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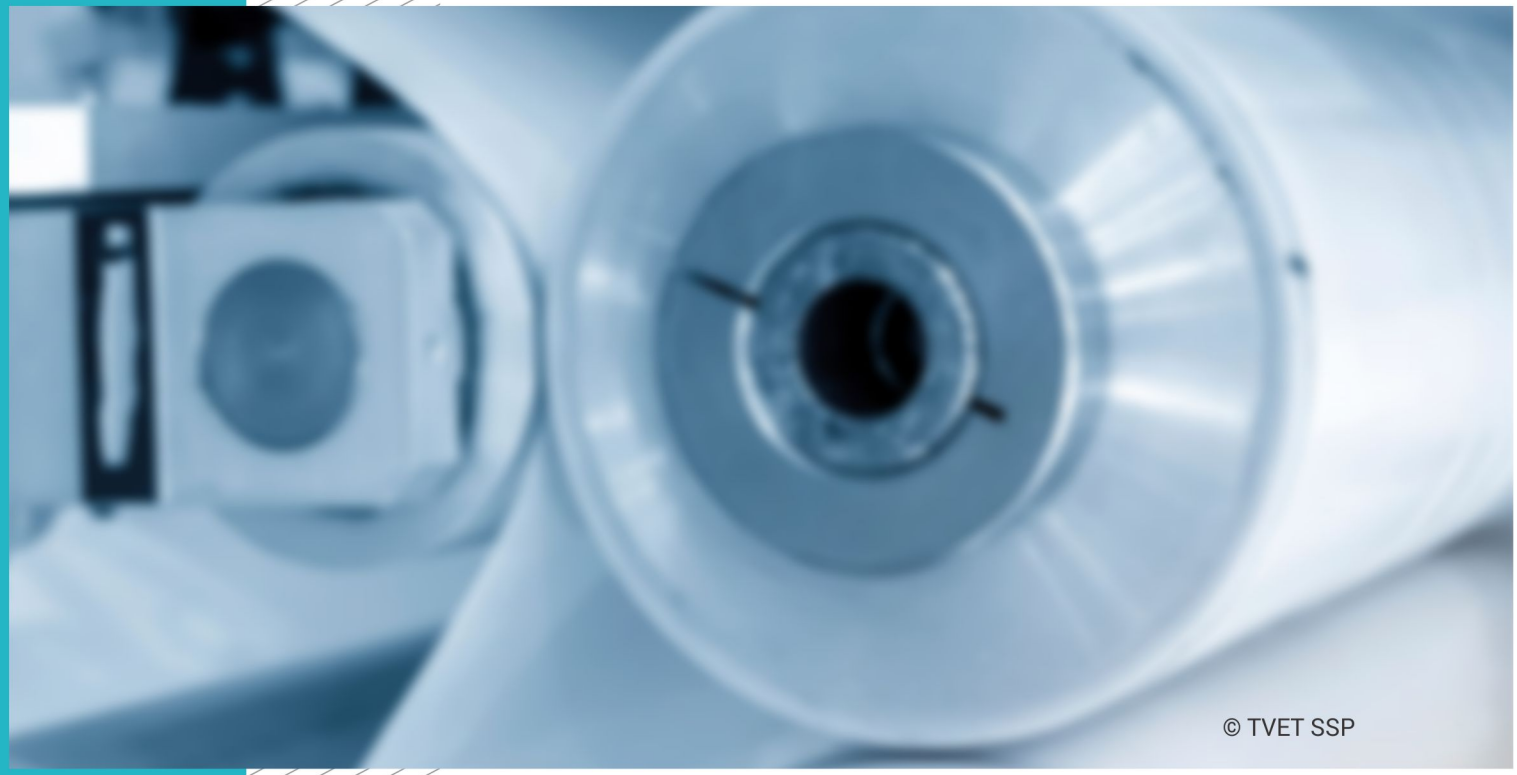
PLASTIC PROCESSOR



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CBT CURRICULUM

National Vocational Certificate Level 3

Version 1 - September, 2018

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Contents

Introduction

Plastics processing machine operators set up and operate plastic mixing, calendaring, extruding and moulding processing machines used in the manufacture of plastic parts and plastic products. They are employed by plastic products manufacturing companies to monitor machines used to manufacture plastic products. Operators check the computer-controlled machines run efficiently. The work also involves making quality checks.

Typical plastic products include:

- Parts of Electronic products
- Automotive parts
- Bottles
- Packaging films
- Pipes
- Tupperware, etc.

To become a Plastic Processor, a candidate will need to:

- Be willing to do repetitive work
- Enjoy practical work with machinery
- Pay strict attention to health and safety regulations, and carry out necessary safety checks carefully
- Be reasonably fit, as you could spend most of each day on your feet

Safety is important at all times. There are risks of injury working with moving machine parts, flying chips, sharp edges and extreme heat from heated materials. Plastic Processors may also be lifting and moving heavy components. Precautions are required while working with manufacturing chemicals, airborne irritants, toxic lubricants and cleaners.

This level (3) of training is aimed at individuals having cleared Level 2 of the same course and are willing to advance into this trade. Hence, it is designed to introduce and provide intermediate level training to candidates.

Description of the training program for Plastic Processor:

Plastic Processor curriculum will prepare students to efficiently operate plastic processing machines such as injection moulding, compression, and extrusion, and to perform basic preventive maintenance on most types of plastic processing machines and equipment. Coursework

includes Safety, Plastic moulding Machines operations, grades, Legal & environmental concerns & equipment maintenance. Graduates of this program may find employment with state and local government agencies and private contractors engaged in manufacturing or other plastic processing activities.

Purpose of the training program:

The purpose of the training is to provide skilled manpower to improve the existing capacity of manufacturing sector. This training will provide the requisite skills to the trainees to operate plastic processing Machines. It will enable the participants to meet challenges in the field of plastic manufacturing industry. Further, to improve skill level of machine operators and prepare them for plastic manufacturing industry by meeting the market competition nationally and internationally.

The core purpose of this qualification is to produce employable Plastic Processors/Machine Operators who could operate plastic processing machines according to national and international standards. In addition, this qualification will prepare untrained youth for employment in plastic processing sector.

Overall objectives of training program:

The overall objectives of the Plastic Processor program are:

- Working safely and professionally
- Read & interpret technical parameters/documentation, plan and organize work processes, identify necessary materials and tools;
- Perform tasks with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional knowledge, core skills & employability skills while performing the job, and repair & maintenance work.
- Check the job with circuit diagrams/components as per drawing for functioning, diagnose and rectify faults in the components/module.
- Document the technical parameters in tabulation sheet related to the task undertaken.

Competencies to be gained after completion of course:

At the end of the course, the trainee must have attained the following competencies:

- Apply Work Health and Safety Practices (WHS)
- Identify and Implement Workplace Policy and Procedures
- Communicate at Workplace
- Perform Computer Application Skills
- Manage Personal Finances

- Operate Injection Moulding Machine for Production
- Operate Pipe Extrusion Machine
- Operate Compression Moulding Machine
- Operate Blow Moulding Machine

Possible job opportunities available immediately and later in the future

The positive impact of Plastic on our everyday lives is quite unlike any other material. From medical, automotive and aerospace applications, right through to packaging, construction and agriculture, plastics have enabled progression and change in a variety of industries. It can often be seen (or rather 'hidden') as an industry behind industries, providing technological advances that benefit many fields and promote innovation.

Upon Completion of the course, depending on achieved level, successful candidates can opt for the following roles:

1. Process Operator
2. Process Technician
3. Process/Machine Tool Setter/Fitter

There are several sub-sectors in the plastic industry in which a Plastic Processor can later get employed in:

- Raw Materials Sector:

A role in this 'upstream' area of the industry could range from exciting colour chemistry through to hands on manufacturing of raw material (polymers), helping to supply downstream users with the ingredients and tools to innovate for everyday life.

- Machinery Sector:

This sector provides the nuts and bolts for those looking to mould and shape raw materials into useful products. Furthermore, this sector also provides key equipment to the raw materials sector, as well as recycling, helping the industry full circle to further its sustainability credentials. A career in this sector could range from the manufacture of machinery (an exciting opportunity for budding engineers!) to the sale and supply of key ancillary equipment to aid moulding and testing of products. As we move to the future, 3D printing looks set to play an ever more prominent role in this sector too.

- Processing Sector:

This is the real 'meat and bones' of the Plastics Industry, where raw materials are converted into the finished product applications that we encounter today. Whether it's your computer screen housing, a steering wheel or specialist aerospace parts, a career in this sector can provide a tangible and visible effect on everyday life. Engineers, apprentices, graduates and need to look no further for a fulfilling career providing products that benefit and drive growth.

- Recycling Sector:

Arguably the 'youngest' sector of the industry, recycling has come a long way over the years in terms of detection, separation and increased volumes. Seeking to 'close the loop' and increase the sustainability (and self-sufficiency) of the Plastics Industry as a whole, this sector involves the collection, recycling and reuse of plastics which have reached their end of life. This could range from short life application plastics (i.e. food packaging or bottles) to longer life application plastics (i.e. window frames or cars). Through its inherent goal to increase sustainability, a career in the recycling industry could have a real positive impact on the world.

Trainee entry level

Title	Entry Requirements
National Vocational Certificate level 3, in "Plastic Processor" (0722 PPP 020)	Entry for assessment for this qualification is open. However, entry into formal training institutes, based on this qualification may require skills and knowledge equivalent to middle and NVC level 2 in "Plastic Processor"

Minimum qualification of trainer

Should have **at least** NVQF level 4 and above or at least three years' experience in the role of Plastic Processor in Plastic Processing. Or D.A.E / B-Tech and having 3 years academic experience & at least 5 years industrial experience

They should also hold or be working towards a formal teaching qualification.

Other formal qualifications in the plastic industry would be useful in addition to the above (B.E. in Polymer Engineering, Advanced Materials Engineering, etc.).

Recommended trainer: trainee ratio

The recommended maximum trainer: trainee ratio for this programme is 1 trainer for 20 trainees.

Medium of instruction i.e. language of instruction

Instruction will be Urdu and English

Duration of the course (Total time, Theory & Practical time)

This curriculum comprises 9 modules divided comprises of generic and technical competencies. The recommended delivery time is 800 hours. Delivery of the course could therefore be full time, 5 days a week, for 6 months. Training providers are at liberty to develop other models of delivery, including part-time and evening delivery.

The full structure of the course is as follows:

Module	Theory hours	Workplace hours	Total hours
Module 1: Apply Work Health and Safety Practices (WHS)	6	24	30
Module 2: Identify and Implement Workplace Policy and Procedures	4	16	20
Module 3: Communicate at Workplace	6	24	30
Module 4: Perform Computer Application Skills	8	32	40
Module 5: Manage Personal Finances	6	24	30
Module 6: Operate Injection Moulding Machine for Production (072200915)	35	140	175
Module 7: Operate Pipe Extrusion Machine (072200916)	30	120	150
Module 8: Operate Compression Moulding Machine (072200917)	30	120	150
Module 9: Operate Blow Moulding Machine (072200918)	35	140	175

Sequence of the modules

This qualification is made up of 9 modules. Five modules relate to health and safety, basic literacy, basic communication skill, professionalism, for example Module 1: Apply Work Health and Safety Practices (WHS); or Module 4: Perform Computer Application Skills. A suggested distribution of these modules is presented below. This is not prescriptive and training providers may modify this if they wish.

The rest of the modules are technical trainings in nature and should be taught as per designed program. Modules have been progressively positioned in the table below, e.g., Module 6: Operate Injection Moulding Machine for Production is a pre-requisite for Module 7: Operate Pipe Extrusion Machine.

Each module covers a range of learning components. These are intended to provide detailed guidance to teachers (for example the Learning Elements component) and give them additional support for preparing their lessons (for example the Materials Required component). The detail provided by each module will contribute to a standardised approach to teaching, ensuring that training providers in different parts of the country have clear information on what should be taught.

<table>
<tr><td>Module 6: Operate Injection Moulding Machine for Production</td><td rowspan="2">Module 1: Apply Work Health and Safety Practices (WHS)</td><td rowspan="3">Module 4: Perform Computer Application Skills</td></tr>
<tr><td rowspan="2">Module 7: Operate Pipe Extrusion Machine</td></tr>
<tr><td>Module 3: Communicate at Workplace</td></tr>
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<tr><td>Module 9: Operate Blow Moulding Machine</td></tr>
</table>

Summary – overview of the curriculum

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 1: Apply Work Health and Safety Practices (WHS) **Aim:** This unit describes the skills to work with safety and participate in hazard assessment activities, follow emergency procedures and participate OHS practices in process	**LU1.** Implement safe work practices at work place **LU2.** Participate in hazard assessment activities a work place **LU3.** Follow emergency procedures at workplace **LU4.** Participate in OHS consultative processes	6	24	30
Module 2: Identify and Implement Workplace Policy and Procedures **Aim:** This unit describes the skills and knowledge required to develop and implement a workplace policy & procedures and to modify the policy to suit changed circumstances. It applies to individuals with managerial responsibilities who undertake work developing approaches to create, monitor and improve strategies and policies within workplaces and engage with a range of relevant stakeholders and specialists.	**LU1.** Identify workplace policy & procedures **LU2.** Implement workplace policy & procedures **LU3.** Communicate workplace policy & procedures **LU4.** Review the implementation of workplace policy & procedures	5	15	20

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 3: Communicate at Workplace **Aim:** This unit describes the performance outcomes, skills and knowledge required to develop communication skills in the workplace. It covers gathering, conveying and receiving information, along with completing assigned written information under direct supervision.	**LU1.** Communicate within the organization **LU2.** Communicate outside the organization **LU3.** Communicate effectively in workgroup **LU4.** Communicate in writing	6	24	30

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 4: Perform Computer Application Skills **Aim:** This unit describes the skills and knowledge required to use spreadsheet applications, prepare in page documents, develops familiarity with Word, Excel, Access, PowerPoint, email, and computer graphics basics. It applies to individuals who perform a range of routine tasks in the workplace using a fundamental knowledge of spreadsheets, Microsoft office and computer graphics in under direct supervision or with limited responsibility	**LU1.** Prepare In-page documents as per required information **LU2.** Prepare Spreadsheets as per required information **LU3.** Use MS Office as per required information **LU4.** Perform computer graphics in basic applications **LU5.** Create Email account for communications	8	32	40

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 5: Manage Personal Finances **Aim:** This unit of competency describes the outcomes required to manage develop, implement and monitor a personal budget in order to plan regular savings and manage debt effectively.	**LU1.** Develop a personal budget **LU2.** Develop long term personal budget **LU3.** Identify ways to maximize future finances	6	24	30
Module 6: Operate Injection Moulding Machine **Aim:** This competency standard is designed to provide skills and knowledge to operate injection moulding machine in accordance with the manufacturer's manual.	**LU1:** Adjust Moulding machine parameters **LU2:** Perform Dry Run **LU3:** Perform Semi Auto Operation **LU4:** Perform Production **LU5:** Perform follow up procedure for machine production **LU6:** Submit production report **LU7:** Transport finish product to concerned department	35	140	175
Module 7: Operate Pipe Extrusion Machine Operation **Aim:** This competency standard covers specific knowledge related to operation of pipe extrusion machine and explaining parameters setting, running procedure, and reporting procedure of machine.	**LU1:** Inspect extrusion machine pre-start parameters **LU2:** Carry out operation **LU3:** Start production as per requirement **LU4:** Perform follow up procedure **LU5:** Submit Production Report **LU6:** Transport Finished Product	30	120	150

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 8: Operate Compression Moulding Machine **Aim:** The standard covers specific knowledge related to operation of compression moulding machine and explaining parameters setting, dry run procedure, and reporting procedure of machine.	**LU1:** Adjust parameters of machine **LU2:** Perform Dry Run **LU3:** Perform Semi-auto Operation **LU4:** Perform Production **LU5:** Perform Follow up procedure for Machine Production **LU6:** Submit Production Report **LU7:** Transport Finished Product to Concerned Department	30	120	150
Module 9: Operate Blow Moulding Machine **Aim:** The standard covers specific knowledge related to operation of blow moulding machine and explaining parameters setting, dry run procedure, and reporting procedure of machine.	**LU1:** Adjust Moulding Machine parameters **LU2:** Perform Dry Run **LU3:** Perform Semi-auto Operation **LU4:** Perform Production **LU5:** Perform Follow up procedure for Machine Production **LU6:** Submit Production Report **LU7:** Transport Finished Product to Concerned Department	35	140	175

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Module-6

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Modules

Module 6: Operate Injection Moulding Machine

Objective of the module: The aim of this module to provide skills and knowledge to operate injection moulding machine in accordance with the manufacturer's manual

Duration: 175 hours **Theory:** 35 hours **Practical:** 140 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Adjust moulding machine parameters	**The trainee will be able to:** Turn on machine as operation manual. Feed parameters as per PPS and job. Verify all parameters as per job/ data sheet	i) Moulding cycle from feeding to ejection • Set processing parameters as per job card • Ensure desired temperatures are achieved • Ensure raw material is ready for processing (De-humidified, etc.) • Ensure all peripheral equipments are working properly (oil pump, air filter, hydraulics, motors, pneumatics, etc.) ii) Recognize screw configurations • Check shot size and speed • Check injection pressure and other parameters	**Total** 65 hours **Theory:** 15 hours **Practical:** 50 hours	Injection Moulding Machine Mould Utility documentation. Service Manuals. Operational Manuals. Basic Hand tools Job card/PPS	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU2:	**The trainee will be able to:**	i) Knowledge and	**Total**	Injection Moulding	Classroom with

Perform Dry Run	Ensure Mould opening & closing position as per tool Ensure mechanism of Ejector of the tool Verify protection of tool as per operation manual and procedure.	understanding of mould and it's mechanism ii) Understanding of hydraulic and pneumatic systems iii) Manual operation of injection mounding machine iv) Identify runner, gate and clamping v) Identify two plate, slider mould, hot runner mould vi) Identify and set up part ejection in the mould	40 hours **Theory:** 08 hours **Practical:** 32 hours	Machine Mould Utility documentation. Service Manuals. Operational Manuals. Basic Hand tools	multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU3: Perform Semi-auto operation	**The trainee will be able to:** Ensure barrel temperatures has achieved according to data sheet Perform purging till required material ready for sample shot. Start moulding cycle as per SOP. Inspect the samples as per data sheet.	i) Recognize machine controls ii) Learn to adjust temperatures from feed zone to injection point iii) Learn to adjust injection pressure iv) Perform Dry-run v) Perform Semi-auto operation vi) Maintaining product quality as per specifications • Be able to measure components for identification of dimensional defects • Usage of measurement tools is critical: Vernier caliper, micrometer gauge, scale, etc. vii) Recognize different defects and their causes • Be able to visually identify commonly occurring defects, such	**Total** 10 hours **Theory:** 02 hours **Practical:** 08 hours	Injection Moulding Machine Machine Mould Utility documentation. Service Manuals. Operational Manuals. Basic Hand tools	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

		as gating, flashing, orange-peel, etc. viii) Gain knowledge of rectification of commonly occurring defects.			
LU4: Perform Production	**The trainee will be able to:** Start machine on auto cycle mode as per operation manual. Perform periodic quality checks as per requirement.	i) Switch machine operation to automatic mode ii) Maintaining product quality as per specifications • Be able to measure components for identification of dimensional defects • Usage of measurement tools is critical: Vernier caliper, micrometer gauge, scale, etc. iii) Recognize different defects and their causes • Be able to visually identify commonly occurring defects, such as gating, flashing, orange-peel, etc. iv) Gain knowledge of rectification of commonly occurring defects.	**Total** 30 hours **Theory:** 06 hours **Practical:** 24 hours	Injection Moulding Machine Mould Utility documentation. Service Manuals. Operational Manuals. Basic Hand tools	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU5: Perform follow up procedure for machine production	**The trainee will be able to:** Ensure product packed in assigned packaging. Check feed level in hopper /bin, etc. Ensure machine lubrication	i) Knowledge of product packaging • Understand different types of packaging, e.g.; flexible packaging, packing in cartons, etc. • How to pack final	**Total** 10 hours **Theory:** 02 hours	Injection Moulding Machine Mould Utility documentation.	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic

	as per requirement.	product? ii) Raw material input in moulding machine • Ensure consistent raw material feed into hopper/feeder • Be able to use overhead crane or moveable lifts/ladders • Understand the importance of cutting tools in opening raw material bags. • Concept of 'clean slits' using sharp tools to ensure particles of bag don't get mixed in raw material iii) Lubrication requirements and procedure of machine • Understand the concept of lubricating moveable parts of machines • Carefully use mould lubricant sprays • Ensure spray cans are stored in a secure location after pre-shot application • Be able to identify different mould release agents as per raw material • Be able to provide first-hand feedback to	**Practical:** 08 hours	Service Manuals. Operational Manuals. Basic Hand tools	Processing Facilities **OR** Visit to a training institute with relevant facilities

		maintenance department for periodic machine maintenance			
LU6: Submit production report	**The trainee will be able to:** Record production report as per given format (kg/units per hour). Submit report to concerned department.	i) Production report writing • Understand the importance of reporting accurate production quantity • Be able to fill-in relevant production reports • Be able to identify waste generated along with identification of machine downtime with reasons ii) Data sharing with relevant departments • Understanding the concept of producing accurate data and benefits of the same on a larger scale • Submission of production reports to production planning department or the supervisor for timely actions.	**Total** 10 hours **Theory:** 02 hours **Practical:** 08 hours	Injection Moulding Machine Machine Mould Utility documentation. Service Manuals. Operational Manuals. Basic Hand tools	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU7: Transport finished product	**The trainee will be able to:** Place finished product in designated area	i) Understand QC protocols • Understand and appreciate the importance of producing	**Total** 10 hours	Injection Moulding Machine	Classroom with multimedia aid and flip charts

to concerned department	Take approval of finished product from Quality control Deliver relevant packaging documents to store personnel.	products as per specification • Be able to implement the first quality control protocol on machine to ensure elimination of defective products at sight ii) Inter-department co-ordination • Be able to co-ordinate with QC department with produced batches for relevant approvals iii) Be able to hand over final products to store • Familiarize with handing-over protocols and paperwork.	**Theory:** 02 hours **Practical:** 08 hours	Machine Mould Utility documentation. Service Manuals. Operational Manuals. Basic Hand tools	**EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

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Module-7

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Module 7: Operate Pipe Extrusion Machine

Objective of the module: The aim of this module to provide skills and knowledge to operate pipe extrusion machine in accordance with the manufacturer's manual

Duration: 150 hours **Theory:** 30 hours **Practical:** 120 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Inspect extrusion machine pre-start parameters	**The trainee will be able to:** Check control variables as per process Check extruder parameters as per standard Check downstream parameters as per standard	i) Machine controls • Learn to input processing parameters in the machine and peripheral components ii) Peripheral equipments such as air compressors, chillers, vacuum pump, printer, dryer, etc. • Ensure working and operation of all affiliated equipment	**Total** 40 hours **Theory:** 08 hours **Practical:** 32 hours	Extruder High speed mixer Pipe extrusion downstream line Extruded product samples Operation manual Basic Hand Tools	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU2: Carry out operation	**The trainee will be able to:** Perform purging. Ensure extrude flow as per requirement Guide the extrudate to haul-off unit. Check pipe concentricity as per standard. Start vacuum bath according to instruction set Ensure cutting as per size	i) Machine controls ii) Temperature adjustment from feed-zone to metering zone iii) Usage of Purging material to ensure clean extruder and die iv) Input Raw material for production of pipe v) Ensure concentric extrudate output from die head vi) Ensure vacuum is obtain in water bath vii) Pipe dimensions as per standard viii) Ensure cutting of pipe in	**Total** 40 hours **Theory:** 08 hours **Practical:** 32 hours	Extruder High speed mixer Pipe extrusion downstream line Extruded product samples Operation manual Basic Hand Tools	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

		desired length			
LU3: Start production as per requirement	**The trainee will be able to:** Adjust pipe sizing as per job card. Fix printer as per job card. Manage production rate as per machine capacity to achieve standard component	i) Machine operation in automatic mode • Be able to perform semi-auto operation • Up on successfully obtaining required product specification, switching the machine to auto mode ii) Peripheral equipment such as air compressors, chillers, vacuum pump, printer, dryer, etc.	**Total** 30 hours **Theory:** 06 hours **Practical:** 24 hours	Extruder High speed mixer Pipe extrusion downstream line Extruded product samples Operation manual Basic Hand Tools	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU4: Perform follow up procedure	**The trainee will be able to:** Verify pipe length as per order Verify pipe standard dimensions and visual inspection Generate parameters report according to set format.	i) Knowledge of pipe standards (BS 3505, etc.) • Understand the difference in producing pipes as per multiple standards • Memorize dimensions of pipes as per commonly used standards ii) Maintaining product quality as per specifications • Be able to measure components for identification of dimensional defects • Usage of measurement tools is critical: Vernier caliper, micrometer gauge, scale, etc. iii) Raw material input in	**Total** 20 hours **Theory:** 04 hours **Practical:** 16 hours	Extruder High speed mixer Pipe extrusion downstream line Extruded product samples Operation manual Basic Hand Tools	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

		machine • Ensure consistent raw material feed into hopper/feeder • Be able to use overhead crane or moveable lifts/ladders • Understand the importance of cutting tools in opening raw material bags. • Concept of 'clean slits' using sharp tools to ensure particles of bag don't get mixed in raw material iv) Lubrication requirements and procedure of machine • Understand the concept of lubricating moveable parts of machines • Be able to provide first-hand feedback to maintenance department for periodic machine maintenance v) Recognize different defects and their causes • Be able to visually identify commonly occurring defects, such as eccentricity, burn lines, blistering, etc. • Gain knowledge of rectification of commonly			

		occurring defects.			
LU5: Submit production report	**The trainee will be able to:** Note machine hours as per format. Record production (kg/hr) as per format. Record rejection (kg/no.) as per procedure and format. Record machine downtime (hrs/min) on set format. Record machine output(productivity) on set format	i) Production report writing • Understand the importance of reporting accurate production quantity • Be able to fill-in relevant production reports • Be able to identify waste generated along with identification of machine downtime with reasons ii) Data sharing with relevant departments • Understanding the concept of producing accurate data and benefits of the same on a larger scale • Submission of production reports to production planning department or the supervisor for timely actions.	**Total** 10 hours **Theory:** 02 hours **Practical:** 08 hours	Reporting formats Job card Extruder High speed mixer Pipe extrusion downstream line Extruded product samples Operation manual Basic Hand Tools	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU6: Transport finished product	**The trainee will be able to:** Ensure finished goods are counted according to organization procedure.	i) Understand QC protocols • Understand and appreciate the importance of producing products as per specification	**Total** 10 hours **Theory:**	Reporting formats Job card Basic Hand Tools Medium of material	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic

	Deliver relevant packaging documents to store personnel	• Be able to implement the first quality control protocol on machine to ensure elimination of defective products at sight ii) Inter-department co-ordination • Be able to co-ordinate with QC department with produced batches for relevant approvals iii) Be able to hand over final products to store • Familiarize with handing-over protocols and paperwork.	02 hours **Practical:** 08 hours	transport	Processing Facilities **OR** Visit to a training institute with relevant facilities

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Module-8

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Module 8: Operate Compression Moulding Machine

Objective of the module: The aim of this module to provide skills and knowledge to operate compression moulding machine in accordance with the manufacturer's manual

Duration: 150 hours **Theory:** 30 hours **Practical:** 120 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Adjust parameters of machine	**The trainee will be able to:** Check raw material to set machine operation Turn on machine as per instruction manual and procedure set by organization Feed parameters as per job/ data sheet. Verify all pre-start parameters as per job card / data sheet	i) Identify production cycle from feeding to de-molding of product ii) Understand the materials used for moulding iii) Difference between types of heaters, thermocouples & controllers for mould iii) Machine controls • Learn to input processing parameters in the machine and peripheral components iv) Ensure working of peripheral equipments such as air compressors, chillers, vacuum pump, printer, dryer, etc. v) Moulding cycle from feeding to ejection • Set processing parameters as per job card • Ensure desired temperatures are achieved • Ensure raw material is ready for processing (De-	**Total** 40 hours **Theory:** 08 hours **Practical:** 32 hours	Compression mounding machine & mould Weighing scale Plastic raw material Product samples Machine manual Job card	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

		humidified, etc.) • Ensure all peripheral equipments are working properly (oil pump, air filter, hydraulics, motors, pneumatics, etc.) vi) Recognize screw configurations • Check shot size and speed vii) Check injection pressure and other parameters			
LU2: Perform dry run	**The trainee will be able to:** Ensure Mould opening & closing position Ensure proper functioning of ejector mechanism of the Mould Verify safety of Mould as per SOP.	i) Knowledge and understanding of mould and it's mechanism ii) Understanding of hydraulic and pneumatic systems iii) Manual operation of compression moulding machine iv) Ensure functionality of clamping mechanism v) Identify and set up part ejection in the mould	**Total** 35 hours **Theory:** 08 hours **Practical:** 28 hours	Compression mounding machine & mould Product samples Machine manual Job card	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU3: Perform semi-auto operation	**The trainee will be able to:** Lubricate the Mould and feed plastic as per standard volume and component Start heating of Mould as per data sheet Feed material dose as per	i) Recognize machine controls ii) Learn to adjust temperatures from feed zone to injection point iii) Learn to adjust injection pressure iv) Perform Semi-auto operation v) Check for day-light opening	**Total** 30 hours **Theory:** 06 hours **Practical:** 24 hours	Compression mounding machine & mould Product samples Machine manual Job card	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR**

	data sheet Clamp the Mould as per instruction manual and procedure by organizational standard Wait for the melting of raw material Wait for the cooling cycle before ejection				Visit to a training institute with relevant facilities
LU4: Perform production	**The trainee will be able to:** Start machine on auto cycle mode as per operation manual. Perform periodic quality checks as per requirement.	i) Maintaining product quality as per specifications • Be able to measure components for identification of dimensional defects • Usage of measurement tools is critical: Vernier caliper, micrometer gauge, scale, etc. ii) Recognize different defects and their causes • Be able to visually identify commonly occurring defects, such as flashing, pin-holes, short-shots, etc. • Gain knowledge of rectification of commonly occurring defects.	**Total** 30 hours **Theory:** 06 hours **Practical:** 24 hours	Compression mounding machine & mould Weighing scale Plastic raw material Product samples Machine manual Job card	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

LU5: Perform follow-up procedure for machine production	**The trainee will be able to:** Ensure product packed in assigned packaging. Check feed level in hopper /bin as per requirement. Ensure machine lubrication as per requirement.	i) Knowledge of product packaging • Understand different types of packaging, e.g.; flexible packaging, packing in cartons, etc. • How to pack final product? ii) Raw material input in moulding machine • Ensure consistent raw material feed into hopper/feeder • Be able to use overhead crane or moveable lifts/ladders • Understand the importance of cutting tools in opening raw material bags. • Concept of 'clean slits' using sharp tools to ensure particles of bag don't get mixed in raw material iii) Lubrication requirements and procedure of machine • Understand the concept of lubricating moveable parts of machines • Carefully use mould lubricant sprays • Ensure spray cans are	**Total** 5 hours **Theory:** 01 hours **Practical:** 08 hours	Compression mounding machine & mould Weighing scale Plastic raw material Product samples Machine manual Job card	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

		stored in a secure location after pre-shot application • Be able to identify different mould release agents as per raw material • Be able to provide first-hand feedback to maintenance department for periodic machine maintenance			
LU6: Submit production report	**The trainee will be able to:** Record production report as per given format (kg or unit/ hour). Submit report to concerned department	i) Production report writing • Understand the importance of reporting accurate production quantity • Be able to fill-in relevant production reports • Be able to identify waste generated along with identification of machine downtime with reasons ii) Data sharing with relevant departments • Understanding the concept of producing accurate data and benefits of the same on a larger scale • Submission of production reports to production planning department or the	**Total** 5 hours **Theory:** 01 hours **Practical:** 08 hours	Job card Production report format	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

		supervisor for timely actions.			
LU7: Transport finish product to concerned department	**The trainee will be able to:** Place finished product in designated area. Take approval of finished product from Quality control Deliver relevant packaging documents to store personnel.	i) Understand QC protocols • Understand and appreciate the importance of producing products as per specification • Be able to implement the first quality control protocol on machine to ensure elimination of defective products at sight ii) Inter-department co-ordination • Be able to co-ordinate with QC department with produced batches for relevant approvals iii) Be able to hand over final products to store	**Total** 5 hours **Theory:** 01 hours **Practical:** 08 hours	Reporting formats Job card Basic Hand Tools Medium of material transport	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

PLASTIC PROCESSOR

Module-9

CBT CURRICULUM

National Vocational Certificate Level 3

Version 1 - September, 2018

Module 9: Operate Blow Moulding Machine

Objective of the module: The aim of this module to provide skills and knowledge to operate blow moulding machine in accordance with the manufacturer's manual

Duration: 175 hours **Theory:** 35 hours **Practical:** 140 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Adjust moulding machine parameters	**The trainee will be able to:** Turn on machine as operation manual. Feed parameters as per PPS and job. Verify all parameters as per job/ data sheet	i) Identify production cycle from feeding to de-molding of product ii) Understand the materials used for moulding iii) Difference between types of heaters, thermocouples & controllers for mould iv) Machine controls • Learn to input processing parameters in the machine and peripheral components v) Ensure working of peripheral equipments such as air compressors, chillers, vacuum pump, printer, dryer, etc. vi) Moulding cycle from feeding to ejection • Set processing parameters as per job card • Ensure desired temperatures are achieved • Ensure raw material is ready for processing (De-humidified, etc.)	**Total** 65 hours **Theory:** 15 hours **Practical:** 50 hours	Blow moulding machine Machine mould Air compressor Vacuum machine De-humidifier Chiller for cold water Utility documentation Service manual Operation manual Basic hand tools	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

		• Ensure all peripheral equipments are working properly (oil pump, air filter, hydraulics, motors, pneumatics, etc.) vii) Recognize screw configurations • Check shot size and speed viii) Check injection pressure and other parameters			
LU2: Perform dry run	**The trainee will be able to:** Ensure Mould opening & closing position as per tool Ensure Mould mechanism and Ejection system Verify protection of tool as per operation manual and procedure. Verify material dryness is as per specification	i) Knowledge and understanding of mould and it's mechanism ii) Understanding of hydraulic and pneumatic systems iii) Manual operation of blow moulding machine iv) Ensure operation of clamping mechanism v) Identify and set up part ejection in the mould	**Total** 40 hours **Theory:** 08 hours **Practical:** 32 hours	Blow moulding machine Machine mould Air compressor Vacuum machine De-humidifier Chiller for cold water Utility documentation Service manual Operation manual Basic hand tools	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU3: Perform semi-auto operation	**The trainee will be able to:** Ensure molding temperatures has achieved according to data sheet Start heating till required material ready for sampling.	i) Recognize machine controls ii) Learn to adjust temperatures from feed zone to injection point iii) Learn to adjust injection pressure iv) Perform Semi-auto operation	**Total** 10 hours **Theory:** 02 hours	Blow moulding machine Machine mould Air compressor	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic

	Start moulding cycle as per SOP. Inspect the samples as per data sheet.	v) Check for day-light opening	**Practical:** 08 hours	Vacuum machine De-humidifier Chiller for cold water Utility documentation Service manual Operation manual Basic hand tools	Processing Facilities **OR** Visit to a training institute with relevant facilities
LU4: Perform production	**The trainee will be able to:** Start machine on auto cycle mode as per SOP Perform periodic quality checks as per requirement	i) Machine operation in automatic mode • Up on successfully obtaining required product, switching the machine to auto mode ii) Maintaining product quality as per specifications • Be able to measure components for identification of dimensional defects • Usage of measurement tools is critical: Vernier caliper, micrometer gauge, scale, etc. iii) Recognize different defects and their causes • Be able to visually identify commonly occurring defects, such as flashing, orange-peel, drooling, etc. • Gain knowledge of	**Total** 30 hours **Theory:** 06 hours **Practical:** 24 hours	Blow moulding machine Machine mould Air compressor Vacuum machine De-humidifier Chiller for cold water Utility documentation Service manual Operation manual Basic hand tools	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

		rectification of commonly occurring defects.			
LU5: Perform follow up procedure for machine production	**The trainee will be able to:** Ensure product packed in assigned packaging. Check feed level in hopper/bin, etc. Ensure machine lubrication as per requirement	i) Knowledge of product packaging • Understand different types of packaging, e.g.; flexible packaging, packing in cartons, etc. • How to pack final product? ii) Raw material input in moulding machine • Ensure consistent raw material feed into hopper/feeder • Be able to use overhead crane or moveable lifts/ladders • Understand the importance of cutting tools in opening raw material bags. • Concept of 'clean slits' using sharp tools to ensure particles of bag don't get mixed in raw material iii) Lubrication requirements and procedure of machine • Understand the concept of lubricating moveable parts of machines • Carefully use mould	**Total** 10 hours **Theory:** 02 hours **Practical:** 08 hours	Blow moulding machine Machine mould Air compressor Vacuum machine De-humidifier Chiller for cold water Utility documentation Service manual Operation manual Basic hand tools	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

		lubricant sprays • Ensure spray cans are stored in a secure location after pre-shot application • Be able to identify different mould release agents as per raw material • Be able to provide first-hand feedback to maintenance department for periodic machine maintenance			
LU6: Submit production report	**The trainee will be able to:** Record production report as per given format (kg or units / hour). Submit report to concerned department.	i) Production report writing • Understand the importance of reporting accurate production quantity • Be able to fill-in relevant production reports • Be able to identify waste generated along with identification of machine downtime with reasons ii) Data sharing with relevant departments • Understanding the concept of producing accurate data and benefits of the same on a larger scale • Submission of production reports to	**Total** 10 hours **Theory:** 02 hours **Practical:** 08 hours	Job card Production report format	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

		production planning department or the supervisor for timely actions.			
LU7: Transport finished product to concerned department	**The trainee will be able to:** Place finished product in designated area Take approval of finished product from Quality control Deliver relevant packaging documents to store personnel.	i) Understand QC protocols • Understand and appreciate the importance of producing products as per specification • Be able to implement the first quality control protocol on machine to ensure elimination of defective products at sight ii) Inter-department co-ordination • Be able to co-ordinate with QC department with produced batches for relevant approvals iii) Be able to hand over final products to store iv) Familiarize with handing-over protocols and paperwork.	**Total** 10 hours **Theory:** 02 hours **Practical:** 08 hours	Reporting formats Job card Basic Hand Tools Medium of material transport	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

General assessment guidance for the Plastic Processor Level - 3

Good practice in Pakistan makes use of sessional and final assessments, the basis of which is described below. Good practice by vocational training providers in Pakistan is to use a combination of these sessional and final assessments, combined to produce the final qualification result.

Sessional assessment is going on all the time. Its purpose is to provide feedback on what students are learning:

- to the student: to identify achievement and areas for further work
- to the teacher: to evaluate the effectiveness of teaching to date, and to focus on future plans.

Assessors need to devise sessional assessments for both theoretical and practical work. Guidance is provided in the assessment strategy

Final assessment is the assessment, usually on completion of a course or module, which says whether the student has "passed". It is – or should be – undertaken with reference to all the objectives or outcomes of the course and is usually fairly formal. Considerations of security – ensuring that the student who gets the credit is the person who did the work – assume considerable importance in final assessment.

Methods of assessment

For lessons with a high quantity of theory, written or oral tests related to learning outcomes and/ or learning content can be conducted. For workplace lessons, assessment can focus on the quality of planning the related process, the quality of executing the process, the quality of the product and/or evaluation of the process.

Methods include direct assessment, which is the most desirable form of assessment. For this method, evidence is obtained by direct observation of the student’s performance.

Examples for direct assessment of a Plastic Processor include:

- Work performances, for example operating an injection Moulding machine or an extrusion machine
- Demonstrations, for example demonstrating tool change over on a machine
- Direct questioning, where the assessor would ask the student about temperature, pressure gauges and their effect on products
- Paper-based tests, such as multiple choice or short answer questions on plastic feeding system, location of power supply, function of torpedo or mandrel.

Indirect assessment is the method used where the performance could not be watched, and evidence is gained indirectly.

Examples for indirect assessment of a Plastic Processor include:

- Work products, such as produced plastic product sample
- Workplace documents, such as a log of production.

Indirect assessment should only be a second choice. (In some cases, it may not even be guaranteed that the work products were produced by the person being assessed.)

Principles of assessment

All assessments should be valid, reliable, fair and flexible:

Fairness means that there should be no advantages or disadvantages for any assessed person. For example, it should not happen that one student gets prior information about the type of work performance that will be assessed, while another candidate does not get any prior information.

Validity means that a valid assessment assesses what it claims to assess. For example, if complex cooking skills are to be assessed and certificated, the assessment should involve performance criteria that are directly related to that cooking activity. An interview about the effect of the cooking processes on different foods would not meet the performance criteria.

Reliability means that the assessment is consistent and reproducible. For example, if the work performance of preparing and cooking a complex poultry dish has been assessed, another assessor (eg the future employer) should be able to see the same work performance and witness the same level of achievement.

Flexibility means that the assessor has to be flexible concerning the assessment approach. For example, if there is a power failure during the assessment, the assessor should modify the arrangements to accommodate the students' needs.

Assessment strategy for the Plastic Processor Level - 3

This curriculum consists of 09 modules:

- Module 1: Apply Work Health and Safety Practices (WHS)
- Module 2: Identify and Implement Workplace Policy and Procedures
- Module 3: Communicate at Workplace
- Module 4: Perform Computer Application Skills
- Module 5: Manage Personal Finances
- Module 6: Operate Injection Moulding Machine for Production
- Module 7: Operate Pipe Extrusion Machine
- Module 8: Operate Compression Moulding Machine
- Module 9: Operate Blow Moulding Machine

Sessional assessment

The sessional assessment for all modules shall be in two parts: theoretical assessment and practical assessment. The sessional marks shall contribute to the final qualification.

Theoretical assessment for all learning modules must consist of a written paper lasting at least one hour per module. This can be a combination of multiple choice and short answer questions.

For practical assessment, all procedures and methods for the modules must be assessed on a sessional basis. Guidance is provided below under Planning for assessment.

Final assessment

Final assessment shall be in two parts: theoretical assessment and practical assessment. The final assessment marks shall contribute to the final qualification.

The final theoretical assessment shall consist of one 3-hour paper. The paper shall be in two parts.

Part A shall last for 2 hours and shall consist of half multiple choice and half short-answer questions. This part shall cover the technical modules:

- Module 6: Operate Injection Moulding Machine for Production
- Module 7: Operate Pipe Extrusion Machine
- Module 8: Operate Compression Moulding Machine
- Module 9: Operate Blow Moulding Machine

For the final practical assessment, each student shall be assessed over a period of two days, with two 3-hour sessions on each day. This represents a total of four sessions totaling 3 hours of practical assessment for each student. During this period, each student must be assessed on his/her ability to operate an assigned machine of the 4 operating modules. The student shall therefore operate 4 plastic processing machines along with their auxiliary equipment

The assessment teams

The number of assessors must meet the needs of the students and the training provider. For example, where two assessors are conducting the assessment, there must be a maximum of five students per assessor. In this example, a group of 20 students shall therefore require assessments to be carried out over a four-day period. For a group of only 10 students, assessments would be carried out over a two-day period only.

Planning for assessment

Sessional assessment: assessors need to plan in advance how they will conduct sessional assessments for each module. The tables on the following pages are for assessors to use to insert how many hours of theoretical and practical assessment will be conducted and what the scheduled dates are.

Final assessment: Training providers need to decide ways to combine modules into a cohesive two-day final assessment programme for each group of five students. Training providers must agree the dishes for practical assessments in advance.

Complete list of tools and equipment

List of Machines and Tools

Sr. #	Description
1.	Steel-toed footwear,
2.	hard hat,
3.	safety gloves,
4.	appropriate safety glasses,
5.	high visibility vest,
6.	hearing protection,
7.	breathing apparatus,
8.	De-electric boots and gloves for protection from electrical shock.
9.	fall protection, and other applicable PPE
10.	Site emergency response plan,
11.	fire extinguishers,
12.	fire blankets,
13.	respirators, masks,
14.	fire hoses,
15.	first aid kits, stretchers, WHMIS book, and other related tools and gear
16.	basic tools, such as grease gun,

Sr. #	Description
17.	hammer,
18.	screwdrivers,
19.	pliers,
20.	self-locking pliers,
21.	adjustable wrench,
22.	assorted other wrenches, measuring tape(100m)
23.	Basic supplies, such as grease, oil, window cleaner, rags, ice scraper, whisk broom.
24.	Color-code cards, utility documentation. Logbooks Service Manuals, OHS Regulation,
	Measuring & marking tools
	Inspection gauges
MACHINES	
1	Injection Molding Machine (60-120 ton) o Air Cool Chiller (5 ton) o Hopper Drier (25kg) o Mixer o Crusher o Auto Loader o Mold o Mold temperature controller o Sprue picker robotic arm

Sr. #	Description
	○ Compressor (10 bar) ○ Dosing units ○ Power Winch set for lifting ○ Chain pulley block set ○ Pallet lifter ○ Hydraulic oil ○ Hydraulic pipes ○ Cooling pipes ○ Mold surveillance system/ Mold monitor
2	Extrusion blow molding ○ Mixer ○ Crusher ○ Auto Loader ○ Mold ○ Dosing units ○ Power Winch set for lifting ○ Chain pulley block set ○ Pallet lifter ○ Hydraulic oil ○ Hydraulic pipes

Sr. #	Description
	○ Cooling pipes ○ Compressor (12 bar) ○ Die heads ○ Parison wall thickness control ○ 2-litre double head double station ○ Water Level gauge ○ De flasher unit ○ Leak tester
3	• Hand operated blow molding machine
4	• Stretch Blow moulding machine ○ Heating Oven ○ Blowing Unit ○ Compressor (35 bar) with air tank ○ Mold De-Humidifier ○ Mold ○ 1 liter twin Cavity hand feeding automatic machine ○ Pre-form loader ○ Crusher

Sr. #	Description
	○ Cooling pipes ○ Low pressure compressor
5	• Injection blow molding machine (30ton) ○ Mold (120 ml) ○ Mold temperature controller ○ Air Drier ○ Air cooled Chiller 5 ton ○ Auto Loader ○ Hydraulic Oil ○ Compressor (12 bar) ○ Cooling pipes ○ High temperature hydraulic pipes ○ Mould protection sprays
6	• Injection stretch blow moulding machine (45 ton) ○ Drier ○ Mould humidifier ○ Chillier ○ Mould temperature controller ○ Auto Loader

Sr. #	Description
	○ Compressor ○ Pre-Mixer ○ Liquid Dosing system ○ Mould sprays
7	• Pipe Extrusion Machine 90mm Screw diameter ○ High speed mixer ○ Twin screw extruder ○ Auto loader ○ Extrusion Die ○ Pip- profile die ○ Vacuum sizing unit ○ Haul-off unit ○ Pipe Cutter ○ Stacker ○ Belling machine ○ Automatic winding unit ○ Pelletizing unit ○ Die changing trolleys
8	• PE pipe extruder 60 mm Screw diameter

Sr. #	Description
	○ High speed mixer ○ Auto loader ○ Extrusion Die ○ Pip- profile die ○ Vacuum sizing unit ○ Haul-off unit ○ Pipe Cutter ○ Stacker ○ Belling machine ○ Automatic winding unit ○ Pelletizing unit ○ Die changing trolleys
9	• Sheet Extruder Machine ○ Auto loader ○ Sheet die ○ Vacuum sizing unit ○ Haul-off unit ○ Stacker ○ Automatic winding unit ○ Pelletizing unit

Sr. #	Description
	○ Die changing trolleys ○ Slitter
10	• Pet Injection Molding Machine (140 ton) ○ Air Cool Chiller (5 ton) ○ Hopper Drier (25kg) ○ Mixer ○ Crusher ○ Auto Loader ○ Mold ○ Mold temperature controller ○ Sprue picker robotic arm ○ Compressor (10 bar) ○ Dosing units ○ Power Winch set for lifting ○ Chain pulley block set ○ Pallet lifter ○ Hydraulic oil ○ Hydraulic pipes ○ Cooling pipes

Sr. #	Description
	○ Mold surveillance system/ Mold monitor ○ Mold Sprays
11	• Film Extrusion Machine ○ Auto loader ○ Blown film die ○ sizing unit ○ Winding unit ○ Pelletizing unit ○ Die changing trolleys ○ Slitter

National Vocational and Technical Training Commission (NAVTTC)

Plot 38, Kirthar Road, Sector H-9/4, Islamabad, Pakistan
+92 51 9044 322
+92 51 9044 322
info@navttc.org
www.navttc.org