How to prepare a check list In the end of the presentation include some multiple choice questions for the feedback of students After the presentation take the students to the workshop and show them what are the critical check points that need to be checked for any die or mold that is ready for delivery. Ensure that all students can clearly observe the process and encourage them to ask the questions	Class room / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Check list

LU8: Demonstrate safe working practice & housekeeping	Lead a brainstorm on ways to demonstrate safe working practice & housekeeping. Use ideas from the brainstorm to explain the following key points: • Hazards associated with dies & molds shop • How to maintain cleanliness & housekeeping • Why should we maintain cleanliness & demonstrate safety all the times • Manual handling safety Display a flip chart showing the following key question: *'What are the challenges when demonstrate safe working practice and maintain housekeeping specific to dies & molds assembly?'* Give each learner a sheet of paper and asked them to write their name at the top. Explain to learners that they will be sharing their work with other learners. Ask learners to write silently for 3-5 minutes answering the question displayed on the flip chart. When learners have completed writing, instruct them to pass their paper to the learner on their left. Each learner will read what their partner has passed to them and write a response. This will also be done silently. After another 2-3 minutes, instruct the learners to pass the paper to their left a second time. Repeat the same procedure, also done in silence. At the end of the activity, ask the learners to return the paper to the original writer. Allow learners a few moments to read over the responses to their writing. Ask learners to work in pairs to reflect on and discuss the responses to the question on the flip chart. When this activity is concluded, collect the papers and make copies for each learner.	Class room / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers PPEs

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Module-2

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Module 2: 071500976 Fabricate a die			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU1: Interpret drawing	Deliver an illustrated presentation about how to interpret drawing. Ensure that the presentation focuses on the following key points: • Interpretation of a die assembly drawing to make BOM • Identification of different machining processes i.e. lathe, milling, grinding, boring etc. • Knowledge of heat treatment processes used for die making • Description of surface finish grades • Description of types of standard fasteners i.e. Nut and bolts, washers, dowel pins etc. • Types of tolerances • Types of fits In the end of the presentation include some multiple choice questions for the feedback of students After the presentation take the students to the drawing studio (use classroom) interpret the drawing with the students and identify the machining process & lifting equipment to be used. Ensure that all students can clearly observe the process and encourage them to ask the questions Ask each trainee to interpret a simple die or mold design and continue monitor that each students has properly understood the method	Class room / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Tool designs Assembly & sub assembly drawing of dies

LU2: Carryout machining process of die components	Lead a discussion about machining process of die components. Use real examples to support the discussion and ensure the discussion considers: • Use of general measuring tools. Scale, measuring tape, Vernier caliper etc. • Different types of machining processes used for die manufacturing **Machines:** lathe, milling, surface and cylindrical grinding, drilling and boring, Special Purpose Machines (SPM) i.e. EDM Wire cut, CNC etc. • Heat treatment process used in die fabrication • Interpretation of tool assembly drawing • Know the use of inspection tools Prepare either: • A flip chart • A PowerPoint slide • A handout …showing key topics for machining processes for die fabrication. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified.	Class room / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Tool room machine shop setup Measuring and Inspection Tools

	Then ask the next group to share the main points they have recorded for the second key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Learners must be able to practice and develop their knowledge and skills relating to machining process of die making Ensure that learners have the opportunity to ask questions to support their understanding.		
LU3: Carry out assembly of a die	Deliver an illustrated presentation on carrying out assembly of die. Ensure that the presentation focuses on the following key points • Basic components of a die. **Components**: punch plate, punch back plate, die plate, Die back plate, striper plate, springs, cushions, guide pillar and bushes, pressure pad, knock out pin, polyurethane, Gas spring, drawing beads, blank holder, pilots, guides • Assembly sequence for a press tool In the end of the presentation include some multiple choice questions for the feedback of students After the presentation take the students to the workshop and show them how to assemble a die Ensure that all students can clearly observe the process and encourage them to ask the questions. Allocate each trainee a task to assemble a part according to the given drawing and continue monitor that each students has properly understood the	Class room / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Parts of die Hoist crane Screw driver set Spanner set Allen key set Fitting bench Fasteners Clamping devices Touching color Feeler gauge Hammer (8-10lb) Mallet File set

	method and performed the required job		Needle file set Pin grinder
LU4: Perform inspection	Lead a discussion about why inspection is needed and how to perform final inspection. Use real examples to support the discussion and ensure the discussion considers: • Knowledge of cutting clearances • Method of mounting die on press • Method of checking clearance • Method of physical inspection of draw and cutting components • Knowledge of dimensional inspection • Knowledge of filling data sheet related to dimensional inspection Prepare either: • A flip chart • A PowerPoint slide • A handout …showing key topics for performing final inspection. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified. Then ask the next group to share the main points they have recorded for the second key topic. Repeat the	Class room / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Press tools Die spotting machine Measuring tools Inspection gauges

	discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Learners must be able to practice and develop their knowledge and skills relating to performing final inspection Ensure that learners have the opportunity to ask questions to support their understanding.		

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Module 3: 071500978 Fabricate a mold			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU1: Interpret drawing	Deliver an illustrated presentation about how to interpret drawing. Ensure that the presentation focuses on the following key points: • Interpretation of a mold assembly drawing to prepare BOM • Machining processes used for mold design **Machines:** lathe, milling, planner / shaper, surface and cylindrical grinding, drilling and boring, SPM etc. • Heat treatment processes used for molds' parts • Surface finish grades requirement for mold • Different types of standard fasteners i.e. Nut and bolts, washers, dowel pins etc • Knowledge of limit, fits & tolerances In the end of the presentation include some multiple choice questions for the feedback of students After the presentation take the students to the drawing studio (use classroom) interpret the drawing with the students and identify the machining process & lifting equipment to be used Ensure that all students can clearly observe the process and encourage them to ask the questions Ask each trainee to interpret a simple die or mold design and continue monitor that each students has	Class room / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Assembly, sub assembly & part drawing

Module 3: 071500978 Fabricate a mold			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	properly understood the method		
LU2: Carryout machining process of mold components	Lead a discussion about machining process of mold components. Use real examples to support the discussion and ensure the discussion considers: • Use of general measuring tools. Scale, measuring tape, Vernier caliper etc. • Different types of machining processes used for die manufacturing **Machines:** lathe, milling, surface and cylindrical grinding, drilling and boring, Special Purpose Machines (SPM) i.e. EDM Wire cut, CNC etc. • Heat treatment process used in mold making • Interpretation of mold assembly drawing • Know the use of inspection tools Prepare either: • A flip chart • A PowerPoint slide • A handout …showing key topics for machining processes for mold fabrication. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask	Class room / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Mold drawing Raw material Tool room machines with all standard accessories

Module 3: 071500978 Fabricate a mold			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	one group to share the main points they have recorded for the first key topic. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified. Then ask the next group to share the main points they have recorded for the second key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Learners must be able to practice and develop their knowledge and skills relating to machining process of mold components. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU3: Carry out assembly of a mold	Deliver an illustrated presentation on carrying out assembly of die. Ensure that the presentation focuses on the following key points • Basic components of a mold **Components**: cavity plate, cavity back plate, guide pillar and bushes, punch, punch plate, spacer, ejector pins, ejector plates, push backs, ejector back plates, sliders, inclined pillars • Assembly sequence for a mold In the end of the presentation include some multiple choice questions for the feedback of students	Class room / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers A disassembled mold Spanner set Keys Standard fasteners Hoist crane

Module 3: 071500978 Fabricate a mold			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	After the presentation take the students to the workshop and show them how to assemble different parts of mold Ensure that all students can clearly observe the process and encourage them to ask the questions. Allocate each trainee a task to assemble a part according to the given drawing and continue monitor that each students has properly understood the method and performed the required job		Screw driver set Spanner set Allen key set Fitting bench Fasteners Clamping devices Touching color Feeler gauge Hammer (8-10lb) Mallet File set Needle file set Pin grinder
LU4: Perform inspection	Lead a discussion about why inspection is needed and how to perform final inspection. Use real examples to support the discussion and ensure the discussion considers: • Method of checking clearance • Method of physical inspection of draw and cutting components • Knowledge of dimensional inspection • Knowledge of filling data sheet related to dimensional inspection • Method of mounting mold on a spotting machine press.	Class room / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers A simple mold Spotting press Spotting strips / color Measuring tools

Module 3: 071500978 Fabricate a mold			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Method of checking gap between punch and cavity. • Purpose of bearing faces, parting lines, slides removable cores • Method of checking the cooling system • Method of spotting a mold Prepare either: • A flip chart • A PowerPoint slide • A handout …showing key topics for performing final inspection. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified. Then ask the next group to share the main points they have recorded for the second key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Learners must be able to practice and develop their		Inspection gauges

Module 3: 071500978 Fabricate a mold			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	knowledge and skills relating to perform final inspection Ensure that learners have the opportunity to ask questions to support their understanding.		

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Module 4: 071500979 Carry out maintenance of dies & molds			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU1: Prepare maintenance plan	Deliver an illustrated presentation on how to prepare maintenance plan. Ensure you address the importance of the following points: • Types of dies and molds. **Molds:** single cavity, multi cavity, slider, three plate etc. **Dies:** single operation die (blanking / piercing etc.), compound die, progressive die, forming die, deep drawing die etc. • Checklist for a mold / die. Prepare either: • A flip chart • A PowerPoint slide • A handout …showing the key topics about preparing a maintenance plan as mentioned above. Go through all the key topics briefly and then allocate **one key topic** to each group. Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**. After the discussion, begin the feedback session. Ask	Class room / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers Different types of dies and molds Computer station with printer

Module 4: 071500979 Carry out maintenance of dies & molds			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for prepare material for heat treatment. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified. Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. Demonstrate students how to prepare maintenance plan. Learners must be able to practice and develop their knowledge and skills relating to prepare maintenance plan Ensure that learners have the opportunity to ask questions to support their understanding		
LU2: Perform preventive maintenance	Deliver an illustrated presentation about. Ensure that the presentation focuses on the following key points: • Understand routine maintenance chart • Effect & disadvantages of dirt, moist or dust on metal parts.	Class room / Demonstration room Workshop	Multimedia Handouts Learner's guide White board

Module 4: 071500979 Carry out maintenance of dies & molds			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Method of replacing parts • Method and advantages of lubrication of a mold • Know the importance of marking the mold and its components and store at designated place properly • Method of preparing preventive maintenance check list • Knowledge of maintenance cooling channels • Method of reporting mold maintenance activities After the presentation divide the class into two or more groups. Assign a key topic to each group. Learners need to work in their groups discussing the topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record their points. Ask the group to share the main points they have recorded. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified. Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics. Learners must be able to practice and develop their knowledge and skills relating to perform preventive maintenance of dies & molds in an appropriate		Board markers A simple assembly of die or mold Measuring tools

Module 4: 071500979 Carry out maintenance of dies & molds			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	practical setting. Ensure that learners have the opportunity to ask questions to support their understanding		
LU3: Perform shut down / breakdown maintenance	Deliver an illustrated presentation about shutdown/breakdown maintenance. Ensure that the presentation focuses on the following key points • Knowledge of shut down or breakdown maintenance and its importance • Different possible causes of damages to a mold i.e. damage, broken parts, wear out etc. • Sequence of disassemble a mold • Method of replacing damaged parts of mold and safety measures • Method of reporting mold maintenance activities In the end of the presentation include some multiple choice questions for the feedback of students After the presentation take the students to the workshop and show some damaged mold's or die parts if available & ask the possible reasons. Ensure that all students can clearly observe all the steps. Encourage them to ask the questions.	Class room / Demonstration room Workshop	Multimedia Handouts Learner's guide White board Board markers A malfunctioned die or mold (if available) Measuring tools Fastening tools

DIES AND MOULDS MAKER

Module-5

TRAINER GUIDE

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Module 5: <insert module title here>			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU1:			
LU2:			
LU3:			
LU4:			

DIES AND MOULDS MAKER

Module-6

TRAINER GUIDE

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Module 6: <insert module title here>			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU1:			
LU2:			
LU3:			
LU4:			

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Module-7

TRAINER GUIDE

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Module 7: <insert module title here>			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU1:			
LU2:			
LU3:			
LU4:			

DIES AND MOULDS MAKER

Module-8

TRAINER GUIDE

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Version 1 - August, 2019

Module 8: <insert module title here>			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU1:			
LU2:			
LU3:			
LU4:			

DIES AND MOULDS MAKER

Module-9

TRAINER GUIDE

National Vocational Certificate Level 4

Version 1 - August, 2019

Module 9: <insert module title here>			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU1:			
LU2:			
LU3:			
LU4:			

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Module-10

TRAINER GUIDE

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Module 10: <insert module title here>			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU1:			
LU2:			
LU3:			
LU4:			

Frequently Asked Questions

1. What is Competency Based Training (CBT) and how is it different from currently offered trainings in institutes?	Competency-based training (CBT) is an approach to vocational education and training that places emphasis on what a person can do in the workplace as a result of completing a program of training. Compared to conventional programs, the competency based training is not primarily content based; it rather focuses on the competence requirement of the envisaged job role. The whole qualification refers to certain industry standard criterion and is modularized in nature rather than being course oriented.
2. What is the passing criterion for CBT certificate?	You shall be required to be declared “Competent” in the summative assessment to attain the certificate.
3. How can I progress in my educational career after attaining this certificate?	You shall be eligible to take admission in the National Vocational Certificate Level-3 in Dies & Molds Maker. You shall be able to progress further to National Vocational Certificate Level-4 in Dies & Molds Maker; and take admission in a level-5, DAE or equivalent course. In certain case, you may be required to attain an equivalence certificate from The Inter Board Committee of Chairmen (IBCC).
4. What is the importance of this certificate in National and International job market?	This certificate is based on the nationally standardized and notified competency standards by National Vocational and Technical Training Commission (NAVTTC). These standards are also recognized worldwide as all the standards are coded using international methodology and are accessible to the employers worldwide through NAVTTC website.
5. Which jobs can I get after attaining this certificate? Are there job for this certificate in public sector as well?	Dies and Mold makers are employed in the manufacturing engineering and production sector especially in automobile, house hold goods, electrical and electronics appliances etc. Experienced Dies and mold makers may advance through promotions with the same employer or by moving to more advanced positions with other employers. They can become: • Domestic dies and molds maker

	• Industrial dies and molds maker • Dies and molds maintenance technicians • Machinist • Dies and molds shop foreman • Supervisor • Managers
6. What are possible career progressions in industry after attaining this certificate?	You shall be able to progress up to the level of supervisor after attaining sufficient experience, knowledge and skills during the job. Attaining additional relevant qualifications may aid your career advancement to even higher levels. Some experienced Dies and molds makers achieve a highly respected level of salaries. There are good prospects for travel both within Pakistan and abroad. The employment outlook in this occupation will be influenced by a wide variety of factors including: • Trends and events affecting overall employment (especially in the manufacturing industry) • Location in Pakistan • Employment turnover (work opportunities generated by people leaving existing positions) • Occupational growth (work opportunities resulting from the creation of new positions that never existed before) • Size of the industry • Flexibility of the applicant (concerning location and schedule of work)
7. Is this certificate recognized by any competent authority in Pakistan?	This certificate is based on the nationally standardized and notified competency standards by National Vocational and Technical Training Commission (NAVTTC). The official certificates shall be awarded by the relevant certificate awarding body.

8. Is on-the-job training mandatory for this certificate? If yes, what is the duration of on-the-job training?	On-the-job training is not a requirement for final / summative assessment of this certificate. However, taking up on-the-job training after or during the course work may add your chances to get a job afterwards.
9. What is the examination / assessment system in this program?	Competency based assessments are organized by training institutes during the course which serve the purpose of assessing the progress and preparedness of each student. Final / summative assessments are organized by the relevant qualification awarding bodies at the end of the certificate program. You shall be required to be declared "Competent" in the summative assessment to attain the certificate.
10. Does this certificate enable me to work as freelancer?	You can start your small business as a Dies & Molds Maker. You may need additional skills on entrepreneurship to support your initiative.

Short Questions/Answers:

Write at least 10 basic components of a Tool set?	The key components of molds and dies are cavity, punch, guide pillars, guide bushes, Tool locating ring, sprue bush, ejector pins, return pins (Push Back), Plates, pressure pad and blank holder.
What are bearing faces?	The bearing faces are the mating surfaces of the mold and dies, it is also known as shut off faces
Write types of fits	Slide fit, press fit, loose fit, interfering fits
Define Sprue, Runner and gates	Sprue: A Sprue is a channel through which molten plastic is injected into the mold by mean of injection nozzle. Runner: A runner is channel that guides molten plastic into the cavity of mold Gate: A gate is an entrance through which molten plastic enters into the cavity.
What are the specific factor for the quality of molded parts	Material, Design, Mold, Condition, Molding machine, Environment
What is the function of ejection system?	The ejection system is used to eject the component from the mold. Usually located at moving part of the mold.
What is sink mark on a plastic component?	This is a dent appeared on the surface of the product. It is often observed on crystalline Plastics with a high shrinkage rate. Whae there is a rib at the back of the surface a sink mark is created on the surface.
What is warpage?	This is when the part is wraps or twisted on removal from the mold.
Define the formula for calculating cutting force for a die?	$F = A \times T\beta$ F= Cutting Force

	S= Material Thickness L= Total cutting length A = L x S = Shearing Area Tβ = Shearing strength of the material

Test Yourself (Multiple Choice Questions)

MODULE	**2**			
Question	**1**	Which produces moulding external shape	A	Punch or Core
			B	Cavity
			C	Runner
			D	Sprue
	2	Molten material injected into the impression through	A	Core
			B	Sprue Bush
			C	Locating Ring

			D	Core or Punch Plate
	3	In blanking clearance is provided on	A	Punch
			B	Die
			C	Die and Punch
			D	None of the above

Question	**4**	Channel connecting runner to the impression is known as	A	Side core
			B	Gate
			C	Insert
			D	Cavity
Question	**5**	Thin cylindrical moulding ejected with	A	Sleeve Ejection
			B	Blade Ejection
			C	Air Ejection
			D	Pin Ejection
Module	**3**			

Question	**6**	What are the basic components of a die and mold assembly	A	Punch and die
			B	Punch and die set
			C	Die and bolster plate
			D	Ram and punch
Question	**7**	What is the purpose of a stripper on a die?	A	Feeds the material to the next progression
			B	Reduces the material thickness by 1/3
			C	Removes material from the punch
			D	Pierces holes and openings in the material

Question	**8**	The main function of the air cushion is to:	A	Control metal flow
			B	Provide resistance
			C	Remove dirt from the die and piece part
			D	Knock slugs from the die blocks
Question	**9**	What is the function of pilots in a progressive die?	A	Pierce holes in the strip
			B	Align the strip to the proper location before the spring stripper or Punches clamp the part to the die block
			C	Cut the scrap into manageable lengths
			D	Clamp the strip in place before the die block enters the strip

Question	**10**	The main function of the guide Pillars (leader pins) on a die set is:	A	Nest the part in the die block
			B	Align the ram of the press to the bolster plate
			C	Keep both halves of the die set aligned
			D	Act as stop blocks for correct shut height adjustment

Multiple Choice Questions Answers Scheme

MODULE	**2**			
Question	**1**	Which produces moulding external shape	B	Cavity
	2	Molten material injected into the impression through	B	Sprue Bush
	3	In blanking clearance is provided on	A	Punch
Question	**4**	Channel connecting runner to the impression is known as	B	Gate
Question	**5**	Thin cylindrical moulding ejected with	A	Sleeve Ejection
Module	**3**			
Question	**6**	What are the basic components of a die and mold assembly	A	Punch and die
Question	**7**	What is the purpose of a stripper on a die?	C	Removes material from the punch
Question	**8**	The main function of the air cushion is to:	A	Control metal flow

Question	**9**	What is the function of pilots in a progressive die?	B	Align the strip to the proper location before the spring stripper or Punches clamp the part to the die block
Question	**10**	The main function of the guide Pillars (leader pins) on a die set is:	C	Keep both halves of the die set aligned

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