Co-funded by the European Union

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Norwegian Embassy
Islamabad

AUTOMOTIVE PARTS PRODUCTION MACHINE OPERATOR

CBT Curriculum

National Vocational Certificate Level 4

Version 1 - November, 2019

NAVTTC

Implemented by
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Published by
National Vocational and Technical Training Commission
Government of Pakistan

Headquarter
Plot 38, Kirthar Road, Sector H-9/4, Islamabad, Pakistan
www.navttc.org

Responsible
Director General Skills Standard and Curricula, National Vocational and Technical Training Commission
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Layout & design
SAP Communications

Photo Credits
TVET Sector Support Programme

This document has been produced with the technical assistance of the TVET Sector Support Programme, which is funded by the European Union, the Federal Republic of Germany and the Royal Norwegian Embassy and has been commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ). The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH in close collaboration with the National Vocational and Technical Training Commission (NAVTTC) as well as provincial Technical Education and Vocational Training Authorities (TEVTAs), Punjab Vocational Training Council (PVTC), Qualification Awarding Bodies (QABs)s and private sector organizations.

Document Version
November, 2019
Islamabad, Pakistan

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Introduction

Definition/ Description of the training program for Automotive Parts Production Machine Operator (Level-4)

The “Automotive Parts Production Machine Operator” level-4 qualification has been developed to meet the demand of automotive parts manufacturing industry for training the the youth of Pakistan in line with the demand of the automotive sector regarding multi-task specialization. By acquiring these qualification graduates are able to apply skills, knowledge and understanding competently in the workplace, and provide the country’s youth with current and future-oriented career and/or self-employment opportunities.

Automotive parts production machine operator (Level-4) are responsible for perform different types of operation of automotive parts production like moulding & extrusion, hot forging, metal die casting and gear cutting beside generic competencies like Contribute to Work Related Health and Safety (WHS) Initiatives, Comply with Workplace Policy and Procedures, Perform Advanced Communication, Develop Advance Computer Application Skills, Manage Human Resource Services and Develop entrepreneurial skills.

Purpose of the training program

The purpose of the “Automotive Parts Production Machine Operator” level-4 course is to engage youth of this country with high demand training of automotive parts manufacturing sector that provides them relevant skill, knowledge and understanding to start their career as “*Automotive Parts Production Machine Operator*” level-4 in automotive industry. The qualification address a variety of skill required for parts production operation of automotive parts manufacturing industry like plastic, rubber, moulding & extrusion, hot forging, casting, and gear cutting beside generic skills of contribute to work related Health and Safety (WHS) initiatives, comply with workplace policy and procedures, perform advanced communication, develop advance computer application Skills, manage human resource services and Develop entrepreneurial skills, with the aim to meet the skilled manpower requirement of the automotive parts manufacturing industry across the country and globe.

Overall objectives of training program

The overall objectives of the Automotive Parts Production Machine Operator (Level-4) training program are:

The Automotive Parts Production Machine Operator qualification level-4 consists of theoretical and practical knowledge required to operate machines used in automotive parts manufacturing industry. The main objectives of the qualification are to impart the training on following:

- Managing and supervising the automotive parts production section in automotive industry.
- Selecting tools, machinery and equipment used to prepare automotive production parts.
- Performing operations on automotive parts production machines like
  - moulding and extrusion
  - hot forging
  - metal die casting
  - gear cutting
- Checking the quality of product, during and after operation.
- Contribute to Work Related Health and Safety (WHS) Initiatives
- Comply with Workplace Policy and Procedures
- Perform Advanced Communication
- Develop Advance Computer Application Skills
- Manage Human Resource Services
- Develop entrepreneurial skills

Competencies to be gained after completion of course

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

- Expert in automotive parts production.
- Lead and supervise a team at workplace.
- Understand and apply the rules and regulation of automotive industry.
- Contribute to Work Related Health and Safety (WHS) Initiatives
- Comply with Workplace Policy and Procedures
- Perform Advanced Communication
- Develop Advance Computer Application Skills
- Manage Human Resource Services

- Develop entrepreneurial skills
- Conduct moulding and extrusion operations
- Perform hot forging operations
- Perform metal die casting operations
- Perform gear cutting operations

Possible available job opportunities available immediately and later in the future

Automotive Parts Production Machine operator (Level-4) is employed in automotive industries locally and internationally. Experienced automotive parts production machine operator after declared competent in Level-4 may grow through promotions from existing position to senior position with the same employer or by moving in advanced positions with other employers. They can become:

- Machine operator
- Line incharge
- Die/Mould Setter
- Team leader
- Production Executive

Some experienced automotive parts production machine operator achieves a highly respected level of salaries. There are good prospects for travel both within Pakistan and abroad. The employment outlook in this occupation will be influenced by a wide variety of factors including:

- Trends and events affecting overall employment
- Location in Pakistan and abroad
- Employment turnover(work opportunities generated by people leaving existing positions)
- Occupational growth (work opportunities resulting from the creation of new positions that never existed before)
- Size of the industry
- Flexibility of the applicant (concerning location and schedule of work).

Trainee entry level

Entry into training institute for this qualification is candidate having National Vocational Certificate middle and level-3, in (Automotive Parts Production Machine Operator or relevant)

Minimum qualification of trainer

B.E/ B.Tech (Mechanical/Automotive) with one year relevant experience

OR

DAE (Mechanical/Auto/die &mould) with Three years relevant experience

Recommended trainer:trainee ratio

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

Medium of instruction i.e. language of instruction

Language of instructions should be Urdu, regional and English.

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

This curriculum comprises 10 modules. The recommended delivery time is 1600 hours. Delivery of the course could therefore be full time, 5 days a week, for 12 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 follow:

Module	Theory[1] Days/hours	Workplace[2] Days/hours	Total hours
Module 1: Contribute to Work Related Health and Safety (WHS) Initiatives	06	24	30

[1] Learning Module hours in training provider premises
[2] Training workshop, laboratory and on-the-job workplace

Module	Theory[1] Days/hours	Workplace[2] Days/hours	Total hours
Module 2: Comply with Workplace Policy and Procedures	06	24	30
Module 3: Perform Advanced Communication	06	24	30
Module 4: Develop Advance Computer Application Skills	08	32	40
Module 5: Manage Human Resource Services	04	16	20
Module 6: Develop entrepreneurial skills	06	24	30
Module 7: Conduct moulding and extrusion operations	58	232	290
Module 8: Perform hot forging operations	20	80	100
Module 9: Perform metal die casting operations	20	80	100
Module 10: Perform gear cutting operations	22	88	110

Sequence of the modules

This qualification (Level-4) is made up of 10 modules. Four modules 7-10 relate to perform different operation like moulding & extrusion, hot forging, metal die casting and gear cutting use in automotive parts production industry. This is not prescriptive and training providers may modify this if they wish.

There are five other modules 2-6 relating to generic skills that a automotive parts production machine operator must have knowledge and understanding, these includes comply with workplace policy and procedures, perform advanced communication, develop advance computer application Skills, manage human resource services and Develop entrepreneurial skills. This is illustrated in the distribution table.

One more module-1 relate to the contribute to work related Health and Safety (WHS) initiatives in automotive parts production industry: The distribution table suggests that this should be delivered at the beginning of the every module.

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 standardized approach to teaching, ensuring that training providers in different parts of the country have clear information on what should be taught.

The distribution table is shown below:

<table>
<tr>
<td rowspan="4">Module 1: Contribute to Work Related Health and Safety (WHS) Initiatives

.</td>
<td>Module 7: Conduct moulding and extrusion operations</td>
<td rowspan="4">Module 2: Comply with 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</td>
</tr>
<tr>
<td>Module 8: Perform hot forging operations</td>
</tr>
<tr>
<td>Module 9: Perform metal die casting operations</td>
</tr>
<tr>
<td>Module 10: Perform gear cutting operations</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: Contribute to Work Related Health and Safety (WHS) Initiatives **Aim:** The Aim of this module is to describe 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.	06	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:** The Aim of this module is to describe 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:** Respect work timeframes. **LU2:** Manage to convene meeting. **LU3:** Decision making at workplace. **LU4:** Set and meet own work priorities at instant. **LU5:** Develop and maintain professional competence. **LU6:** Follow and implement work safety requirements.	06	24	30

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 3: Perform Advanced Communication **Aim:** The Aim of this module is to describe 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.	06	24	30
Module 4: Develop Advance Computer Application Skills **Aim:** The Aim of this module is to 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 form.	**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.	08	32	40

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 5: Manage Human Resource Services **Aim:** The Aim of this module is to describe 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.	04	16	20

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 6: Develop Entrepreneurial Skills **Aim:** The Aim of this module is to identify 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.	06	24	30

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 7:Conduct moulding and extrusion operations **Aim:** The aim of this module is to cover the specific skills and knowledge related to the plastic and rubber parts manufacturing operation on moulding and extrusion machines, material handling, inspection techniques and maintenance of machines and workplace.	**LU1:** Prepare for moulding and extrusion. **LU2:** Conduct pre-operational checks on machine. **LU3:** Prepare moulds (Injection, Compression, blow, rubber injection,PU). **LU4:** Prepare Die. **LU5:** Operate injection molding machine. **LU6:** Operate rubber compression mounding machine. **LU7:** Operate blow moulding machine. **LU8:** Operate rubber injection moulding machine. **LU9:** Operate Polyurethane moulding mchine. **LU10:** Operate extrusion machine. **LU11:** Inspect the final product. **LU12:** Perform workplace cleaning and maintenance.	58	232	290
Module 8: Perform hot forging operations **Aim:** This aim of this module is to cover the specific skills and knowledge related to the process of hot forging parts manufacturing operation on hot forging and press forging machines, material handling, inspection techniques and maintain of machines and workplace.	**LU1:** Prepare for hot press forging. **LU2:** Conduct pre-operational checks on machine. **LU3:** Prepare mould/die. **LU4:** Operate machine. **LU5:** Inspect final product. **LU6:** Perform workplace cleaning and maintenance.	20	80	100

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 9: Perform metal die casting operations **Aim:** The aim of this module is to cover the specific skills and knowledge related to prepare a machine for die casting process, material handling, formulation/ construction, defects & remedies and maintains machine and workplace. .	**LU1:** Prepare for die casting. **LU2:** Conduct pre-operational checks on machine. **LU3:** Prepare casting mould. **LU4:** Operate machine. **LU5:** Inspect final product. **LU6:** Perform workplace cleaning and maintenance.	20	80	100
Module 10: Perform gear cutting operations **Aim:** The aim of this module is to cover the specific skills and knowledge related to perform gear hobbing process, material handling, inspection techniques and maintain the machine and workplace.	**LU1:** Prepare for gear cutting. **LU2:** Conduct pre-operational checks on hobbing machine. **LU3:** select tools. **LU4:** Operate machine. **LU5:** Inspect final product. **LU6:** Perform workplace cleaning and maintenance.	22	88	110

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Module-1

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Modules

Module 1: Contribute to Work Related Health and Safety (WHS) Initiatives.

Objective of the module: This module describe 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).

Duration: 30 hours **Theory:** 06 hours **Practical:** 24 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: **Contribute to initiate work-related health and safety measures**	**The trainee will be able to:** Compile database on work-related health and safety. Identify measures that address legal obligations. Consult with individuals/ parties to formulate measures and initiatives. Consult with individuals/parties to identify factors impacting on work-related health and safety. Participate in consultative meetings.		**Total** **Theory:** **Practical:**		Classroom Training workshop

LU2: **Contribute to establish work-related health and safety measures**	**The trainee will be able to:** Assist in planning of work-related health and safety measures. Contribute to the development of work-related health and safety measures. Identify to implement work-related health and safety measures i.e. • resourcing requirements, • timelines • responsibilities Assist to implement work-related health and safety measures and initiatives i.e. • scheduling • liaison • administering resources • communication		**Total** **Theory:** **Practical:**		Classroom Training workshop
LU3: **Contribute to ensure legal requirements of WHS measures**	**The trainee will be able to:** Identify WHS legal requirements. Apply knowledge of all aspects of WHS measures to		**Total** **Theory:** **Practical:**		Classroom Training workshop

	• Consultation • workplace policies • participation processes Ensure, WHS measures are in accordance with legal requirements.				
LU4: **Contribute to review WHS measures**	**The trainee will be able to:** Develop effective practices to review work-related health and safety measures. Assist individuals and parties related to WHS measures in following activities. • preparing reports • communicating review • evaluating outcomes		**Total** **Theory:** **Practical:**		Classroom Training workshop
LU5: **Evaluate the organization's WHS system**	**The trainee will be able to:** Assess ongoing compliance with OHS (Occupational Health and safety). Take feedback from concerned persons regarding WHS measures.		**Total** **Theory:** **Practical:**		Classroom Training workshop

	Assess the overall effectiveness of WHS management practices. Assist the development process of WHS measures in following ways. • Suggest amendments • Document amendments • Implement amendments Take feedback from concerned persons regarding WHS measures. Communicate improvements in WHS Measures.				

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Module-2
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Module 2: Comply with Workplace Policy and Procedures.

Objective of the module: This module 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.

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Duration: 30 hours **Theory:** 06 hours **Practical:** 24 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: **Respect work timeframes**	**The trainee will be able to:** Complete work tasks within deadlines in according to order of priority. Supervisors are informed of any delays in work times or projects.		**Total** **Theory:** **Practical:**		Classroom
LU2: **Manage to convene meeting**	**The trainee will be able to:** Develop agenda in line with meeting purpose. Selection of participants and notify them accordingly. Confirm meeting arrangements according to		**Total** **Theory:** **Practical:**		Classroom

	the time. Record the minutes of the meeting.				
LU3: **Decision making at workplace**	**The trainee will be able to:** Define the problem, challenge, or opportunity. Generate an array of possible solutions or responses. Evaluate the costs and benefits, or pros and cons, associated with each option. Assess the impact of the decision and modify the course of action as needed.		**Total** **Theory:** **Practical:**		Classroom
LU4: **Set and meet own work priorities at instant**	**The trainee will be able to:** Take initiative to prioritize and facilitate competing demands to achieve organization goals and objectives. Use technology efficiently and effectively to manage work priorities and commitments. Maintain appropriate work-life balance.		**Total** **Theory:** **Practical:**		Classroom

LU5: **Develop and maintain professional competence**	**The trainee will be able to:** Assess personal knowledge and skills against competency. Participate in networks to enhance personal knowledge, skills and work relationships. Seek feedback from employees, clients and colleagues to develop and improve competence.		**Total** **Theory:** **Practical:**		Class room
LU6: **Follow and implement work safety requirements**	**The trainee will be able to:** Identify and report emergency incidents. Practice organizational policy and procedures for responding to emergency incidents. Identify and implement workplace procedures and work instructions for controlling risks.		**Total** **Theory:** **Practical:**		Classroom Training workshop

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Module-3
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Module 3: Perform Advanced Communication.

Objective of the module: This module 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.

Duration: 30 hours **Theory:** 06 hours **Practical:** 24 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: **Demonstrate professional skills**	**The trainee will be able to:** Use different modes of communication to communicate • Speaking • Reading • Writing • Listening • Presentation • visual representation etc. Develop CV Skills according requirements. Upgrade professional skills by attending trainings, webinars, conferences etc. Perform Continuous professional development required at workplace. Develop interview skills.		**Total** **Theory:** **Practical:**		Classroom Training workshop
LU2:	**The trainee will be able to:**		**Total**		Classroom

Plan and Organize work	Identify task requirements. Plan steps to complete tasks. Review planning and organizing process. Organize work.		**Theory:** **Practical:**		Training workshop
LU3: **Provide trainings at workplace**	**The trainee will be able to:** Assess the need for training. Prepare trainees for the learning experience. Present training session. Support trainees in managing their own learning. Facilitate group learning. Provide opportunity for practice. Provide feedback on progress on trainees. Review delivery experience.		**Total** **Theory:** **Practical:**		Classroom Training workshop

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Module-4
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Module 4: Develop Advance Computer Application Skills.

Objective of the module: This module 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 form.

Duration: 40 hours **Theory:** 08 hours **Practical:** 32 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: **Manage Information System to complete a task**	**The trainee will be able to:** Perform Data Entry in MS office. Manage File/folder in MS office. Perform Scanning of document. Maintain Office Record in drives. Perform Printing of document. Search required Files/Folders. Convert Files in required		**Total** **Theory:** **Practical:**		Classroom Training workshop

	format. Manage sizes of Files/Folders. • Compress • Zip /unzip				
LU2: **Prepare Presentation using computers**	**The trainee will be able to:** Prepare presentation as per requirement .i.e. • Open blank presentation and add text / graphics • Create a simple design for a presentation • Apply existing styles within a presentation • Use presentation template and slides to create a presentation • Use various tools to improve the look of the presentation • Save presentation to the appropriate storage device and folder Customize basic settings to meet user requirements. Format presentation as		**Total** **Theory:** **Practical:**		Classroom Training workshop

	require • Develop organizational charts • Add objects and manipulate to meet presentation purposes • Modify slide layout, including text and colors, to meet presentation requirements • Save presentation in another format • Save to storage device and close presentation. • Add slide show effect into presentation as required to enhance the presentation • Incorporate pre-set Animation • Apply multimedia effects • Record Narration • Apply hyperlink • Apply video • Rehearse Timings • Test presentation for overall effect. Print the presentation • Select appropriate print format for presentation • Select preferred				

	slide orientation • Add notes and slide numbers • Preview slides and run spell check before presentation • Print selected slides and submit presentation to appropriate person for feedback. Practice verbal presentation. Practice presentation through AV Aids.				
LU3: **Use Microsoft Access to manage database**	**The trainee will be able to:** Collect the data using a standard data base package. Start access to manage database .i.e. • Identify problem statement of Data • Develop a table with fields /attributes according to database usage/		**Total** **Theory:** **Practical:**		Classroom Training workshop

	user requirements. • Create a primary key and establish an index for each table. • Modify table layout and field attributes as required. • Create a relationship between the two tables. • Add data in a table according to information requirements. • Add records as required. • Delete records as required. • Save database to storage area. • close down database to storage area. • Apply criteria in the Query. • SQL view of Query. • Wildcards of query. • Query Criteria. Customize basic settings: • Adjust page layout to meet user				

	requirements. • Open and view different toolbars. • Format font as appropriate for the purpose of the database entries. • Create reports. • Design reports to present data in a logical sequence. • Modify reports to include or exclude additional requirements. • Distribute reports to appropriate person in a suitable format. Create forms • Use a wizard to create a simple form. • Open existing database and modify records through a simple form. • Rearrange objects within the form to accommodate information requirements.				
LU4:	**The trainee will be able to:**		**Total**		

Develop graphics for Design	Develop graphic design concepts based on a thorough understanding of the communication need. Use design techniques confidently to produce designs. Integrate design tools skillfully to produce designs. Evaluate the success of completed designs to meet objectives. Evaluate feedback from client / peers.		**Theory:** **Practical:**		

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Module-5

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Module 5: Manage Human Resource Services.

Objective of the module: This module 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.

Duration: 20 hours **Theory:** 04 hours **Practical:** 16 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: **Determine strategies for delivery of human resource services**	**The trainee will be able to:** Analyze business strategy and operational plans to determine human resource requirements. Review external business environment that likely impact on organization's human resource requirements. Consult line and senior managers to identify human resource needs in their areas. Review organization's requirements for diversity in the workforce. Deliver human resource services that comply with		**Total** **Theory:** **Practical:**		Classroom Training workshop

	business goals. Develop strategic action plan for delivery of human resource services. Develop roles and responsibilities of human resource team Develop quality assurance policy.				
LU2: **Manage the delivery of human resource services**	**The trainee will be able to:** Communicate human resource strategies and services to internal and external stakeholders. Develop and negotiate service agreements between • The human resource team, • Service providers • Client groups Document service specifications, performance standards and timeframes. Document /communicate service • Specifications, • Performance standards • Timeframes Monitor Quality assurance		**Total** **Theory:** **Practical:**		Classroom Training workshop

	processes. Ensure that services are delivered by appropriate providers, according to service agreements and operational plans. Identify underperformance of human resource team or service providers				
LU3: **Evaluate human resource service delivery**	**The trainee will be able to:** Establish Management information system for human resource services. Conduct survey to determine level of satisfaction. Analyze feedback of survey. Recommend changes to service delivery. Support agreed change processes across the organization.		**Total** **Theory:** **Practical:**		Classroom Training workshop
LU4: **Manage integration of business ethics in human resource**	**The trainee will be able to:** Ensure ethics in personal behavior. Ensure code of conduct is observed across the organization.		**Total** **Theory:** **Practical:**		

practices	Observe confidentiality requirements in dealing with all human resource information. Deal promptly with unethical behavior. Ensure all persons responsible for human resource. Functions understand requirements regarding their ethical behavior.				

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Module-6
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Module 6: Develop entrepreneurial skills.

Objective of the module: This module 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.

Duration: 30 hours **Theory:** 06 hours **Practical:** 24 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: **Develop a business plan**	**The trainee will be able to:** Conduct a market survey to collect following information • Customer /demand • Tools, equipment, machinery and furniture with rates • Raw material • Supplier • Credit / funding sources • Marketing strategy • Market trends • Overall expenses • Profit margin Select the best option in terms of cost, service, quality, sales, profit		**Total** **Theory:** **Practical:**		Classroom

	margin, and overall expenses. Compile the information collected through the market survey, in the business plan format.				
LU2: **Collect information regarding funding sources**	**The trainee will be able to:** Identify the available funding sources based on their terms and conditions, maximum loan limit, payback time, interest rate. Choose the best available option according to investment requirement. Prepare documents according to the loan agreement requirement. Include the information of funding sources in the business plan.		**Total** **Theory:** **Practical:**		Classroom Training workshop
LU3: **Develop a marketing plan**	**The trainee will be able to:** Make a marketing plan for the business including product, price, placement, promotion, people, packaging and positioning.		**Total** **Theory:** **Practical:**		Classroom Training workshop

	Include the information of marketing plan in the business plan.				
LU4: **Develop basic business communication skills**	**The trainee will be able to:** Communicate with internal customers e.g.: labor, partners and external customers e.g.: suppliers, customers etc., using effective communication skills. Use different modes of communication to communicate internally and externally e.g.: presentation, speaking, writing, listening, visual representation, reading etc. Use specific business terms used in the market.		**Total** **Theory:** **Practical:**		Classroom Training workshop

AUTOMOTIVE PARTS PRODUCTION MACHINE OPERATOR

Module-7

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Module 7: 0716001046 Conduct moulding and extrusion operations

Objective of the module: This module covers the specific skills and knowledge related to the plastic and rubber parts manufacturing operation on moulding and extrusion machines, material handling, inspection techniques and maintenance of machines and workplace.

Duration: 290 hours **Theory:** 58 hours **Practical:** 232 hrs

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: **Prepare for moulding and extrusion**	**The trainee will be able to:** Arrange material as per drawing or process sheet. Select the tools and equipment. Set machine as per job specification.	Knowledge and Understanding of material preparation as per drawing or process sheet. Knowledge and Understanding of material (Plastic, Rubber, PU, Extrusion) Knowledge and Understanding about how to select the tools and equipment. Knowledge and Understanding about how to set machine as per job specification.	**Total** 15 **Theory:** 03 **Practical:** 12	PPEs Moulds (Injection, Compression, Blow, Rubber Injection, Extrusion and PU) Dryer Air compressor Water chiller Heater Adjustable Spanner Pipe Wrench Mixer (for Rubber Compounding) Dryer Combination Spanner Set Socket Set with handle Screw Driver Set	Class Room Training workshop.

				Allen Key Set Plier Set Hammer Mallet (Soft Hammer) First aid box	
LU2: **Conduct pre-operational checks on machine**	**The trainee will be able to:** Inspect all electrical connections. Check all mechanical fitting and joints. Check operation of emergency switches. Check and maintain correct machine lubricant level. Check chillier temperature. Check function by operate machine manually.	Knowledge and understanding about how to check electrical connections Knowledge and understanding about how to check mechanical fitting and joints. Knowledge and understanding about how to check emergency switches. Knowledge and understanding about how to check machine lubricant, temperature and pressures. Knowledge and understanding about operation of machine.	**Total** 15 **Theory:** 03 **Practical:** 12	PPEs Maintenance tools kit Air compressor Water chiller Heater Adjustable Spanner Pipe Wrench Combination Spanner Set Socket Set with handle Screw Driver Set Allen Key Set Plier Set Tongue & Groove Plier	Class Room Training workshop. Relevant industry

				Hammer Mallet (Soft Hammer) First aid box	
LU3: **Prepare moulds (Injection, Compression, blow, rubber injection,PU)**	**The trainee will be able to:** Place the mould on machine (Moulding/Extrusion). Align the mould on machine. Operate machine manually and match the upper and lower mould. Clamp the mould. Install the cooling water lines on mould. Set the parameters. Perform the trial of mould to verify the operation.	Knowledge and understanding of Mold/ Die loading on machine (Injection, Compression, blow, rubber injection, PU) Knowledge and understanding about how to set the parameters. Knowledge and understanding about how to perform the trial of mould/Die, to verify the operation.	**Total** 15 **Theory:** 03 **Practical:** 12	PPEs Plastic injection moulding machine Extrusion machine Moulds (Injection, Compression, Blow, Rubber Injection, Extrusion and PU) Rubber compression moulding machine Blow moulding machine Rubber injection moulding machine Polurethane moulding machine Air compressor Water chiller Heater Lifter Hoist with stand Adjustable	Class Room Training workshop. Relevant industry.

				Spanner Pipe Wrench Combination Spanner Set Socket Set with handle Screw Driver Set Allen Key Set Measurement Tape Plier Set Tongue & Groove Plier Hammer Mallet (Soft Hammer) First aid box	
LU4: **Prepare die**	**The trainee will be able to:** Place the die on machine with lifting equipment. Align the die on machine. Operate machine manually and match the upper and lower dies. Clamp the die.	Knowledge and understanding about how to lift die. Knowledge and understanding about alignment of die. Knowledge and understanding about Die Clamping Knowledge and understanding about parameters setting Knowledge and understanding about how to trial of die/mold to verify the	**Total** 15 **Theory:** 03 **Practical:** 12	PPEs Plastic injection moulding machine Extrusion machine Moulds (Injection, Compression, Blow, Rubber Injection, Extrusion and PU) Rubber compression	Class Room Training workshop. Relevant industry

	Set parameters Perform the trial of die to verify the operation.	operation.		moulding machine Blow moulding machine Rubber injection moulding machine Polurethane moulding machine Maintenance tools kit Air compressor Water chiller Heater Lifter Hoist with stand Adjustable Spanner Pipe Wrench Combination Spanner Set Socket Set with handle Screw Driver Set Allen Key Set Tool Trolley Measurement Tape Micrometer	

				Vernier Caliper Plier Set Blower Tongue & Groove Plier Hammer Mallet (Soft Hammer) First aid box	
LU5: **Operate injection molding machine**	**The trainee will be able to:** Set all parameters. Proceed with operation. Monitor operation to ensure compliance with job requirements. .	Knowledge and understanding about machine selection. Knowledge and understanding about parameters setting. Knowledge and understanding about injection molding operation. Knowledge and understanding about monitoring operation. Knowledge and understanding about quality of plastic parts Knowledge and explaining about different parts of molding machine Knowledge and explaining types of moulds. Knowledge and explaining fits and limits system.	**Total** 35 **Theory:** 07 **Practical:** 28	PPEs Plastic injection moulding machine Dryer Maintenance tools kit Air compressor Water chiller Heater Lifter Vernier Caliper Blower Mallet (Soft Hammer) First aid box	Class Room Training workshop. Relevant industry.
LU6: **Operate rubber**	**The trainee will be able to:** Perform degassing on	Knowledge and understanding about machine selection. Knowledge and understanding about	**Total** 35	PPEs Rubber compression	Class Room. Training workshop.

compression mounding machine	mould. Set all parameters. Proceed with operation. Monitor operation to ensure compliance with job requirements.	parameters setting. Knowledge and understanding about degassing on mould. Knowledge and understanding about rubber compression mounding operation. Knowledge and understanding about monitoring operation. Knowledge and understanding about quality of rubber compression mounding parts. Knowledge of define different parts about molding machine Knowledge and explaining types about moulds. Knowledge and explaining about fits and limits system.	**Theory:** 07 **Practical:** 28	moulding machine Mixer (for Rubber Compounding) Air compressor Water chiller Heater Vernier Caliper Blower Mallet (Soft Hammer) First aid box	Relevant industry.
LU7: **Operate blow moulding machine**	**The trainee will be able to:** Set all Parameters. Proceed with operation. Monitor operation to ensure compliance with job requirements.	Knowledge and understanding about machine selection. Knowledge and understanding about parameters setting. Knowledge and understanding about blow mounding operation. Knowledge and understanding about monitoring operation. Knowledge and understanding about quality of Blow mounding parts. Knowledge and explaining about different parts of molding machine. Knowledge and explaining types of	**Total** 35 **Theory:** 07 **Practical:** 28	Blow moulding machine Dryer Air compressor Water chiller Heater Vernier Caliper Blower Mallet (Soft Hammer) First aid box	Class Room. Training workshop. Relevant industry.

		moulds. Knowledge and understanding about fits and limits system.			
LU8: **Operate rubber injection moulding machine**	**The trainee will be able to:** Perform degassing on mould. Set all parameters. Proceed with operation. Monitor operation to ensure compliance with job requirements.	Knowledge and understanding about machine selection. Knowledge and understanding about parameters setting. Knowledge and understanding about degassing on mould. Knowledge and understanding about injection moulding operation. Knowledge and understanding about how to monitor operation. Knowledge and understanding about quality of injection moulding parts Knowledge and explaining different parts of moulding machine. Knowledge and explaining types of moulds. Knowledge and explaining about fits and limits system.	**Total** 35 **Theory:** 07 **Practical:** 28	Rubber injection moulding machine Mixer (for Rubber Compounding) Air compressor Water chiller Heater Vernier Caliper Blower Mallet (Soft Hammer) First aid box	Class Room. Training workshop. Relevant industry.
LU9: **Operate Polyurethane moulding mchine**	**The trainee will be able to:** Mix the raw material polyurethane part A (Polyols) in the drum of mixing machine. Mix the raw material polyurethane part B (Isocyanates) in the drum of mixing machine.	Knowledge and understanding about machine selection. Knowledge and understanding about parameters setting. Knowledge and understanding about material mixing Knowledge and understanding about PU moulding operation. Knowledge and understanding about	**Total** 35 **Theory:** 07 **Practical:** 28	PPEs Polurethane moulding machine Maintenance tools kit Air compressor Water chiller	Class Room. Training workshop. Relevant industry.

	Fill the tank of polyurethane machine part A (Polyols) by using the pump. Fill the tank of polyurethane machine part B (isocyanates) by using the pump. Fasten the machine tank cover to avoid the moisture. Circulate the water on machine tank to maintain the required temperature of raw material. Set the water temperature according to the weather condition. Set all parameters (Ratio A & B). Operate the material circulating pump A (Polyols) and B (Isocyanates) on operating position. Fill the de-flashing tank by hand and ensure safety. Set the die on platform.	monitoring operation. Knowledge and understanding about quality of PU moulding parts Knowledge and understanding about PU process. Knowledge and understanding about different parts of molding machine Knowledge and understanding about maintenance of PU machine. Knowledge and understanding about behavior of Environment on process.		Heater Mallet (Soft Hammer) First aid box	

	Proceed with operation. Monitor operation to ensure compliance with job requirements.				
LU10: **Operate extrusion machine**	**The trainee will be able to:** Set all parameters. Fix the nozzle in extruder according to job material. Fill the water tank. Set the cutting distance of material as per requirement. Proceed with operation. Monitor operation to ensure compliance with job requirements.	Knowledge and understanding about machine selection. Knowledge and understanding about machine and parameters setting. Knowledge and understanding about extrusion mounding operation. Knowledge and understanding about monitor operation. Knowledge and understanding about quality checks of extrusion mounding parts. Knowledge and understanding about different parts of molding machine. Knowledge and explaining about fits, limits and Hole and Shaft system	**Total** 35 **Theory:** 07 **Practical:** 28	PPEs Extrusion machine Dryer Maintenance tools kit Air compressor Water chiller Heater Vernier Caliper Mallet (Soft Hammer) First aid box	Class Room. Training workshop. Relevant industry.
LU11: **Inspect the final product**	**The trainee will be able to:** Perform visual inspection of defects. Check dimensionally. Check by go no go gauge. Complete inspection	Knowledge and understanding about visual inspection. Knowledge and understanding about how to Check dimensionally. Knowledge and understanding about how to check with the gauges. Knowledge and understanding about how to make inspection report.	**Total** 10 **Theory:** 02 **Practical:** 08	Measurement Tape Micrometer Vernier Caliper GO no-go Gauges Inspection reports Printers Papers	Class Room. Training workshop. Relevant industry.

	report.			computer	
LU12: **Perform workplace cleaning and maintenance**	**The trainee will be able to:** Maintain all check sheets and work instructions on the machine. Maintain the tools and equipment. Keep tools and equipment at appropriate place. Perform cleaning of machine, mould/die and floor. Apply anti-rust spray/cleaning agent. Perform lubrication. Transfer wastage material into the wastage area. Return excess material to store.	Knowledge and understanding about how maintain all check sheets and work instructions on the machine. Knowledge and understanding about how to maintain the tools and equipment. Knowledge and understanding about how to keep tools and equipment at their appropriate place. Knowledge and understanding about lubricants and lubrication. Knowledge and understanding about how to perform cleaning of machine, mould/die and floor. Knowledge and understanding about how to apply anti-rust spray/cleaning agent. Knowledge and Understanding about how to handle waste/excess material.	**Total** 10 **Theory:** 02 **Practical:** 08	PPEs Maintenance tools kit Adjustable Spanner Pipe Wrench Combination Spanner Set Socket Set with handle Screw Driver Set Allen Key Set Tool Trolley Plier Set Blower Tongue & Groove Plier Hammer cotton Mallet (Soft Hammer) First aid box	Class Room. Training workshop. Relevant industry.

AUTOMOTIVE PARTS PRODUCTION MACHINE OPERATOR

Module-8
CBT Curriculum
National Vocational Certificate Level 4

Version 1 - November, 2019

Module 8: 0716001047 Perform hot forging operations

Objective of the module: This module covers the specific skills and knowledge related to the process of hot forging parts manufacturing operation on hot forging and press forging machines, material handling, inspection techniques and maintain of machines and workplace.

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

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. **Prepare for hot press forging**	**The trainee will be able to:** Arrange material as per drawing or process sheet. Select tools and equipment. Set machine as per job specification.	Knowledge and understanding about Arrangement of material as per drawing or process sheet. Knowledge and understanding about material Knowledge and understanding about how to select the tools and equipment. Knowledge and understanding about how to set machine as per job specification.	**Total** 15 **Theory:** 03 **Practical:** 12	PPEs Hot forging Press machine (hydraulic/pneumatic) Combination spanner set Socket Set with handle Screw driver set Allen key set Plier set Hammer Chisel First aid box	Class Room. Training workshop.
LU2. **Conduct pre-operational checks on machine**	**The trainee will be able to:** Inspect all electrical connection. Check all mechanical fitting and joints.	Knowledge and understanding about how to check electrical connections. Knowledge and understanding about how to check mechanical fitting and joints. Knowledge and understanding about how to check emergency switches.	**Total** 15 **Theory:** 03 **Practical:**	PPEs Gas burner Tool kit trolley Adjustable spanner Combination spanner	Class Room. Training workshop. Relevant industry.

	Check operation of emergency switches. Check air connections. Check the control panel button. Check and maintain oil tank lubrication. Check the manual stroke for proper ram working.	Knowledge and understanding about how to check machine lubricant, temperature and pressures Knowledge and understanding about how to operate machine manually.	12	set Socket Set with handle Screw driver set Allen key set Plier set Hammer Chisel First aid box	
LU3. **Prepare mould/ die**	**The trainee will be able to:** Install mould/die with lifting equipment. Set all parameters. Turn on gas burner for pre-heating mould/die. Maintain the idle temperature of mould/die.	Knowledge and understanding about how to lift die/Mold. Knowledge and understanding about alignment of die/mold. Knowledge and understanding about how to Clamp Die/Mold. Knowledge and understanding about parameters setting. Knowledge and understanding about preheating of die/mould. Knowledge and understanding about idle temperature of die/mould.	**Total** 15 **Theory:** 03 **Practical:** 12	PPEs Hot forging Press machine (hydraulic/pneumatic) Mould/die set Manual toggle Mould/die setter on machine Mould/die lifting crane Gas burner Shakels Eye bolt Tool kit trolley Adjustable spanner	Class Room. Training workshop. Relevant industry.

				Combination spanner set Socket Set with handle Screw driver set Allen key set Hammer Chisel First aid box	
LU4. **Operate machine**	**The trainee will be able to:** Release the mult/blank from induction heater. Adjust mult/blank on mould/die. Proceed with operation. Monitor operation to ensure compliance with job requirements.	Knowledge and understanding about machine selection. Knowledge and understanding about machine setting and parameters setting. Knowledge and understanding about induction heater Knowledge and understanding about operation. Knowledge and understanding about monitoring operation. Knowledge and understanding about Mult/Blank and their Calculation. Knowledge and understanding about quality checks of forging parts. Knowledge and understanding about different parts of forging press machine.	**Total** 35 **Theory:** 07 **Practical:** 28	PPEs Hot forging Press machine (hydraulic/pneumatic) Allen key set Measurement tape Vernier Caliper Hammer Chisel First aid box	Class Room. Training workshop. Relevant industry.
LU5. **Inspect final**	**The trainee will be able to:** Perform visual	Knowledge and understanding about visual inspection. Knowledge and understanding about	**Total** 10	PPEs Measurement tape	Class Room. Training workshop.

product	inspection of defects. Check dimensionally. Inspect the part for non-filling. Complete inspection report.	how to Check dimensionally. Knowledge and understanding about how to check with the help of gauges. Knowledge and understanding about how to make inspection report.	**Theory:** 02 **Practical:** 08	Vernier Caliper First aid box	Relevant industry.
LU. 6 **Perform workplace cleaning and maintenance**	**The trainee will be able to:** Maintain all check sheets and work instruction on machine. Perform cleaning of mould, machine and floor. Apply anti-rust spray/cleaning agent. Perform lubrication on slides and mould/die. Maintain tools and equipment. Keep tools and equipment at appropriate place. Transfer wastage material in to the wastage area. Return excess material to store.	Knowledge and understanding about how to maintain all check sheets and work instructions on the machine. Knowledge and understanding about how to maintain tools and equipments Knowledge and understanding about how to Keep tools and equipment at appropriate place. Knowledge and understanding about lubricants and lubrication. Knowledge and understanding about Perform cleaning of machine, mould/die and floor. Knowledge and understanding about how to apply anti-rust spray/cleaning agent Knowledge and understanding about handling waste/excess material	**Total** 10 **Theory:** 02 **Practical:** 08	PPEs Tool kit trolley Adjustable spanner Combination spanner set Socket Set with handle Screw driver set Allen key set Measurement tape Vernier Caliper Plier set Hammer Chisel cotton First aid box	Class Room. Training workshop. Relevant industry.

AUTOMOTIVE PARTS PRODUCTION MACHINE OPERATOR

Module-9
CBT Curriculum
National Vocational Certificate Level 4

Version 1 - November, 2019

Module 9: 0716001048 Perform metal die casting operation

Objective of the module: This mould covers the specific skills and knowledge related to prepare a machine for die casting process, material handling, formulation/ construction, defects & remedies and maintains machine and workplace.

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

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. **Prepare for die casting**	**The trainee will be able to:** Arrange material as per drawing or process sheet. Select tools and equipment. Prepare the melting furnace (Crucible). Set machine as per job specification.	Knowledge and understanding about how to arrange material as per drawing or process sheet. Knowledge and understanding about material. Knowledge and understanding about how to select the tools and equipment. Knowledge and understanding about how to set machine as per job specification.	**Total** 15 **Theory:** 03 **Practical:** 12	PPEs Mould/die set Manual toggle Mould/die setter on machine Mould/die lifting crane Gas burner Shakels Eye bolt Tool kit trolley Adjustable spanner Combination spanner set Socket Set with handle Screw driver set	Class Room. Training workshop. Relevant industry.

				Allen key set Plier set Hammer First aid box	
LU2. **Conduct pre-operational checks on machine**	**The trainee will be able to:** Inspect all electrical connection. Check all mechanical fitting and joints. Check operation of emergency switches. Check the plunger Check cooling lines. Check and maintain proper lubrication. Check air pressure. Check water connection.	Knowledge and understanding about how to check electrical connections. Knowledge and understanding about how to check mechanical fitting and joints. Knowledge and understanding about how to check emergency switches. Knowledge and understanding about how to check machine lubricant, temperature and pressures Knowledge and understanding about Plunger. Knowledge and understanding about operation of machine.	**Total** 15 **Theory:** 03 **Practical:** 12	PPEs Die setting Air compressor Water chiller Heater Lifter Adjustable Spanner Pipe Wrench Combination Spanner Set Socket Set with handle Screw Driver Set Allen Key Set Measurement Tape Plier Set Tongue & Groove Plier Hammer First aid box	Class Room. Training workshop. Relevant industry.

LU3. **Prepare casting mould**	**The trainee will be able to:** Lift mould with lifting equipment. Place the mould between the mould platen. Align mould in the centre of platen. Set cutting part size. Connect hydraulic and water connection. Clamp mould with bolts/ hydraulic clamps. Apply releasing spray/ beads.	Knowledge and understanding about how to lifting die/Mold. Knowledge and understanding about Die/Mold Clamping. Knowledge and understanding about alignment of die/mold. Knowledge and understanding about parameters setting. Knowledge and understanding about hydraulic and water connection. Knowledge and understanding about how to perform trial of die/mold to verify the operation.	**Total** 15 **Theory:** 03 **Practical:** 12	PPEs Moulds setting Air compressor Water chiller Heater Lifter Hoist with stand Adjustable Spanner Pipe Wrench Combination Spanner Set Socket Set with handle Screw Driver Set Allen Key Set Measurement Tape Plier Set Tongue & Groove Plier Hammer Mallet (Soft Hammer) First aid box	Class Room. Training workshop. Relevant industry.
LU4.	**The trainee will be able**	Knowledge and understanding about	**Total**		Class Room.

Operate machine	**to:** Set all parameters. Lift the material with ladle from the holding furnace. Pour the material in the plunger. Proceed with operation. Monitor operation to ensure compliance with job requirements.	temperature and melting point of material. Knowledge and understanding about types of casting. Knowledge and understanding about machine selection. Knowledge and understanding about machine and parameters setting. Knowledge and understanding about Furnace. Knowledge and understanding about operation. Knowledge and understanding about how to monitor operation. Knowledge and understanding about pouring and their calculation. Knowledge and understanding about different parts of die casting machine	35 **Theory:** 07 **Practical:** 28		Training workshop. Relevant industry.
LU5. **Inspect final product**	**The trainee will be able to:** Perform visual inspection of defects. Check dimensionally. Check part on checking fixture. Complete inspection report.	Knowledge and understanding about visual inspection. Knowledge and understanding about how to Check dimensionally. Knowledge and understanding about how to checking with the gauges. Knowledge and understanding about how to make inspection report.	**Total** 10 **Theory:** 02 **Practical:** 08	PPEs Vernier caliper Lifter Measurement Tape First aid box	Class Room. Training workshop. Relevant industry.

LU6. **Perform workplace cleaning and maintenance**	**The trainee will be able to:** Maintain all check sheets and work instruction on machine. Perform cleaning of die, machine and floor Perform lubrication on slides, tie bar and mould. Apply anti rust spray/cleaning agent. Maintain tools and equipment. Keep tools and equipment at appropriate place. Transfer wastage material in to the wastage area. Return excess material to store.	Knowledge and understanding about how to Maintain all check sheets and work instructions on the machine. Knowledge and understanding about how to maintain the tools and equipment. Knowledge and understanding about how to Keep tools and equipment at appropriate place. Knowledge and understanding about lubricants and lubrication. Knowledge and understanding about how to perform cleaning of machine, mould/die and floor. Knowledge and understanding about how to apply anti-rust spray/cleaning agent Knowledge and Understanding about how to handle waste/excess material	**Total** 10 **Theory:** 02 **Practical:** 08	PPEs Cotton Air compressor Lifter First aid box	Class Room. Training workshop. Relevant industry.

AUTOMOTIVE PARTS PRODUCTION MACHINE OPERATOR

Module-10
CBT Curriculum
National Vocational Certificate Level 4

Version 1 - November, 2019

Module 10: 0716001049 Perform gear cutting operation

Objective of the module: This module covers the specific skills and knowledge related to perform gear hobbing process, material handling, inspection techniques and maintain the machine and workplace.

Duration: 110 hours **Theory:** 22 hours **Practical:** 88 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. **Prepare for gear cutting**	**The trainee will be able to:** Arrange material as per drawing or process sheet. Select tools and equipment. Set machine as per job specification.	Knowledge and understanding about how to arrange material as per drawing or process sheet. Knowledge and understanding about material. Knowledge and understanding about how to select the tools and equipment. Knowledge and understanding about how to set machine as per job specification.	**Total** 15 **Theory:** 03 **Practical:** 12	PPEs Gear hobbing machine Cutting tools Clamping devices Pliers set Screw driver set Spacers Combination spanner set Socket set with Handle Vanier caliper Micro meter Dial indicator with stand First aid box	Class Room. Training workshop.
LU2. **Conduct pre-operational checks on**	**The trainee will be able to:** Inspect all electrical connections.	Knowledge and understanding about how to check electrical connections Knowledge and understanding about how	**Total** 15 **Theory:**	PPEs Gear hobbing machine	Class Room. Training workshop. Relevant industry.

hobbing machine	Check all mechanical fitting and joint. Check operation of emergency switches. Check and maintain correct machine lubricant and coolant levels.	to check mechanical fitting and joints. Knowledge and understanding about how to check emergency switches. Knowledge and understanding about how to check machine lubricant, temperature and pressures. Knowledge and understanding about how to check machine operation.	03 **Practical:** 12	Cutting tools Clamping devices Pliers set Screw driver set Spacers Combination spanner set Socket set with Handle Vanier caliper Micro meter Dial indicator with stand Allen key set First aid box	
LU3. **Select tools**	**The trainee will be able to:** Select the cutter as per gear type and module. Select the clamping device as per job. Select measurement tools.	Knowledge and understanding about Cutting tools. Knowledge and understanding about Clamping devices. Knowledge and understanding about how to Select measurement tools. Knowledge and understanding about calculation and formulas.	**Total** 15 **Theory:** 03 **Practical:** 12	PPEs Gear hobbing machine Cutting tools Clamping devices Pliers set Screw driver set Spacers Combination spanner set	Class Room. Training workshop. Relevant industry.

				Socket set with Handle Vanier caliper Micro meter Dial indicator with stand Allen key set First aid box	
LU4. **Operate machine**	**The trainee will be able to:** Clamp the tool. Clamp the work piece. Set all parameters. Align the tool according to work piece. .Proceed with operation. Monitor operation to ensure compliance with job requirements.	Knowledge and understanding about how to Clamp the tool. Knowledge and understanding about how to Clamp work piece. Knowledge and understanding about machine selection. Knowledge and understanding about machine and parameters setting. Knowledge and understanding about different types of gears. Knowledge and understanding about operation. Knowledge and understanding about how to monitor operation. Knowledge and understanding about how to align work piece. Knowledge and understanding about different parts of gear cutting machine.	**Total** 45 **Theory:** 09 **Practical:** 36	PPEs Gear hobbing machine Cutting tools Clamping devices Pliers set Screw driver set Spacers Combination spanner set Socket set with Handle Vanier caliper Micro meter Dial indicator with stand Allen key set	Class Room. Training workshop. Relevant industry.

				First aid box	
LU5. Inspect final product	**The trainee will be able to:** Perform visual inspection of defects. Check dimensionally. Complete inspection report.	Knowledge and understanding about visual inspection. Knowledge and understanding about Checking dimensionally. Knowledge and understanding about checking with the gauges. Knowledge and understanding about how to make inspection report.	**Total** 10 **Theory:** 02 **Practical:** 08	PPEs Vanier caliper Micro meter Dial indicator with stand Profile projector First aid box	Class Room. Training workshop. Relevant industry.
LU6. **Perform workplace cleaning and maintenance**	**The trainee will be able to:** Maintain all check sheets and work instruction on machine. Perform cleaning of machine and floor. Apply Anti-rust spray/Cleaning agent. Perform lubrication. Maintain tools and equipment. Keep tools and equipment at appropriate place. Transfer wastage material in to the wastage area. Return Excess material to store.	Knowledge and Understanding about how to Maintain all check sheets and work instructions on the machine. Knowledge and Understanding about how to maintain the tools and equipment.Knowledge and Understanding about how to Keep tools and equipment at their appropriate place. Knowledge and Understanding about lubricants and lubrication. Knowledge and Understanding about how to Perform cleaning of machine, mould/die and floor.Knowledge and Understanding about how to Apply anti-rust spray/cleaning agentKnowledge and Understanding about how to handle waste/excess material	**Total** 10 **Theory:** 02 **Practical:** 08	PPEs Gear hobbing machine Cutting tools Clamping devices Pliers set Screw driver set Spacers Combination spanner set Socket set with Handle Vanier caliper Micro meter Dial indicator with stand First aid box	Class Room. Training workshop. Relevant industry.

General assessment guidance for Automotive Parts Production Machine Operator 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 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 or not 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 and declared after performance based assessment at the each module as “Competent” or “Not Yet Competent”

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 “Automotive Parts Production Machine Operator” Level-4 include:

- Work performances, for example perform gear hobbing, moulding and extrusion, metal die casting and hot forging operation or preparing workstation for performing the job.
- Demonstrations, for example demonstrating the tools and equipment require for gear hobbing, moulding and extrusion, metal die casting and hot forging operation according to the given spec sheet.

- Direct questioning, where the assessor would ask the student why he is finishing in a certain way, or how the student will find out about the current and future requirements for the automotive product and at sales outlets.
- Paper-based tests, such as multiple choice or short answer questions on process of production required to produce automotive parts on specific machines, preparing the work station for developing productive working relationships with associates.

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

Examples for indirect assessment of an “Automotive Parts Production Machine Operator” Level-4 include:

- Work products, such as a photo or sample of automotive product made by trainee are present at portfolio.
- Workplace documents, such as a diary of daily working that has been ready for finishing or packing.

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 moulding & extrusion, gear cutting skills are to be assessed and certificated, the assessment should involve performance criteria that are directly related to that moulding & extrusion, gear cutting activities. An interview about the process of the moulding & extrusion, gear cutting on different moulding & extrusion and gear cutting machine would not meet the performance criteria.

Reliability means that the assessment is consistent and reproducible. For example, if the work performance of gear cutting and final inspection 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 student’s needs.

Assessment strategy for the “Automotive Parts Production Machine Operator” Level-4 Curriculum

This curriculum consists of 10 modules:

Module 1: Contribute to Work Related Health and Safety (WHS) Initiatives

Module 2: Comply with 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: Conduct moulding and extrusion operations

Module 8: Perform hot forging operations

Module 9: Perform metal die casting operations

Module 10: Perform gear cutting operations

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 consist of half multiple choice and half short-answer questions. This part shall cover the following modules:

Module 7: Conduct moulding and extrusion operations

Module 8: Perform hot forging operations

Module 9: Perform metal die casting operations

Module 10: Perform gear cutting operations

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 12 hours of practical assessment for each student. During this period, each student must be assessed on his/her ability to complete task as per given in assessment package as trained in different modules (Module 7 to Module 10) of the course.

Module 1-6: Contribute to Work Related Health and Safety (WHS) Initiatives, Comply with Workplace Policy and Procedures, Perform Advanced Communication, Develop Advance Computer Application Skills, Manage Human Resource Services, Develop entrepreneurial skills shall not be assessed separately, but must be assessed during each of the practical sessions.

The assessment team

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 program for each group of five students. Training providers must agree the tasks for practical assessments in advance.

Complete list of machines. (20 trainees for whole course)

Sr#	Description	Quantity
01.	Injection moulding machine	5
02.	Forging press	5
03.	Rubber compression moulding machine	5
04.	Rubber injection machine	5
05.	Air compressor	1
06.	Water chiller	1
07.	High Pressure PU	5
08.	Extrude machine	5
09.	Blow moulding machine	5
10.	Mixer (for Rubber Compounding)	5
11.	Dryer	5
12.	Holding furnace	5
13.	Rubber sharing machines	5
14.	PU mixture	5
15.	PU filling pump	5
16.	Cooling tower	2
17.	Metal die casting machine	5
18.	Gear cutting/hobbing machine	5

Complete list of tools and equipment. (20 trainees for whole course)

Sr#	Description	Quantity
01.	Helmet, Goggles, Gloves, Dungaree, Protective Shoes, face masks	20
02.	Fire safety equipments	5
03.	Fire extinguisher, sand buckets, blankets	.5
04.	First aid box	3
05.	Protective guards (walk way barriers, welding apron,) gauges, leather gloves	20
06.	Tool kit (Ring spanner, open end spanner, retched handle, hammer, socket set, chisel, mallet, torque wrench, clamp)	20
07.	Measuring tools/inspection gauges (Vernier caliper , micrometer mm, Thread gauge, radius gauge, ring gauge, plug gauge, height gauge, bevel protector, measuring tape, ruler, dial indicator with stand, Profile projector)	20
08.	Repair manual.	3
09.	Small socket set	20
10.	Screwdriver set	20
11.	Shop towel	20
12.	Needle nose pliers	20
13.	Impact screw driver	20
14.	Inspection lamp.	5
15.	Hydraulic jack	3
16.	Adjustable barrier guard	5
17.	Die casting mould	5
18.	Plunger Tips	2
19.	Plunger adopter	2
20.	Plunger rod	2
21.	Flanged Nuts	2
22.	Ladle /Auto Ladle	5
23.	Die casting shoot sleeves	2

24.	Lubrication Spray Gun	5
25.	Allen Bolts 4mm-24mm	2
26.	Temperature Gun	2
27.	Manifolds	5
28.	Tee bolt	20
29.	Chipping hammer	20
30.	Cross pein hammer	20
31.	Wire brush	20
32.	Wire cutter	20
33.	C-clamp	20
34.	Scriber	20
35.	Cooled chisel	20
36.	Channel lock pliers / Grip pliers	20
37.	Center punch	20
38.	Bevel protector	20
39.	Hand hacksaw	20
40.	Measuring tape	20
41.	Tri Square	20
42.	Set square	20
43.	Sprit level	20
44.	Bench Vice	20
45.	Chipping hammer	20
46.	Lifting equipments (Manual lifter, tool trolley, overhead crane, shackle, I bolt, sling wire, chain, Hoist, Hoist stand)	5
47.	Digital clamp meter	20
48.	Machine oil (Different grades)	2 drum
49.	Grease	100 kg
50.	Rib peeling cutting blades	20
51.	Upsetting chaser	20
52.	Parallel chaser	20
53.	Coupler	20

54.	Metal band saw machine	20
55.	Adjustable coupler	20
56.	Standard coupler	20
57.	Row Material (Aluminum, Mild Steel , Stainless Steel Shafts)	500KG
58.	Clamp frame Handle	20
59.	Toggle clamps	20
60.	Counter balance weights	20
61.	Ladle cup	20
62.	Spray head	5
63.	Safety signs	20
64.	High temperature grease	100 kg
65.	Welding holder	20
66.	Gas burner	5
67.	Gear Cutters	20

Complete list of Consumables. (20 trainees for whole course)

Sr#	Description	Quantity
01.	White/Black board	2
02.	Flap chart board (Different size)	2
03.	Geometrical tools	5
04.	PC, Multimedia (Latest)/ LCD(Smart TV), Internet.	2 each
05.	Telephone and cell phones	2
06.	Organization SOPs	-
07.	Equipment Maintenance Manuals	-
08.	Log Book	-
09.	Handbooks	-
10.	Design Books/ Sheets	-
11.	Pencils	40

12.	Erasers	40
13.	Pencil Sharpeners	40
14.	Paper Cutter	40
15.	Nylon thread	20
16.	Circuit breakers	20
17.	Fusses	20
18.	Relays	20
19.	Switches	20
20.	Pneumatic hoses	20
21.	Hydraulic hoses	20
22.	Couplers	20
23.	Hydraulic joints	20
24.	Machine oil (Different grades)	2 drum
25.	Hydraulic oil	2 drum
26.	Gear oil	2 drum
27.	Grease	100 kg
28.	Roller bearings	5 each
29.	Shutter pulley	5
30.	Bins	30 p-3
31.	Gas kits	2 sets of each machine
32.	Jubilee clip	20 each sizes
33.	Hydraulic seals	2 sets of each machine
34.	Carbon	5
35.	Zinc Oxide	5
36.	Calcium	5
37.	DOP Oil	5
38.	Satiric Acid	5
39.	TMQ	5
40.	Wax	5

41.	CBS	5
42.	TMTR	5
43.	Sulphur	5
44.	TPG	5
45.	MBTS	5
46.	Releasing spray/ beads	5
47.	Damar tape	20
48.	Insulating tape	20
49.	Teflon tape	40
50.	ISO	5 Drum
51.	POLYOLE	Drum
52.	PU Head Nozzles	2 sets of each sizes
53.	Plastic resin (PP, HIPS , PE, ABS, pinseal ABS, ABS Carbon effect, PETG,PC,NOYL Etc)	5 bags of each
54.	Contact cleaner	5
55.	Pneumatic Pipe different sizes	2 of each set
56.	Pneumatic nozzle and connector	10 of each
57.	Anti-rust spray	20
58.	Round bar raw material (MS, low carbon steel, High carbon steel, aluminium)	500 Kg
59.	Synthetic Rubber with additives (for injection and Compression Rubber Molding)	5 Bags of each
60.	Mild Steel and Aluminum Shaft in different dia meters (for Gear Hobbing)	500 Kg
61.	Aluminum blocks of different grades	200 Kg
62.	Cleaning beads	10 Kg
63.	Pressure Gauges	10 according to machine
64.	Hydraulic Gauge	10 according to machine
65.	Gas burner flame	10
66.	Heater guard	20
67.	Steel band strips	20
68.	Ejector pins	10 of each sizes

69.	Wire mash filters	5 of each (according to machine)
70.	Nitrogen degassing unit / powder	5
71.	Slap Stick Lubricants	1 Drum
72.	Thermocouples with guard	10 of each (According to machine)
73.	Plunger cleaner	5
74.	High temp oil	1 Drum
75.	Copper spray	10
76.	Heater guard	20
77.	Steel band strips	40
78.	Control buttons	40 according to machine
79.	Heater handle	10 according to heaters
80.	Heater transit lock	40 according
81.	Heaters (I Type , U Type, Ceramic) according to the machine	20 each according to machine
82.	Thermocouples	40 according to machine
83.	Temperature controllers	40 according to machine
84.	Compressor oil	1 drum
85.	Clamp set	20 according to machine and die requirement
86.	Vacuum oil	2 drum
87.	Gas kits	2 of each

		(according to machine)
88.	Hydraulic seals	2 of each (according to machine)
89.	Pneumatic seals	2 of each (according to machine)
90.	O Ring set	2 of each (according to machine)
91.	Hydraulic Clamps	20 according to machine and die requirement
92.	Depoxy	10
93.	Pattern paste	5 kg
94.	Connectors (PVC, Ceramic, Jacks) according to the machine	40 (according to the machine)
95.	Trimming knife	20
96.	Bulbs (For Pin Hole Inspection)	5
97.	Thermocouples	20 as per machine
98.	Temperature controllers	20 as per machine
99.	Heater Insulation coil	10 as per machine

Credit values

The credit value of the National Certificate Level-4 in Automotive Parts Production Machine Operator is defined by estimating the amount of time/ instruction hours required to complete each competency unit and competency standard. The NVQF uses a standard credit value of 1 credit = 10 hours of learning (Following Higher Education Commission (HEC) guidelines.

The credit values are as follows:

Competency Standard	**Estimate of hours**	**Credit**
Module 1: Contribute to Work Related Health and Safety (WHS) Initiatives	30	03
Module 2: Comply with Workplace Policy and Procedures	30	03
Module 3: Perform Advanced Communication	30	03
Module 4: Develop Advance Computer Application Skills	40	04
Module 5: Manage Human Resource Services	20	02
Module 6: Develop entrepreneurial skills	30	03
Module 7: Conduct moulding and extrusion operations	290	29
Module 8: Perform hot forging operations	100	10

Competency Standard	Estimate of hours	Credit
Module 9: Perform metal die casting operations	100	10
Module 10: Perform gear cutting operations	110	11

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