



# Model Curriculum

**QP Name: Automotive Additive Manufacturing Engineer**

**QP Code: ASC/Q6414**

**QP Version: 1.0**

**NSQF Level: 6**

**Model Curriculum Version: 1.0**

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## Training Parameters

<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Manufacturing
<b>Occupation</b>	Production Engineering
<b>Country</b>	India
<b>NSQF Level</b>	6
<b>Aligned to NCO/ISCO/ISIC Code</b>	NCO-2015/NIL
<b>Minimum Educational Qualification and Experience</b>	M.E./M.Tech in the relevant field OR B.E/ B. Tech in the relevant field with 1 Year of relevant experience OR 3 years Diploma (Automobile/ Mechanical/Electrical/Electronics) from a recognized body (after class 12th) with 3 years of relevant experience OR Certificate NSQF (Automotive Prototype Manufacturing Lead Technician Level 5) with 3 Years of relevant experience
<b>Pre-Requisite License or Training</b>	
<b>Minimum Job Entry Age</b>	22 years
<b>Last Reviewed On</b>	28 <sup>th</sup> July, 2022
<b>Next Review Date</b>	28 <sup>th</sup> July, 2025
<b>NSQC Approval Date</b>	28 <sup>th</sup> July, 2022
<b>QP Version</b>	1.0
<b>Model Curriculum Creation Date</b>	28 <sup>th</sup> July, 2022
<b>Model Curriculum Valid Up to Date</b>	28 <sup>th</sup> July, 2025
<b>Model Curriculum Version</b>	1.0
<b>Minimum Duration of the Course</b>	600 Hours
<b>Maximum Duration of the Course</b>	600 Hours

# Program Overview

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

## Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills.

- Show how to finalize design specification and ensure reliability and validity of the product design.
- Identify product specifications and requirements for CAD designing.
- Carry out designing of product on CAD software.
- Use 3D printing machine for the printing of automotive components.
- 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 (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
<b>Bridge Module</b>					
Module 1: Introduction to the role of an Automotive Additive Manufacturing Engineer	5:00	0:00			5:00
<b>ASC/N9810: Manage work and resources (Manufacturing) NOS Version No. – 1.0 NSQF Level – 5</b>	<b>20:00</b>	<b>40:00</b>			<b>60:00</b>
Module 2: Manage work and resources according to safety and conservation standards	20:00	40:00			60:00
<b>ASC/N9812 – Interact effectively with team, customers and others NOS Version No. 1.0 NSQF Level 5</b>	<b>20:00</b>	<b>35:00</b>			<b>55:00</b>
Module 3: Communicate effectively and efficiently	20:00	35:00			55:00
<b>ASC/N6435 – Prepare for product designing NOS Version No. – 1.0 NSQF Level - 6</b>	<b>15:00</b>	<b>55:00</b>	<b>80:00</b>		<b>150:00</b>
Module 4: Prepare for product designing	15:00	55:00	80:00		150:00
<b>ASC/N6436 – Design</b>	<b>15:00</b>	<b>85:00</b>	<b>80:00</b>		<b>180:00</b>

<b>automotive component, jigs &amp; fixtures using CAD Software</b> <b>NOS Version No. –1.0</b> <b>NSQF Level – 6</b>					
Module 5: Design automotive component, jigs & fixtures using CAD Software	15:00	85:00	80:00		180:00
<b>ASC/N6437 – Develop product prototype by 3D printing</b> <b>NOS Version No. –1.0</b> <b>NSQF Level - 6</b>	<b>15:00</b>	<b>55:00</b>	<b>80:00</b>		<b>150:00</b>
Module 6: Develop product prototype by 3D printing	15:00	55:00	80:00		150:00
<b>Total Duration</b>	<b>90:00</b>	<b>270:00</b>	<b>240:00</b>		<b>600:00</b>

# Module Details

## Module 1: Introduction to the role of an Automotive Additive Manufacturing Engineer

### *Bridge module*

#### Terminal Outcomes:

- Discuss the role and responsibilities of an Automotive Additive Manufacturing Engineer.

Duration: <05:00>	Duration: <00:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>• List the role and responsibilities of an Automotive Additive Manufacturing Engineer.</li> <li>• Discuss the job opportunities for an Automotive Additive Manufacturing Engineer in the automobile industry.</li> <li>• Explain about Indian automobile manufacturing market.</li> <li>• List various automobile Original Equipment Manufacturers (OEMs) and different products/ models manufactured by them.</li> <li>• Discuss manufacturing and automotive product design standards and procedures followed in the company.</li> </ul>	
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	

## 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: <20:00>	Duration: <40:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>• Discuss organisational procedures for health, safety and security and individual role and responsibilities related to the same.</li> <li>• List the potential workplace related risks, threats and hazards, their causes and preventions.</li> <li>• List personal protective equipment like safety gloves, glasses, shoes and mask used at the workplace.</li> <li>• List various types of fire extinguisher.</li> <li>• Identify various safety boards/ signs placed on the shop floor.</li> <li>• Explain 5S standards, procedures and policies followed at workplace.</li> <li>• Discuss organisational procedures to deal with emergencies and accidents at the workplace and importance of following them.</li> <li>• State the importance of conducting safety drills or training sessions.</li> <li>• Explain the process of filling daily check sheet for reporting to the concerned authorities about improvements done and risks identified.</li> <li>• Discuss how and when to report about potential hazards identified in the workplace and limits of responsibility for dealing with them.</li> <li>• Outline the importance of keeping workplace, equipment, restrooms etc. clean and sanitised.</li> <li>• Explain the importance of following hygiene and sanitation regulations developed by organisation at the workplace.</li> <li>• Discuss the importance of maintaining the availability of running water, hand wash and alcohol-based sanitizers at the</li> </ul>	<ul style="list-style-type: none"> <li>• Apply appropriate ways to implement safety practices to ensure safety of people at the workplace.</li> <li>• Display the correct way of wearing and disposing PPE.</li> <li>• Demonstrate the use of fire extinguisher.</li> <li>• Demonstrate how to provide first aid procedure in case of emergencies.</li> <li>• Demonstrate how to evacuate the workplace in case of an emergency.</li> <li>• Employ various techniques for checking malfunctions in the machines with the support of maintenance team and as per Standard Operating Procedures (SOP).</li> <li>• Demonstrate to arrange tools/ equipment/ fasteners/ spare parts into proper trays, cabinets, lockers as mentioned in the 5S guidelines/work instructions.</li> <li>• Apply appropriate ways to organise safety drills or training sessions for others on the identified risks and safety practices.</li> <li>• Prepare a report about the health, safety and security breaches.</li> <li>• Apply appropriate ways to check that workplace, equipment, restrooms etc. are cleaned and sanitised.</li> <li>• Role play a situation to brief the team about the hygiene and sanitation regulations developed by organisation.</li> <li>• Demonstrate the correct way of washing hands using soap and water and alcohol-based hand rubs.</li> <li>• Apply appropriate methods to support the employees to cope with stress, anxiety etc.</li> <li>• Demonstrate proper waste collection and disposal mechanism depending upon types of waste.</li> </ul>

<p>workplace.</p> <ul style="list-style-type: none"> <li>• Discuss the significance of conforming to basic hygiene practices such as washing hands, using alcohol based hand sanitizers or soap.</li> <li>• Recall ways of reporting advanced hygiene and sanitation issues to the concerned authorities.</li> <li>• Elucidate various stress and anxiety management techniques.</li> <li>• Discuss the significance of greening.</li> <li>• Classify different categories of waste for the purpose of segregation.</li> <li>• Differentiate between recyclable and non-recyclable waste.</li> <li>• Discuss various methods of waste collection and disposal.</li> <li>• List the various materials used at the workplace.</li> <li>• Explain organisational recommended norms for storage of tools, equipment and material.</li> <li>• Discuss the importance of efficient utilisation of material and water.</li> <li>• Explain basics of electricity and prevalent energy efficient devices.</li> <li>• Explain the processes to optimize usage of material and energy/electricity.</li> <li>• Enlist common practices for conserving electricity at workplace.</li> </ul>	<ul style="list-style-type: none"> <li>• Perform the steps involved in storage of tools, equipment and material after completion of work.</li> <li>• Employ appropriate ways to resolve malfunctioning (fumes/ sparks/ emission/ vibration/ noise) and lapse in maintenance of equipment as per requirements.</li> <li>• Perform the steps to prepare a sample material and energy audit reports.</li> <li>• Employ practices for efficient utilization of material and energy/electricity.</li> </ul>
<p><b>Classroom Aids:</b></p>	
<p>Whiteboard, marker pen, projector</p>	
<p><b>Tools, Equipment and Other Requirements</b></p>	
<ul style="list-style-type: none"> <li>• Housekeeping material: Cleaning agents, cleaning cloth, waste container, dust pan and brush set, liquid soap, hand towel, fire extinguisher</li> <li>• Safety gears: Safety shoes, ear plug, goggles, gloves, helmet, first-aid kit</li> </ul>	



## Module 3: Communicate Effectively and Efficiently

### Mapped to ASC/N9812, v1.0

#### Terminal Outcomes:

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

<b>Duration: &lt;20:00&gt;</b>	<b>Duration: &lt;35:00&gt;</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Explain the importance of complying with organizational requirements to share information with team members.</li> <li>• Discuss the ways to adjust the communication styles to reflect sensitivity towards gender and persons with disability (PwD).</li> <li>• Explain the importance of respecting personal space of colleagues and customers.</li> <li>• Describe the ways to manage and coordinate with team members for work integration.</li> <li>• State the importance of team goals over individual goals, keeping commitment made to team members, and informing them in case of delays.</li> <li>• Discuss the importance of following the organisation’s policies and procedures</li> <li>• Discuss the importance of rectifying errors as per feedback and minimizing mistakes.</li> <li>• Discuss gender-based concepts, issues and legislation as well organization standards, guidelines, rights and duties of PwD.</li> <li>• Discuss the importance of PwD and gender sensitization to ensure that team shows sensitivity towards them.</li> <li>• State the importance of following organizational standards and guidelines related to PwD.</li> <li>• Recall the rights and duties at workplace with respect to PwD.</li> <li>• Outline organisation policies and procedures pertaining to written and verbal communication.</li> </ul>	<ul style="list-style-type: none"> <li>• Employ different means and methods of communication depending upon the requirement to interact with the team members.</li> <li>• Employ appropriate ways to maintain good relationships with team members and superiors.</li> <li>• Apply appropriate techniques to resolve conflicts and manage team members for smooth workflow.</li> <li>• Conduct training sessions to train the team members on proper reporting of completed work and receiving feedback.</li> <li>• Employ suitable ways to escalate problems to superiors as and when required.</li> <li>• Prepare a sample report on the progress and team performance .</li> <li>• Role play a situation on how to offer help to people with disability (PwD) if required at work.</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard/blackboard, marker/chalk, duster, computer or Laptop attached to LCD projector	
<b>Tools, Equipment and Other Requirements</b>	

## Module 4: Prepare for product designing

### Mapped to ASC/N6435, v1.0

#### Terminal Outcomes:

- Perform the steps to carry out 3D modelling of product in CAD software.
- Demonstrate how to support the manager in finalization of design specification and ensuring reliability and validity of the product design.

<b>Duration: &lt;15:00&gt;</b>	<b>Duration: &lt;55:00&gt;</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• List sequence of operations for each process</li> <li>• Elaborate ways to analyse product requirements like basic customer preferences, benchmarking data, technology parameters etc.</li> <li>• List various designing software like CATIA, Auto-CAD, Unigraphics etc. required during the designing process.</li> <li>• Elaborate ways to analyse the technology and technique to be used for designing of the product.</li> <li>• List the design requirement in terms of material used for making the product.</li> <li>• Elaborate draughting standards and techniques- e.g. ANSI series IS/ ISO.</li> <li>• List technical drawing practices as per the company standards.</li> <li>• Describe drawings and modelling techniques like 2D and 3D.</li> <li>• Discuss ways to maintain aspects of aesthetic appeal, ergonomics etc. while designing the physical product.</li> <li>• Describe the impact of shape/ size/ environment on the product design.</li> <li>• List the steps to be performed for creating 3D model of product in CAD software.</li> <li>• Describe various CAD techniques available in the CAD software and required or designing of product 3D model.</li> <li>• Discuss elements related to color design (interior and exterior) of the product.</li> <li>• Discuss reliability requirements on the basis of benchmarks, competitive analysis, cost, safety, etc.</li> <li>• List the steps to be performed for testing the feasibility of product with the customer requirements by conducting simulation/ packaging study.</li> </ul>	<ul style="list-style-type: none"> <li>• Show how to select the designing software like CATIA, Auto-CAD, Unigraphics etc. for creating the designs and models.</li> <li>• Demonstrate the use of designing software.</li> <li>• Apply appropriate ways to examine the type of material required.</li> <li>• Employ appropriate ways to create a picture/image of the design.</li> <li>• Demonstrate ways to define the shape/ size/ environmental impact of the design.</li> <li>• Show how to visualise the customer requirements and prepare a rough sketch of product according to it.</li> <li>• Prepare a sample design geometry of product by applying appropriate CAD techniques.</li> <li>• Demonstrate how to product (Jigs &amp; Fixtures, Automotive components) with its technical and structural constituents in CAD software on the basis of the initial sketches.</li> <li>• Show how to support the team during creation of design input specifications and requirement specifications for each of the aggregates, 3D model of the product, etc.</li> <li>• Apply appropriate ways to achieve the required specification of the product and ensure conformance between design output and design input.</li> <li>• Apply appropriate ways for maintaining and taking backup of CAD files and records of related information by following organisational guidelines.</li> <li>• Apply appropriate methods to develop a Quality Cost Delivery analysis for all decision metrics for developing the prototype of the component and cost involved.</li> </ul>

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| <ul style="list-style-type: none"> <li>• List key reliability risk items in a product design.</li> <li>• Describe risk reduction strategies.</li> <li>• Elaborate ways to analyses failure risks and mechanics in the product model.</li> <li>• Describe design of experiments methodology.</li> <li>• Describe Life Data Analysis (LDA) techniques.</li> </ul> | <ul style="list-style-type: none"> <li>• Apply appropriate ways to define the elements related to color design (interior and exterior) through analysis of a range of data.</li> <li>• Apply appropriate ways to define reliability requirements on the basis of benchmarks, competitive analysis, cost, safety, etc.</li> <li>• Demonstrate use of simulation models to estimate the products design reliability and analyse product reliability.</li> <li>• Demonstrate use of design of experiments methodology to identify factors significant to the life of the vehicle.</li> <li>• Demonstrate Life Data Analysis (LDA) techniques to statistically estimate the reliability of the product design and calculate various reliability-related metrics.</li> </ul> |
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**Classroom Aids:**

Whiteboard, marker pen, projector

**Tools, Equipment and Other Requirements**

- Drafting tools, MS office, designing software like CATIA, Auto-CAD, Unigraphics
- Handbook and Technical Reference Books.
- Safety materials: Fire extinguisher, safety gloves, aprons, safety glasses, ear plug, safety shoes and first-aid kit

## Module 5: Design automotive component, jigs & fixtures using CAD Software

### Mapped to ASC/N6436, v1.0

#### Terminal Outcomes:

- Identify requirements and specifications for the product designing process.
- Perform preparatory activities to carry out product designing process.
- Perform the steps to carry out 3D modelling of product in CAD software.

Duration: <15:00>	Duration: <85:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>• Discuss the information needed to collect from the work order, process manuals and instructions from internal design team and supervisor about the customer requirements and work to be done.</li> <li>• List various designing software like CATIA, Unigraphics, Fusion 360 etc. required for creating the designs and models.</li> <li>• List the design requirement in terms of material used for making the component, packaging and other requirements to decide the dimensions, measurements and tolerances of the aggregate/ component.</li> <li>• Elaborate draughting standards and techniques e.g. ANSI series IS/ ISO.</li> <li>• List technical drawing practices as per the company standards.</li> <li>• Describe drawings and modelling techniques like 2D and 3D.</li> <li>• Identify the reporting hierarchy and procedure for escalating faults and issues related to design concept clarity, dimensions and practicality.</li> <li>• Describe algebra and trigonometric rules and applications.</li> <li>• Describe Geometric and Trigonometric rules/ formula for developing the specifications of the component.</li> <li>• List the steps to be performed for creating 3D model of product in CAD software.</li> <li>• Describe various CAD techniques available in the CAD software and required or designing of product 3D model.</li> <li>• List types of files format such as STL or AMF etc. generated in the various steps of the process.</li> <li>• List the steps to be performed for checking and correcting the common</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate how to interpret the work order, process manuals, instructions etc. to obtain the design requirements.</li> <li>• Show how to select the designing software like CATIA, Unigraphics, Fusion 360 etc. for creating the designs and models.</li> <li>• Demonstrate the use of designing software.</li> <li>• Demonstrate how to interpret the new or existing product to collect the design requirements.</li> <li>• Show how to create an object model as per drawing/dimension by using selected CAD software.</li> <li>• Demonstrate use of the Geometric and Trigonometric rules/ formula for developing the specifications of the component.</li> <li>• Apply appropriate procedure of setting required units and dimension parameters in the CAD file.</li> <li>• Demonstrate how to insert sketches, scanned images, diagrams, signs or symbols etc. in a CAD file.</li> <li>• Prepare a sample 3D model of product by applying appropriate CAD techniques.</li> <li>• Demonstrate the use of software features like tools modelling, sculpting, generative design, simulation, assemblies, collaboration, tool validation and design options for creating the object model.</li> <li>• Apply appropriate ways to verify the object model by comparing it with the information and specifications mentioned in the product modelling document.</li> <li>• Show how to convert the object model into STL or AMF file format.</li> <li>• Apply appropriate ways check and rectify the common errors in object model files</li> </ul>

<p>errors in object model file.</p> <ul style="list-style-type: none"> <li>• Discuss methods of using instruments like Vernier callipers, Micrometres, rulers and other inspection tools.</li> </ul>	<p>by following organisational guidelines.</p> <ul style="list-style-type: none"> <li>• Demonstrate steps to transfer the verified object model STL / AMF file into portable storage device or directly to 3D printer.</li> </ul>
<p><b>Classroom Aids:</b></p>	
<p>Whiteboard, marker pen, projector</p>	
<p><b>Tools, Equipment and Other Requirements</b></p>	
<ul style="list-style-type: none"> <li>• Drafting tools, MS office, designing software like CATIA, Unigraphics, Fusion 360</li> <li>• Handbook, job orders and Technical Reference Books</li> <li>• 3D Printing machines- Fixed Deposition Modelling Machine, Stereo-Lithography Machine, Metal Sintering Machine &amp; any other type of 3D printing machine with the all the consumables required, Flash Drive (With pre-stored program)</li> <li>• Safety materials: Fire extinguisher, safety gloves, aprons, safety glasses, ear plug, safety shoes and first-aid kit.</li> </ul>	

## Module 6: Develop product prototype by 3D printing

### Mapped to ASC/N6437, v1.0

#### Terminal Outcomes:

- 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: <15:00>	Duration: <55:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>• Discuss the information needed to interpret from the instructions received from supervisor related to work to be done and work requirements.</li> <li>• Explain various 3D Printing technologies such as Fused Deposition Modelling, StereoLithography etc.</li> <li>• Identify various symbols and notifications being displayed by the 3D Printing machine.</li> <li>• Describe functionality of the 3D printing machine.</li> <li>• Explain the selection criteria of 3D printing machine as per the product specifications.</li> <li>• Recall various specifications of machine such as build speed, extrusion speed, nozzle temperature etc.</li> <li>• List machine operating parameters such as room temperature range, air cleanliness.</li> <li>• Explain standard tessellation language (.stl) code file and its selection criteria for machine operation.</li> <li>• List steps for preparing 3D printing machine for operation.</li> <li>• List the steps to be performed for operating the 3D printing machine.</li> <li>• List the steps to be performed for uploading and removing new code files in the machine memory.</li> <li>• Describe post-processing techniques such as removing and cleaning printed parts, inspection, segregation etc. of parts.</li> <li>• Discuss ways for removing the fabricated part from machine and support structures from the part.</li> <li>• Explain methods of inspecting the quality and non-conformities of the part.</li> <li>• Discuss the process of storing of ok parts as per organisational guidelines.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate how to convert a standard design model into standard tessellation language (.stl) file format.</li> <li>• Show how to select encoding format for the 3D printing program file.</li> <li>• Use appropriate resources to obtain information about part orientation, support structure requirement, machine specifications, machine operating parameters etc. as per the work requirement.</li> <li>• Show how to set the 3D printing machine and its parameters as per SOP/WI.</li> <li>• Demonstrate how to connect the data storage devices with the machine.</li> <li>• Role play a situation on how to coordinate with the designer for rectifying the errors generated during file uploading and observed during running of process.</li> <li>• Demonstrate organizational specified procedure of starting and operating the 3D printing machine for printing of automotive components.</li> <li>• Show how to select the optimum orientation of part.</li> <li>• Apply appropriate ways to identify and rectify errors in machine during the machine operation.</li> <li>• Prepare a sample report about the errors identified and rectified in the machine.</li> <li>• Demonstrate how to remove the printed part and support structures from the machine carefully.</li> <li>• Apply appropriate ways to clean the part for getting required surface finish.</li> <li>• Apply appropriate inspection methods for checking the quality and non-conformities of the part.</li> <li>• Apply appropriate ways to identify</li> </ul>

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| <ul style="list-style-type: none"> <li>• List maintenance activities for a 3D printing machine.</li> <li>• List the steps to be performed for troubleshooting and repairing defects in the machine.</li> <li>• Discuss the importance of placing tags on machines for next maintenance cycles.</li> <li>• Summarise the documents, records and information to be maintained related to the maintenance and repairing done.</li> </ul> | <ul style="list-style-type: none"> <li>• measurement errors between 3D printed files and drafted files provided.</li> <li>• Apply appropriate methods to remove the errors in product design and rectify the difference.</li> <li>• Demonstrate how to store and preserve the manufactured automotive parts as per organisational guidelines.</li> <li>• Show how to prepare the maintenance plan and checklist as per machinery requirement.</li> <li>• Employ appropriate ways for troubleshooting and repairing defects in the machine.</li> <li>• Apply appropriate ways to ensure the smooth running and appropriate working of the repaired 3D printing machine.</li> </ul> |
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**Classroom Aids:**

Whiteboard, marker pen, projector

**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	
B.E/B.Tech	Mechanical/Electrical/ Electronics/ Automobile/ Instrumentation	4	Mechanical/Electrical/ Electronics/ Automobile/ Instrumentation	1	Mechanical/Electrical/ Electronics/ Automobile/ Instrumentation	NA
B.E/B.Tech	Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation	5	Mechanical/Electrical/ Electronics/ Automobile/ Instrumentation	0	Mechanical/Electrical/ Electronics/ Automobile/ Instrumentation	NA
M.E/M.Tech	Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation	3	Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation	1	Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation	NA

Trainer Certification	
Domain Certification	Platform Certification
“Automotive Additive Manufacturing Engineer, ASC/QXXXX, version 1.0”. 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	
B.E./B.Tech	Mechanical/Electrical/Electronics/Automobile/Instrumentation	5	Mechanical/Electrical/Electronics/Automobile/Instrumentation	1	Mechanical/Electrical/Electronics/Automobile/Instrumentation	NA
B.E./B.Tech	Mechanical/Electrical/Electronics/Automobile/Instrumentation	6	Mechanical/Electrical/Electronics/Automobile/Instrumentation	0	Mechanical/Electrical/Electronics/Automobile/Instrumentation	NA
M.E./M.Tech	Mechanical/Electrical/Electronics/Automobile/Instrumentation	4	Mechanical/Electrical/Electronics/Automobile/Instrumentation	1	Mechanical/Electrical/Electronics/Automobile/Instrumentation	NA

Assessor Certification	
Domain Certification	Platform Certification
“Automotive Additive Manufacturing Engineer, ASC/QXXXX, version 1.0”. 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 SDMS/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
  - Centre 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
<b>Declarative Knowledge</b>	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.
<b>Key Learning Outcome</b>	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).
<b>OJT (M)</b>	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
<b>OJT (R)</b>	On-the-job training (Recommended); trainees are recommended the specified hours of training on site
<b>Procedural Knowledge</b>	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.
<b>Training Outcome</b>	Training outcome is a statement of what a learner will know, understand and be able to do upon the completion of the training.
<b>Terminal Outcome</b>	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

<b>NOS</b>	National Occupational Standard(s)
<b>NSQF</b>	National Skills Qualifications Framework
<b>QP</b>	Qualifications Pack
<b>TVET</b>	Technical and Vocational Education and Training
<b>SOP</b>	Standard Operating Procedure
<b>WI</b>	Work Instructions
<b>PPE</b>	Personal Protective equipment