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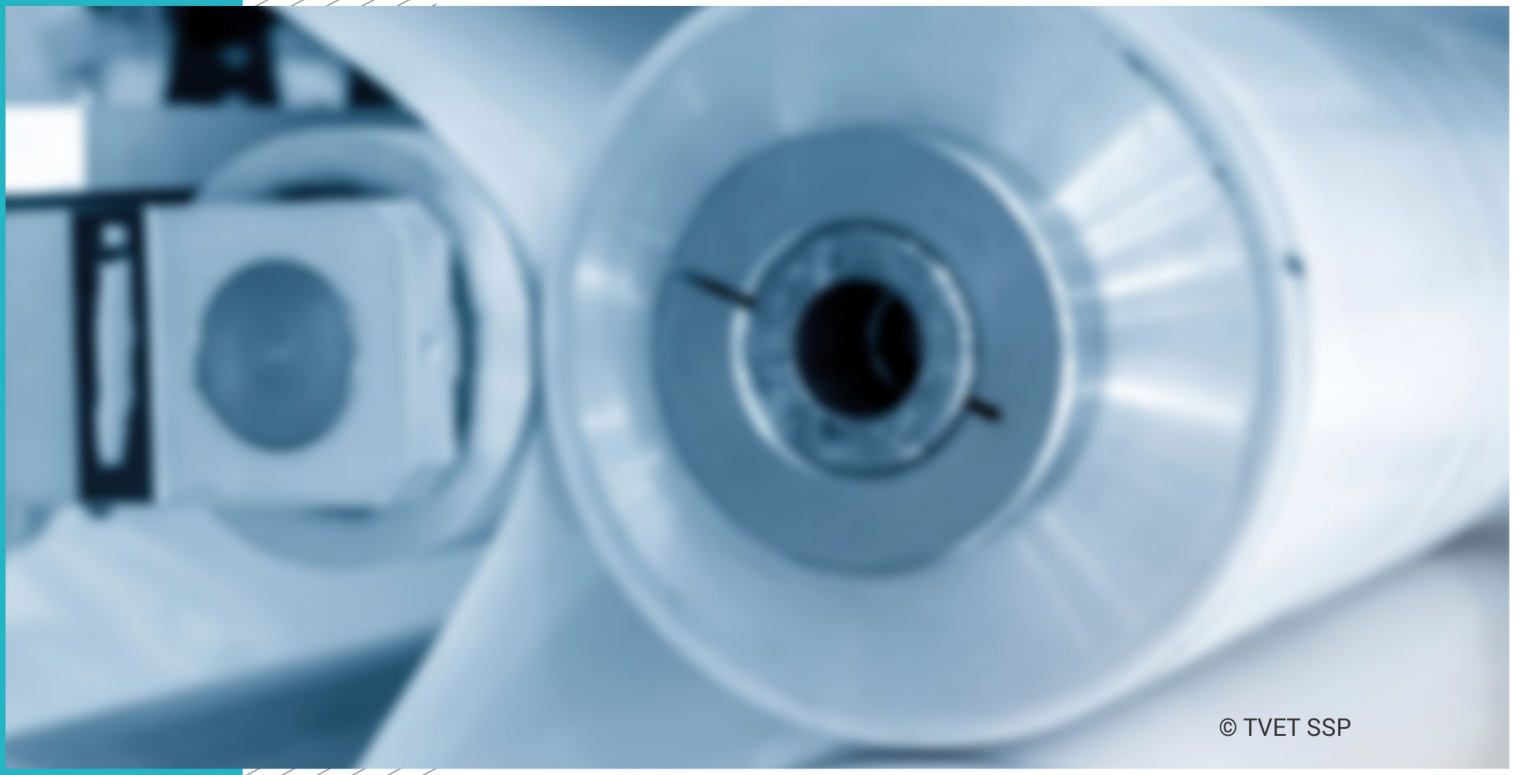
PLASTIC PROCESSOR



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CBT CURRICULUM

National Vocational Certificate Level 4

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

- Contribute to Work Related Health and Safety (WHS) Initiatives
- Analysis Workplace Policy and Procedures
- Perform Advanced Communication
- Develop Advance Computer Application Skills
- Manage Human Resource Services

- Develop Entrepreneurial Skills
- Perform Off-tool Sampling
- Perform Tool Change Over
- Perform Shutdown Procedures
- Manage Product Quality
- Manage Production Flow

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 4, in "Plastic Processor" (0722 PPP 021)	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 3 in "Plastic Processor"

Minimum qualification of trainer

Should have **at least** D.A.E / B-Tech and having 4 years academic experience & at least 5 years industrial experience working as a Plastic Processor.

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 11 modules 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: Contribute to Work Related Health and Safety (WHS) Initiatives	6	24	30
Module 2: Analysis Workplace Policy and Procedures	6	24	30
Module 3: Perform Advanced Communication	6	24	30
Module 4: Develop Advance Computer Application Skills	8	32	40
Module 5: Manage Human Resource Services	4	16	20
Module 6: Develop Entrepreneurial Skills	6	24	30
Module 7: Perform Off-tool Sampling (072200919)	30	120	150
Module 8: Perform Tool Change Over (072200920)	30	120	150
Module 9: Perform Shutdown Procedures (072200921)	20	80	100

Module	Theory hours	Workplace hours	Total hours
Module 10: Manage Product Quality (072200922)	24	96	120
Module 11: Manage Production Flow (072200923)	20	80	100

Sequence of the modules

This qualification is made up of 11 modules. Six modules relate to health and safety, basic literacy, basic communication skill, professionalism, for example Module 1: Contribute to Work Related Health and Safety (WHS) Initiatives; or Module 4: Develop Advanced 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 7: Perform Off-tool Sampling is a pre-requisite for Module 7: Perform Tool Change over.

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 7: Perform Off-tool Sampling</td><td rowspan="2">Module 10: Manage Product Quality</td><td rowspan="3">Module 1: Contribute to Work Related Health and Safety (WHS) Initiatives</td></tr>
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Summary – overview of the curriculum

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 1: Contribute to Work Related Health and Safety (WHS) Initiatives **Aim:** This unit describes the skills and knowledge required to manage the identification, review, development, implementation and evaluation of effective participation and consultation processes as an integral part of managing work health and safety (WHS).	**LU1.** Contribute to initiate work-related health and safety measures **LU2.** Contribute to establish work-related health and safety measures **LU3.** Contribute to ensure legal requirements of WHS measures **LU4.** Contribute to review WHS measures **LU5.** Evaluate the organization's WHS system	6	24	30

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 2: Comply with Workplace Policy and Procedures **Aim:** This unit describes the skills and knowledge required to 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.** Manage work timeframes **LU2.** Manage to convene meeting **LU3.** Decision making at workplace **LU4.** Set and meet own work priorities at instent **LU5.** Develop and maintain professional competence **LU6.** Follow and implement work safety requirements	6	24	30

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 3: Perform Advanced Communication **Aim:** This unit describes the performance outcomes, skills and knowledge required to develop communication skills used professionally. It covers plan and organise work and conduct trainings at workplace, along with demonstrating professional skills independently	**LU1.** Demonstrate professional skills **LU2.** Plan and Organize work **LU3.** Provide trainings at workplace	6	24	30
Module 4: Develop Advance Computer Application Skills **Aim:** This unit provides an overview of Microsoft Office programs to create personal, academic and business documents following current professional and/or industry standards, i.e. Data Entry, Power Point Presentation and managing data base and graphics for Design It applies to individuals employed in a range of work environments who need to be able to present a set range of data in a simple and direct forms	**LU1.** Manage Information System to complete a task **LU2.** Prepare Presentation using computers **LU3.** Use Microsoft Access to manage database **LU4.** Develop graphics for Design	8	32	40

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 5: Manage Human Resource Services **Aim:** This unit describes the skills and knowledge required to plan, manage and evaluate delivery of human resource services, integrating business ethics. It applies to individuals with responsibility for coordinating a range of human resource services across an organization. They may have staff reporting to them.	**LU1.** Determine strategies for delivery of human resource services **LU2.** Manage the delivery of human resource services **LU3.** Evaluate human resource service delivery **LU4.** Manage integration of business ethics in human resource practices	4	16	20

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 6: Develop Entrepreneurial Skills **Aim:** This Competency Standard identifies the competencies required to develop entrepreneurial skills, in accordance with the organization's approved guidelines and procedures. You will be expected to develop a business plan, collect information regarding funding sources, develop a marketing plan and develop basic business communication skills. Your underpinning knowledge regarding entrepreneurial skills will be sufficient to provide you the basis for your work.	**LU1.** Develop a business plan **LU2.** Collect information regarding funding sources **LU3.** Develop a marketing plan **LU4.** Develop basic business communication skills	6	24	30

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 7: Perform Off Tool Sampling **Aim:** This competency standard identifies the competencies required to perform off tool sampling in accordance with job order/sheet's guidelines. You will be expected to carry out off tool sample, ensuring cost effectiveness, conforming to standards and regulations. The underpinning knowledge regarding off tool sampling will be enough to provide the basis for your work.	**LU1:** Ensure type of Tool **LU2:** Set Machine Parameters **LU3:** Execute Dry Run Operation **LU4:** Produce Sample **LU5:** Verify Sample Specification **LU6:** Generate Sample Report **LU7:** Take Approval for Processing	30	120	150

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 8: Perform Tool Change over **Aim:** The standard covers specific knowledge related to operation of tool change procedure, installation and explaining parameter setting, and reporting procedure of machine.	**LU1:** Obtain Work Order according to Standard **LU2:** Prepare took for Production **LU3:** Carry out Tool Installation **LU4:** Carry out Tool Storage	30	120	150

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 9: Perform Shutdown Procedure **Aim:** This competency standard is designed to provide skills and knowledge to performance shutdown procedures to machine in accordance with the manufacturer's Manual. You will be able to perform arrangement of tools, shutdown as planned, and emergency shutdown as per machine requirement. The standard covers specific knowledge related to operation of shutdown procedure, and reporting procedure of machine.	**LU1:** Arrange Tools and Accessories **LU2:** Perform Planned Shutdown **LU3:** Perform Emergency Shutdown	20	80	100

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 10: Manage Product Quality **Aim:** This competency standard is designed to provide skills and knowledge to manage product quality, in accordance with inspection procedure, irregularities, quality acceptance, of quality control department. You will be able to report quality inspection and facilitate quality audit process. The underpinning knowledge regarding quality management and procedure of quality audit of sample and production will be enough to provide the basis for your work.	**LU1:** Perform Inspection **LU2:** Identify Irregularities As Per Standard **LU3:** Apply Acceptable Quality Level to Product **LU4:** Prepare Quality Inspection Report **LU5:** Facilitate in Auditing	24	96	120

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 11: Manage Production Flow **Aim:** This competency standard is designed to provide skills and knowledge to manage production flow of machine in accordance with the manufacturer's Manual. You will be able to perform planning of production schedule, ensuring of raw material and accessories, verify data sheet of machine and prepare production report. The standard covers specific knowledge related to management of production workflow, identifying bottlenecks and rectifying them.	**LU1:** Plan Production Schedule **LU2:** Ensure Raw Material & Accessories **LU3:** Ensure the Machine Data Sheet **LU4:** Prepare Production Report	20	80	100

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Module-7

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Modules

Module 7: Perform Off Tool Sampling

Objective of the module: The aim of this module to identify the competencies required to perform off tool sampling in accordance with job order/sheet's guidelines

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

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Ensure type of tool	**The trainee will be able to:** Select tool as per given job card/ work order Select machine as per tool according to job card/ work order. Verify selection of tool/ Machine according to job requirement Install the tool on selected machine as per installation manual. Connect auxiliaries with tool as per machine operation manual.	i) Machine knowledge ii) Tool selection iii) Tool lifting and installation iv) Auxiliaries Equipment such as hydraulics, pneumatics, electrical and heating systems	**Total** 10 hours **Theory:** 2 hours **Practical:** 08 hours	Basic Hand tools Moulding Machine Machine Mould Utility documentation. Service Manuals. Operational Manuals. Basic supplies, such as grease, oil, cleaning agent, emery paper etc.	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU2: Set machine parameters	**The trainee will be able to:** Set parameters as per	i) Moulding cycle from feeding to ejection • Set processing parameters as per job card • Ensure desired temperatures are	**Total** 40 hours	Basic Hand tools Moulding Machine	Classroom with multimedia aid and flip charts

	Process Parameter Sheet (PPS) of machine and job card. Check safeties of Mould and machine for safe operation.	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	**Theory:** 08 hours **Practical:** 32 hours	Machine Mould Utility documentation. Service Manuals. Operational Manuals. Basic supplies, such as grease, oil, cleaning agent, emery paper etc.	**EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU3: Execute Dry Run operation	**The trainee will be able to:** Check open/close Mould manually for dry run operation. Ensure temperature of heaters as per SOP Check Ejector mechanism as per execution operation	i) Knowledge and 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	**Total** 30 hours **Theory:** 06 hours **Practical:** 24 hours	Basic Hand tools Moulding Machine Machine Mould Utility documentation. Service Manuals. Operational Manuals. Basic supplies, such as grease, oil, cleaning agent, emery paper etc.	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU4: Produce Sample	**The trainee will be able to:** Purge material in manual mode as per job requirement.	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	**Total** 30 hours **Theory:**	Basic Hand tools Moulding Machine Machine Mould Utility	Classroom with multimedia aid and flip charts **EITHER**

	Run continuous operation on semi-auto/ auto mode till the required physical appearance achieved. Verify the physical appearance of sample as per SOP of quality standard	v) Perform Semi-auto operation vii) 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. viii) Recognize different defects and their causes • Be able to visually identify commonly occurring defects, such as gating, flashing, orange-peel, etc. ix) Gain knowledge of rectification of commonly occurring defects.	06 hours **Practical:** 24 hours	documentation. Service Manuals. Operational Manuals. Basic supplies, such as grease, oil, cleaning agent, emery paper etc.	Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU5: Verify sample specification	**The trainee will be able to:** Check dimensions of the sample as per drawing specification. Check assembly of the sample as per job card. Produce the required sample size in auto mode according to pilot lot.	i) Measuring & marking tools • Understand QC protocols • Understand and appreciate the importance of producing products as per specification • Produce samples as per standard ii) Be able to visually identify defects compared to sample specimen • Be able to measure components for identification of dimensional defects • Usage of measurement tools is critical: Vernier caliper, micrometer gauge, scale, etc. iii) Check if and when the part is supposed to fit in to other components. iv) Ensure dimensional and mechanical accuracy	**Total** 10 hours **Theory:** 2 hours **Practical:** 8 hours	Basic Hand tools Moulding Machine Machine Mould Utility documentation. Service Manuals. Operational Manuals. Basic supplies, such as grease, oil, cleaning agent, emery paper etc.	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

LU6: Generate Sample report	**The trainee will be able to:** Prepare the sample report on given format. Submit the sample report for approvals as per standard	i) Production report writing • Understand the importance of reporting accurate production quantity and specifications • Be able to fill-in relevant production reports • Report sample size and percentage of defected products	20 hours **Theory:** 4 hours **Practical:** 16 hours	Basic Hand tools Moulding Machine Machine Mould Utility documentation. Service Manuals. Operational Manuals. Basic supplies, such as grease, oil, cleaning agent, emery paper etc.	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU7: Take approval for processing	**The trainee will be able to:** Execute sampling process after approval received. Maintain process parameters for quality production.	i) Operation of machine in semi-auto and auto mode ii) Optimization of machine parameters for production iii) Data sharing with relevant departments • Understanding the concept of producing accurate data and benefits of the same on a larger scale	**Total** 10 hours **Theory:** 02 hours **Practical:** 08 hours	Basic Hand tools Moulding Machine Machine Mould Utility documentation. Service Manuals. Operational Manuals. Basic supplies, such as grease, oil, cleaning agent, emery paper etc.	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

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Module-8

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Module 8: Perform Tool Change-over

Objective of the module: The aim of this module to provide skills and knowledge to performance of tool change over to 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: Obtain work order	**The trainee will be able to:** Collect work order from relevant department. Interpret work order as per organizational procedure. Read existing job order sheet/card. Communicate pre completion of existing job order to relevant department.	i) Basic literacy skills • Be able to read instructions about product, quantity and raw material • Be able to identify rolling required to produce different components as per work order ii) Reporting procedure • Understanding the work order contents • Knowledge of units (Kg, inches, etc.) iii) Work order process • Understand the top-down stream of task assignment • Knowledge of what the work order represents • Who generates the work order? • Where can it be obtained from? iv) Tool handling and storing procedure • Understanding where to	**Total** 10 hours **Theory:** 02 hours **Practical:** 08 hours	Moulding machine/extruder Mould/die Utility documentation	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

		obtain desired tool • How to handle mould and dies? v) Set machine parameters as per data sheet provided vi) Be able to input machine parameters as mentioned in work order or datasheet			
LU2: Prepare tool for production	**The trainee will be able to:** Line up tools according to work order. Clean tool according to instruction manual and procedure. Check quality report before installation.	i) Understanding of Tool design and utilities • Identification of correct tools for the job • Softer materials to be used for brushing and cleaning of polished metal surfaces ii) Tool handling protocols • Understanding the concept and appreciating importance of PPEs iii) Tool cleaning protocols	**Total** 50 hours **Theory:** 10 hours **Practical:** 40 hours	Moulding machine/extruder Mould/die Utility documentation Basic tools Die/mould handling equipment Safety gear	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU3: Carry out tool installation	**The trainee will be able to:** Arrange required hand/ power tools and accessories for installation. Check hydraulic/ pneumatics, and water lines. Perform Installation of tool(Mould/die)	i) Handling of hand/power tools ii) Understanding of hydraulics/pneumatics and water lines iii) Tool design iv) Tool alignment and fixture v) Training of crane operations	**Total** 50 hours **Theory:** 10 hours **Practical:** 40 hours	Moulding machine/extruder Mould/die Utility documentation Basic tools Die/mould handling equipment Safety gear	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant

	Ensure level/alignment of tool with machine.				facilities
LU4: Carry out tool storage	**The trainee will be able to:** Arrange required hand/ power tools and accessories for offloading Apply anti rust coating on tool (Mould/Die). Drain cooling media before offloading of Tool. Perform offloading as per instruction manual and procedure. Prepare and submit remarks sheet as per standard. Clean and shift tool (Mould/Die) for storage in designated area.	i) Utilization of tool handling accessories, such as cranes, etc. ii) Pre-storage Tool protection treatments iii) Tools transportation SOPs iv) Be able to hand over unused tools to store • Familiarize with handing-over protocols and paperwork.	**Total** 40 hours **Theory:** 08 hours **Practical:** 32hours	Mould/die Utility documentation Basic tools Die/mould handling equipment Safety gear	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

Module 09: Perform Shutdown Procedure

Curriculum for Plastic Processor

Objective of the module: The aim of this module to provide skills and knowledge to performance shutdown procedures to machine in accordance with the manufacturer's manual

Duration: 100 hours **Theory:** 20 hours **Practical:** 80 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Arrange tools and accessories	**The trainee will be able to:** Select tools and accessories as per job requirement Verify the tools according to job requirement. Arrange material for purging as per standard Offload Mould / die as per requirement	i) Tool lifting techniques • Training of hand lifting tools • Training on machine based lifting tools • Training of cranes ii) Basic hand tools of machine maintenance and operation • Knowledge of relevant hardware and tools required for the job iii) Plastic Materials • Knowledge of which plastic materials are supposed to be cleared completely out of machines before shutting down iv) Understanding of hydraulic, pneumatic, electrical and heating system • Understanding complete wiring and lines associated with machine	**Total** 20 hours **Theory:** 04 hours **Practical:** 16 hours	Service manuals Operational manual Basic hand tools Lifting crane Moulding/extrusion machine Mould/die	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU2: Perform planned shutdown	**The trainee will be able to:** Remove material from hopper as per requirement.	i) Vacuum assisted material removing system ii) Material feed mechanism iii) Purging process iv) Initiation of Machine	**Total** 60 hours **Theory:**	Service manuals Operational manual Basic hand tools	Classroom with multimedia aid and flip charts

	Load purging material in Hopper. Set machine parameter for purging. Perform purging as requirement. Stop machine auxiliaries Stop main drives/ machine. Drain out cooling channels as requirement. Clean and lubricate Mould/ die. Perform low pressure clamping as per SOP. Turn off power supply of machine Report designated person as organizational procedure.	shutdown v) Knowledge of lubrication SOP is movable components	12 hours **Practical:** 48 hours	Lifting crane Moulding/extrusion machine Mould/die	**EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU3: Perform Emergency shutdown	**The trainee will be able to:** Carry out immediate emergency stop button Inform incident to designated person as SOP. Identify root cause of shutdown. Take corrective actions as per	i) Understand safety protocols ii) Emergency shutdown SOPs iii) Incident report protocols	**Total** 40 hours **Theory:** 08 hours **Practical:** 32 hours	Machine Operational manual Emergency SOPs Incident reporting formats	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant

	requirement. Submit shutdown report.				facilities

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Module-10

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Module 10: Manage Product Quality

Objective of the module: The aim of this module to provide skills and knowledge to manage product quality, in accordance with inspection procedure, irregularities, quality acceptance, of quality control department

Duration: 120 hours **Theory:** 24 hours **Practical:** 96 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Perform inspection	**The trainee will be able to:** Ensure calibration of inspection tools as per given standard. Inspect the sample as per requirement. Prepare reports on organizational standard formats. Follow periodic inspection as per approved standard.	i) Measuring instruments ii) Awareness of QC protocols iii) Understand and appreciate the importance of producing products as per specification iv) Be able to implement the first quality control protocol on machine to ensure elimination of defective products at sight v) Sample preparation vi) Knowledge standards (BS, ASTM, DIN, etc.) • Understand the difference in producing samples as per multiple standards vii) Testing machine operation	**Total** 30 hours **Theory:** 6 hours **Practical:** 24 hours	Measuring tools and instruments Utility documentation. Service Manuals. Operational Manuals. Basic Hand tools. Computer/ laptop for documentation(latest version with complete office automation software)	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU2: Identify irregularities as per standard	**The trainee will be able to:** Check irregularities in production as per organizational standard. Communicate irregularities in production as per organizational standard to relevant person and	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	**Total** 30 hours **Theory:** 06 hours **Practical:** 24 hours	Measuring tools and instruments Utility documentation. Service Manuals. Operational Manuals. Basic Hand tools.	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR**

	authorities. Prepare reports of Ok or NOT Ok parts as per quality standard of organization.	gauge, scale, etc. ii) 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.		Computer/ laptop for documentation (latest version with complete office automation software)	Visit to a training institute with relevant facilities
LU3: Apply acceptable quality level to product	**The trainee will be able to:** Take preventive action to revert to quality standard Take corrective action to revert to quality standard Record corrective/ preventive actions taken	i) Understand corrective protocols to ensure samples pass test ii) Testing standards iii) Testing Machine SOPs iv) Test report generation protocols v) Report generation protocols	**Total** 20 hours **Theory:** 04 hours **Practical:** 16 hours	Measuring tools and instruments Utility documentation. Service Manuals. Operational Manuals. Basic Hand tools. Computer/ laptop for documentation(latest version with complete office automation software)	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU4: Prepare quality inspection report	**The trainee will be able to:** Prepare process data sheet as per organizational standard Report breakdown hours as per organizational standard	i) Inspection report writing • Understand the importance of reporting accurate production quantity • Be able to fill-in relevant inspection reports • Be able to identify waste	**Total** 20 hours **Theory:** 04 hours **Practical:**	Measuring tools and instruments Utility documentation. Computer/ laptop for documentation (latest version with complete office automation	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities

		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 operations supervisor for timely actions.	16 hours	software)	**OR** Visit to a training institute with relevant facilities
LU5: Facilitate in auditing	**The trainee will be able to:** Complete process records prior to audit as required Provide records to internal/external auditor.	i) Document preparation and file maintenance ii) Understand audit protocols	**Total** 20 hours **Theory:** 04 hours **Practical:** 16 hours	Utility documentation. Computer/ laptop for documentation (latest version with complete office automation software)	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-11

CBT CURRICULUM

National Vocational Certificate Level 4

Version 1 - September, 2018

Module 11: Manage Production Flow

Objective of the module: The aim of this module to provide skills and knowledge to manage production flow of machine in accordance with the manufacturer's manual

Duration: 100 hours Theory: 20 hours Practical: 80 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Plan production schedule	**The trainee will be able to:** Verify Job card Distribute plans on shop floor Ensure workforce according to production target	i) Understand job card ii) Machine capacity iii) Selection of suitable operator with respect to operational skills iv) Employee Utilization Rate – The percentage of time during which a staff member is actively working versus the number of work hours expected for work v) The optimal amount of time required to generate a single item vi) Inventory Turnover – A ratio that indicates how many instances a firm's inventory is sold and refurbished over a determined time period, which can be measured by dividing the total sales by number of inventory or by dividing the value of products sold (COGS) by average number of inventory available during a specified selling period (monthly,	**Total** 30 hours **Theory:** 06 hours **Practical:** 24 hours	Utility documentation. Service Manuals. Operational Manuals	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

		quarterly, yearly) vii) Capacity Utilization Rate – The percentage of the actual manufacturing yield versus the possible manufacturing yield			
LU2: Ensure raw material & accessories	**The trainee will be able to:** Verify the types of material Arrange the master batch or pigment Arrange the packaging material	i) Material identification ii) Material additives iii) Pigment and dies iv) Product packaging	**Total** 30 hours **Theory:** 06 hours **Practical:** 24 hours	Utility documentation. Service Manuals. Operational Manuals	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU3: Ensure machine datasheet	**The trainee will be able to:** Feed new setting Verify from PD &QC+QA Arrange reference sheet	i) Machine setup operation ii) Coordination with QC & QA deptt. iii) Measures to improve production methods, equipment performance	**Total** 20 hours **Theory:** 04 hours **Practical:** 16 hours	Utility documentation. Service Manuals. Operational Manuals Machine	Classroom with multimedia aid and flip charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities
LU4: Prepare	**The trainee will be able to:** Select the target	i) Compiles, stores, and retrieves production data. ii) Write production and	**Total** 20 hours	Utility documentation. Reporting formats	Classroom with multimedia aid and flip

production report	Make hourly production report Feed the actual production with plan	operating reports and resolve operational, manufacturing, and maintenance problems to ensure minimum costs and prevent operational delays.	**Theory:** 04 hours **Practical:** 16 hours		charts **EITHER** Visit to Plastic Processing Facilities **OR** Visit to a training institute with relevant facilities

General assessment guidance for the Plastic Processor Level-4

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-4

This curriculum consists of 11 modules:

- Module 1: Contribute to Work Related Health and Safety (WHS) Initiatives
- Module 2: Analysis Workplace Policy and Procedures
- Module 3: Perform Advanced Communication
- Module 4: Develop Advance Computer Application Skills
- Module 5: Manage Human Resource Services
- Module 6: Develop Entrepreneurial Skills
- Module 7: Perform Off-tool Sampling
- Module 8: Perform Tool Change Over
- Module 9: Perform Shutdown Procedures
- Module 10: Manage Product Quality
- Module 11: Manage Production Flow

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 7: Perform Off-tool Sampling
- Module 8: Perform Tool Change Over
- Module 9: Perform Shutdown Procedures
- Module 10: Manage Product Quality
- Module 11: Manage Production Flow

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

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