Model Curriculum

QP Name: Automotive Material Testing Incharge

QP Code: ASC/Q6504

QP Version: 2.0

NSQF Level: 6

Model Curriculum Version: 1.0

Automotive Skill Development Council, 153, Gr Floor, Okhla Industrial Area, Phase – III, Leela Building, New Delhi – 110020

Table of Contents

Training Parameters

Sector	Automotive
Sub-Sector	R&D
Occupation	Testing and Validation
Country	India
NSQF Level	6
Aligned to NCO/ISCO/ISIC Code	NCO-2004/Nil
Minimum Educational Qualification & Experience	B.E./B.Tech (Mechanical/Automobile) with 2 Years of relevant experience OR Diploma from recognized regulatory body with (Mechanical/Electrical/Electronic/Automobile) with 5 years of relevant experience OR Certificate (Automotive Product Testing Engineer, Level 5) with 2 years of relevant experience
Pre-Requisite License or Training	
Minimum Job Entry Age	23 years
Last Reviewed On	30/09/2021
Next Review Date	30/09/2024
NSQC Approval Date	30/09/2021
Version	2.0
Model Curriculum Creation Date	30/09/2021
Model Curriculum Valid Up to Date	30/09/2024
Model Curriculum Version	1.0
Minimum Duration of the Course	600 Hours, 0 Minutes
Maximum Duration of the Course	600 Hours, 0 Minutes

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes

After completing this programme, participants will be able to:

- Examine the procedure for performing Metallurgical test, chemical test and Failure analysis being done by associates.
- Manage resources in coordination with HR department and Procure new equipment's as per requirement
- Analyse alternate material for the improvement of product quality.
- Identify 3D printing machine based on the product to be manufactured
- Work effectively and efficiently as per schedules and timelines.
- Implement safety practices.
- Use resources optimally to ensure less wastage and maximum conservation.
- Communicate effectively and develop interpersonal skills.

Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration	On-the-Job Training Duration	Total Duration
Bridge Module	**08:00**	**00:00**			**08:00**
Module 1: Introduction to the role of Automotive Material Testing Incharge	08:00	00:00			08:00
ASC/N9810: Manage work and resources (Manufacturing) **NOS Version No. – 1.0** **NSQF Level – 5**	**24:00**	**32:00**	-	-	**56:00**
Module 2: Manage work and resources according to safety and conservation standards	24:00	32:00	-	-	56:00
ASC/N9812 – Interact effectively with team, customers and others **NOS Version No. 1.0** **NSQF Level 5**	**24:00**	**32:00**	-	-	**56:00**

Module 3: Communicate effectively and efficiently	24:00	32:00	-	-	56:00
ASC/N6503 **Perform testing and validation of materials** **NOS Version No. 2.0** **NSQF Level 6**	**72:00**	**96:00**	-	-	**168:00**
Module 4: Performing test and validation of materials	72:00	96:00			168:00
ASC/N6504 **Develop alternate material for improving the product quality** **NOS Version No. 2.0** **NSQF Level 6**	**66:00**	**96:00**	-	-	**162:00**
Module 5: Developing alternate material to improve the product quality	66:00	96:00			160:00
ASC/N6811 **Select and operate 3D Printing machine for product generation** **NOS Version No. 1.0** **NSQF Level 6**	**60:00**	**90:00**	-	-	**150:00**
Module 6: Selecting and operating a 3D printing machine.	60:00	90:00			150:00
Total Duration	**254:00**	**346:00**	-	-	**600:00**

Module Details

Module 1: Introduction to the role of Automotive Material Testing Incharge

Bridge module

Terminal Outcomes:

- Discuss the role and responsibilities of an Automotive Material Testing Incharge.

Duration: *<08:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• List the role and responsibilities of an Automotive Material Testing Incharge. • Discuss the job opportunities of an Automotive Material Testing Incharge. • Explain about Indian automotive manufacturing market. • List various automobile Original Equipment Manufacturers (OEMs) and different products/ models manufactured by them. • Identify the standard checklists and schedules recommended by OEM. • Discuss the need and importance of computerised systems and updated softwares in Automotive manufacturing process.	
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
Checklist	

Module 2: Manage work and resources according to safety and conservation standards

Mapped to ASC/N9810, v1.0

Terminal Outcomes:

- Employ appropriate ways to maintain safe and secure working environment.
- Apply material and energy conservation practices at the workplace.

Duration: *<24:00>*	**Duration**: *<32:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Discuss organisational procedures for health, safety and security and individual role and responsibilities related to the same. • List the potential workplace related risks, threats and hazards, their causes and preventions. • List personal protective equipment like safety gloves, glasses, shoes and mask used at the workplace. • List various types of fire extinguisher. • Identify various safety boards/ signs placed on the shop floor. • Explain 5S standards, procedures and policies followed at workplace. • Discuss organisational procedures to deal with emergencies and accidents at the workplace and importance of following them. • State the importance of conducting safety drills or training sessions. • Explain the process of filling daily check sheet for reporting to the concerned authorities about improvements done and risks identified. • Discuss how and when to report about potential hazards identified in the workplace and limits of responsibility for dealing with them. • Outline the importance of keeping workplace, equipment, restrooms etc. clean and sanitised. • Explain the importance of following hygiene and sanitation regulations developed by organisation at the workplace. • Discuss the importance of maintaining the availability of running water, hand wash and alcohol-based sanitizers at the workplace.	• Apply appropriate ways to implement safety practices to ensure safety of people at the workplace. • Display the correct way of wearing and disposing PPE. • Demonstrate the use of fire extinguisher. • Demonstrate how to provide first aid procedure in case of emergencies. • Demonstrate how to evacuate the workplace in case of an emergency. • Employ various techniques for checking malfunctions in the machines with the support of maintenance team and as per Standard Operating Procedures (SOP). • Demonstrate to arrange tools/ equipment/ fasteners/ spare parts into proper trays, cabinets, lockers as mentioned in the 5S guidelines/work instructions. • Apply appropriate ways to organise safety drills or training sessions for others on the identified risks and safety practices. • Prepare a report about the health, safety and security breaches. • Apply appropriate ways to check that workplace, equipment, restrooms etc. are cleaned and sanitised. • Role play a situation to brief the team about the hygiene and sanitation regulations developed by organisation. • Demonstrate the correct way of washing hands using soap and water and alcohol-based hand rubs. • Explain methods to support the employees to cope with stress, anxiety etc. • Demonstrate proper waste collection and disposal mechanism depending upon types of waste. • Perform the steps involved in storage of tools, equipment and material after completion of work.

• Discuss the significance of conforming to basic hygiene practices such as washing hands, using alcohol based hand sanitizers or soap. • Recall ways of reporting advanced hygiene and sanitation issues to the concerned authorities. • Elucidate various stress and anxiety management techniques and their. • Discuss the significance of greening. • Classify different categories of waste for the purpose of segregation. • Differentiate between recyclable and non-recyclable waste. • Discuss various methods of waste collection and disposal. • List the various materials used at the workplace. • Explain organisational recommended norms for storage of tools, equipment and material. • Discuss the importance of efficient utilisation of material and water. • Explain basics of electricity and prevalent energy efficient devices. • Explain the processes to optimize usage of material and energy/electricity. • Enlist common practices for conserving electricity at workplace.	• Employ appropriate ways to resolve malfunctioning (fumes/ sparks/ emission/ vibration/ noise) and lapse in maintenance of equipment as per requirements. • Perform the steps to prepare a sample material and energy audit reports. • Employ practices for efficient utilization of material and energy/electricity.
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
• Housekeeping material: Cleaning agents, cleaning cloth, waste container, dust pan and brush set, liquid soap, hand towel, fire extinguisher • Safety gears: Safety shoes, ear plug, goggles, gloves, helmet, first-aid kit	

Module 3: Communicate Effectively and Efficiently

Mapped to NOS ASC/N9812, v1.0

Terminal Outcomes:

- Use effective communication and interpersonal skills.
- Apply sensitivity while interacting with different genders and people with disabilities.

Duration: *24:00*	**Duration:** *32:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the importance of complying with organizational requirements to share information with team members. • Discuss the ways to adjust the communication styles to reflect sensitivity towards gender and persons with disability (PwD). • Explain the importance of respecting personal space of colleagues and customers. • Describe the ways to manage and coordinate with team members for work integration. • State the importance of team goals over individual goals, keeping commitment made to team members, and informing them in case of delays. • Discuss the importance of following the organisation's policies and procedures • Discuss the importance of rectifying errors as per feedback and minimizing mistakes. • Discuss gender-based concepts, issues and legislation as well organization standards, guidelines, rights and duties of PwD. • Discuss the importance of PwD and gender sensitization to ensure that team shows sensitivity towards them. • State the importance of following organizational standards and guidelines related to PwD. • Recall the rights and duties at workplace with respect to PwD. • Outline organisation policies and procedures pertaining to written and verbal communication.	• Employ different means and methods of communication depending upon the requirement to interact with the team members. • Employ appropriate ways to maintain good relationships with team members and superiors. • Apply appropriate techniques to resolve conflicts and manage team members for smooth workflow. • Conduct training sessions to train the team members on proper reporting of completed work and receiving feedback. • Employ suitable ways to escalate problems to superiors as and when required. • Prepare a sample report on the progress and team performance . • Role play a situation on how to offer help to people with disability (PwD) if required at work.
Classroom Aids:	

White board/black board marker/chalk, duster, computer or Laptop attached to LCD projector
Tools, Equipment and Other Requirements

Module 4: Performing test and validation of materials

Mapped to ASC/N6503, v2.0

Terminal Outcomes:

- Manage laboratory for performing Metallurgical test, chemical test and Failure analysis being done by associates.
- Manage resources and new technologies in coordination with concerned department/team.

Duration: 72:00	**Duration**: *96:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Examine strict compliance to HSE (Health, safety, and environment) requirements. • Discuss the test findings and ensure documentation with each associate • Discuss with the process owner for establishing traceability up to the validation sample. • Manage the documentation of testing and validation results as per the ISO/IEC17025/NABL requirements. • Verify the collected data related to the suspected material • Verify that the documents related to the suspected material like PFMEAs, Failure reports, Material inspection reports etc are available to the concerned associates • Verify the cutting of a section of suspected part, In case of destructive testing like corrosion analysis, stress analysis etc • Verify proper techniques like electromagnetic radiation, spectroscopy, sound etc, In case of NDT • Examine that the complete batch of the rejected material part is quarantined/ recalled, In case of rejection • Discuss with concerned team in case of rejection and decide the most conforming material with Sourcing and R&D. • Verify the material of sample part after its validation • Identify the Protocols for communication with different department • Identify the manufacturing process, raw materials, products and their proper storage • List the various physical, chemical and metallurgical properties of each material • Identify material handling equipment's used for loading and unloading activity.	• Maintain laboratory to perform test and validation activities of materials. • Examine that the sample is prepared correctly. • Examine the procedures for performing tests being done by associates. • Perform failure analysis of non-conforming material and quarantine it. • Decide the method of failure analysis; Destructive Testing or Non-Destructive Testing (NDT), based on the criticality and failure occurrence of the suspected failed part/component and ensure the documentation of the results. • Interpret the result with R&D department and seek their inputs • Prepare a process change note (PCN) in SAP/ERP for implementation of the new material part. • Conduct recruitment of sufficient number of staff in coordination with HR department for carrying out the various activities in material lab department • Verify proper training of new joining by the existing staff members in an efficient manner. • Discuss with QA/ senior management for requirement of new testing equipment's. • Perform the Procurement of new equipment's as per requirement and monitor their working and maintenance • Examine new developments in evaluation techniques, materials etc. • List various approved vendors for the outsourced materials • Explain basics of Information systems like SAP, ERP etc

• Identify the personnel and other HR policies of the organization	
Classroom Aids:	
Laptop, White board, Marker, Projector & stationary	
Tools, Equipment and Other Requirements	
PCs/Laptops, Internet with Wi-Fi (Min2 Mbps Dedicated) 18 documents of PPAP, Design records, Design Records, Authorized Engineering Change Documents, Customer Engineering Approval, Design Failure Modes and Effects Analysis (DFMEA), applied in special situations, Process Flow Diagram, Process Failure Modes and Effects Analysis (PFMEA) Control Plan, Part Submission Warrant (PSW), Engineering Change Documents Dimensional Results, PLC Simulator, Hydraulic, Pneumatic, Electronic Control Systems Simulator, Internet of Things study material and IOT communication devices, Manufacturing Execution system, manufacturing operation management system. Hydraulics and pneumatics systems simulator, PLC Simulator with required software, Air Cylinders, valves, connector/tubing simulators, Pick and place robots assembly Electronics sensor like proximity, optical, magnetic sensors.	

Module 5: Developing alternate material to improve the product quality.

Mapped to ASC/N6504, v2.0

Terminal Outcomes:

- Perform design release for proto parts/vehicle in coordination with R & D for future business plan.
- Perform the steps of selecting the vendor and procuring the parts.
- Support quality team for validation of new Proto.

Duration: *66:00*	**Duration**: *96:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Examine the data collected from failures of various parts/components due to material, NPD- customer requirements, SOR etc. from Marketing and R&D department. • Identify the customer requirements and prepare a database of the most conforming material for considered part based on the application • Select the most feasible material for the part with respect to physical, chemical properties, unit cost, performance improvement, availability etc. • Conduct a meeting with the part supplier in co-ordination with Sourcing department. • Prepare a schedule for new material development and ensure its strict adherence • Discuss with Sourcing team and ensure the development of the sample part with the new material. • Verify the results obtained and in coordination with supplier ensure the resolution of the differences. • Identify the manufacturing process, raw materials, products and their proper storage • List various approved vendors for the outsourced materials • Identify the Protocols for communication with different department • List the various physical, chemical and metallurgical properties of each material •	• Examine the failure data and identify the part, type of material failed and frequency of failure. • Prepare the list of non-conforming parts and select the most frequent and high-cost value part based on failure data. • Discuss with design team and re-develop the drawings/ specifications of the part considering the results on the new material • Discuss with the supplier and share the new drawing of the part in SAP/ERP/PLM and finalize the drawings of the new material part and finalize the cost accordingly. • Perform the various tests as per the standard operating procedures complying to the HSE requirements in coordination with concerned team. • Prepare document of the results for the validation and share it concerned department • Examine the new material performance by regularly discovering the performance of the part during process • List various ISO/IEC17025/, NABL system requirements.
Classroom Aids:	
Laptop, White board, Marker, Projector & stationary	
Tools, Equipment and Other Requirements	

PCs/Laptops, Internet with Wi-Fi (Min2 Mbps Dedicated) 18 documents of PPAP, Design records, Design Records, Authorized Engineering Change Documents, Customer Engineering Approval, Design Failure Modes and Effects Analysis (DFMEA), applied in special situations, Process Flow Diagram, Process Failure Modes and Effects Analysis (PFMEA) Control Plan, Part Submission Warrant (PSW), Engineering Change Documents Dimensional Results, PLC Simulator, Hydraulic, Pneumatic, Electronic Control Systems Simulator, Internet of Things study material and IOT communication devices, Manufacturing Execution system, manufacturing operation management system. Hydraulics and pneumatics systems simulator, PLC Simulator with required software, Air Cylinders, valves, connector/tubing simulators, Pick and place robots assembly Electronics sensor like proximity, optical, magnetic sensors.

Module 6: Operate 3D Printing machine for production

Mapped to ASC/N6811, v1.0

Terminal Outcomes:

- Identify raw material, machine, components and automotive parts involved in manufacturing process.
- Perform the steps to operate and set up the machine for printing the automotive components.
- Demonstrate post-processing activities like quality check, segregation, storage etc.

Duration: *60:00*	**Duration**: *90:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Discuss manufacturing and automotive product design standards and procedures followed in the company. • Explain various 3D Printing technologies such as Fused Deposition Modelling, StereoLithography etc. • Identify various symbols and notifications being displayed by the 3D Printing machine. • Describe functionality of the 3D printing machine. • Discuss the importance of preserving critical electronic parts/equipment from moisture/ heat/ environmental external conditions. • List the machine, support structure, raw material etc. required for work. • List types of materials available for fabrication in various 3D printing technique. • Explain the selection criteria of raw material and 3D printing machine as per the product specifications. • Recall various specifications of machine such as build speed, extrusion speed, nozzle temperature etc. • List machine operating parameters such as room temperature range, air cleanliness. • List types of files such as .stl, code file, etc generated in the various steps of the process. • Explain standard tesselation language (.stl) code file and its selection criteria for machine operation.	• Demonstrate how to select the raw material and 3D printing machine for printing the automotive components as per product specifications. • Use appropriate resources to obtain information about part orientation, support structure requirement, machine specifications, machine operating parameters etc. as per the work requirement. • Show how to delete unwanted code files, upload new code files and select any pre-stored program in the machine memory. • Demonstrate how to connect the data storage devices with the machine. • Show how to check the number of automotive parts needed to be manufactured. • Role play a situation on how to co-ordinate with the designer for rectifying the errors generated during file uploading and observed during running of process. • Apply appropriate ways to check the critical components of machine. • Demonstrate how to set and clean the 3D printing machine before starting the printing operation by following organisational procedures. • Apply appropriate techniques to decipher the codes to calculate the volume of material • Show how to load appropriate amount of consumables material.

• List the steps to be performed for deleting unwanted code files, uploading new code files and selecting any pre-stored program in the machine memory. • Summarise the steps to be performed for checking the critical components of machine. • List steps for preparing 3D printing machine for operation. • List the steps to be performed for operating the 3D printing machine. • Describe post-processing techniques such as removing and cleaning fabricated parts, inspection, segregation etc. of parts. • Discuss ways for removing the fabricated part from machine and support structures from the part. • Explain methods of inspecting the quality and non-conformities of the part. • Discuss the process of segregating of damaged and ok parts as per organisational guidelines. • Discuss the process of storing of ok parts as per organisational guidelines. • Discuss the documents needed to be maintained related to work.	• Show how to pre-heat the bed of the machine and set the laser or nozzles temperature of the machine to defined values. • Demonstrate organizational specified procedure of operating the 3D printing machine for printing of automotive components. • Apply appropriate ways to identify and rectify errors in machine during the machine operation. • Show how to stop the machine during an unwanted situation. • Demonstrate how to remove the fabricated part and support structures from the machine carefully. • Apply appropriate ways to clean the part for getting required surface finish. • Apply appropriate inspection methods for checking the quality and non-conformities of the part. • Show how to segregate the parts into rework or reject as per organisational guidelines. • Demonstrate how to store the manufactured automotive parts as per organisational guidelines.
Classroom Aids:	
Laptop White board, Marker, Projector & stationary	
Tools, Equipment and Other Requirements	
3D Printing machines- Fixed Deposition Modelling Machine, Stereo-Lithography Machine, Metal Sintering Machine & any other type of 3D printing machine with the all the consumables required. Flash Drive (With pre-stored program)	

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Diploma	Mechanical/Automobile	5	Mechanical/ Automobile	1	Mechanical/Automobile	**NA**
B.E / B.TECH	Mechanical/Automobile	4	Mechanical/ Automobile	1	Mechanical/Automobile	**NA**
M.E / M.TECH	Mechanical/Automobile	3	Mechanical/ Automobile	1	Mechanical/Automobile	**NA**

Trainer Certification	
Domain Certification	**Platform Certification**
"Automotive Automation Specialist, ASC/Q6807, version 2.0". Minimum accepted score is 80%.	"Trainer; MEP/Q2601 v1.0" Minimum accepted score is 80%.

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Diploma	Mechanical/Automobile	6	Mechanical/Automobile	1	Mechanical/Automobile	**NA**
B.E / B.TECH	Mechanical/Automobile	5	Mechanical/Automobile	1	Mechanical/Automobile	**NA**
M.E / M.TECH	Mechanical/Automobile	4	Mechanical/Automobile	1	Mechanical/Automobile	**NA**

Assessor Certification	
Domain Certification	**Platform Certification**
"Automotive Automation Specialist, ASC/Q6807, version 2.0". Minimum accepted score is 80%.	"Assessor; MEP/Q2701 v1.0" Minimum accepted score is 80%.

Assessment Strategy

1. Assessment System Overview:

    - Batches assigned to the assessment agencies for conducting the assessment on SDSM/SIP or email
    - Assessment agencies send the assessment confirmation to VTP/TC looping SSC
    - Assessment agency deploys the ToA certified Assessor for executing the assessment
    - SSC monitors the assessment process & records

2. Testing Environment:

    - Confirm that the centre is available at the same address as mentioned on SDMS or SIP
    - Check the duration of the training.
    - Check the Assessment Start and End time to be as 10 a.m. and 5 p.m.
    - If the batch size is more than 30, then there should be 2 Assessors.
    - Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
    - Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
    - Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
    - Check the availability of the Lab Equipment for the particular Job Role.

3. Assessment Quality Assurance levels / Framework:

    - Question papers created by the Subject Matter Experts (SME)
    - Question papers created by the SME verified by the other subject Matter Experts
    - Questions are mapped with NOS and PC
    - Question papers are prepared considering that level 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
    - Assessor must be ToA certified & trainer must be ToT Certified
    - Assessment agency must follow the assessment guidelines to conduct the assessment

4. Types of evidence or evidence-gathering protocol:
    - Time-stamped & geotagged reporting of the assessor from assessment location
    - Center photographs with signboards and scheme specific branding
    - Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period
    - Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos

5. Method of verification or validation:
    - Surprise visit to the assessment location
    - Random audit of the batch
    - Random audit of any candidate

6. Method for assessment documentation, archiving, and access
    - Hard copies of the documents are stored
    - Soft copies of the documents & photographs of the assessment are uploaded / accessed from Cloud Storage
    - Soft copies of the documents & photographs of the assessment are stored in the Hard Drives

References

Glossary

Term	Description
Declarative Knowledge	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
Key Learning Outcome	Key learning outcome is the statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
OJT (M)	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
OJT (R)	On-the-job training (Recommended); trainees are recommended the specified hours of training on site
Procedural Knowledge	Procedural knowledge addresses how to do something, or how to perform a task. It is the ability to work, or produce a tangible work output by applying cognitive, affective or psychomotor skills.
Training Outcome	Training outcome is a statement of what a learner will know, understand and be able to do upon the completion of the training.
Terminal Outcome	Terminal outcome is a statement of what a learner will know, understand and be able to do upon the completion of a module. A set of terminal outcomes help to achieve the training outcome.

Acronyms and Abbreviations

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
AMC	Annual Maintenance Contract
PPE	Personal Protective Equipment
ERP	Enterprise Resource Planning
PM	Predictive Maintenance
QMS	Quality Management System
PLC	Programmable Logic Controller
SCADA	Supervisory Control And Data Acquisition
TOPS	Team Oriented Problem Solving
AMC	Annual Maintenance Contract
PPE	Personal Protective Equipment
ERP	Enterprise Resource Planning
PM	Predictive Maintenance
QMS	Quality Management System
PLC	Programmable Logic Controller
SCADA	Supervisory Control And Data Acquisition
TOPS	Team Oriented Problem Solving
HMI	Human Machine Interfaces
PLC	Programmable Logic Controller
SCADA	Supervisory Control And Data Acquisition
VFD	Variable Frequency Drive
HMI	Human Machine Interfaces
RFID	Radio Frequency Identification

QMS	Quality Management System
CFT	Complement Fixation Test