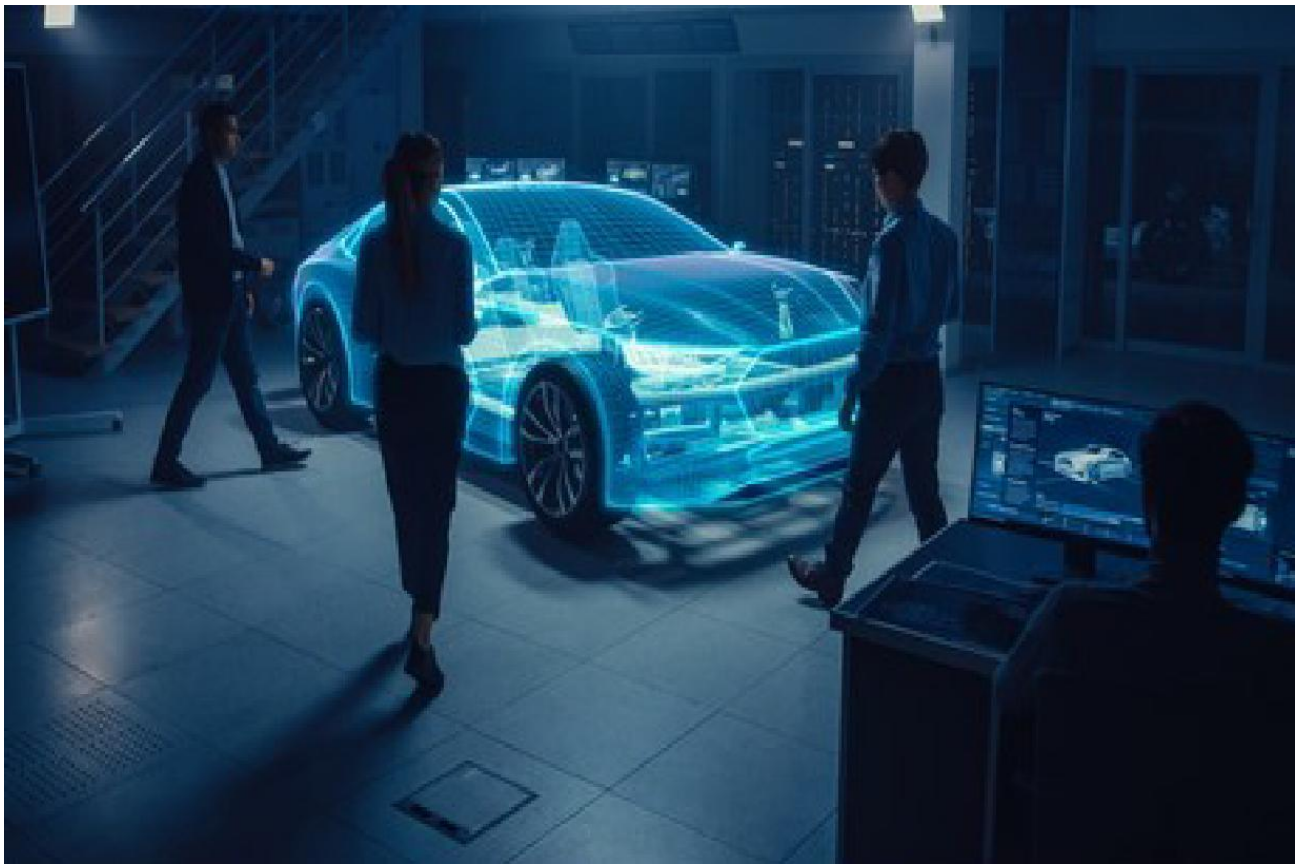

Basics of 3D Printing

MCr Code: ASC/MCr-0001

Version: 1.0

NSQF Level: 2.5

Automotive Skills Development Council | E-113, Okhla Industrial Area, Phase – III,
New Delhi – 110020

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Training Parameters

Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Product Development
Country	India
NSQF Level	2.5
Minimum Educational Qualification and Experience	Pursuing 9th Class
Pre-Requisite License or Training	No Minimum age restriction for school education perusing learners. No pervious certification required.
Minimum Job Entry Age	18 Years
Last Reviewed On	18/02/2025
Next Review Date	18/02/2028
NSQC Approval Date	18/02/2025
Model Curriculum Creation Date	18/02/2025
Model Curriculum Valid Up to Date	18/02/2028
Minimum Duration of the Course	30 Hours
Maximum Duration of the Course	30 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 to:

- Understand about 3D printing and its applications
- Discuss about reverse engineering and its importance in product development
- Demonstrate process of 3D Printing
- Demonstrate use of 3D printer and scanner

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	Total Duration
Module 1: Introduction of course and industry	01:00	00:00	01:00
Module 2: About 3D printing and reverse engineering	06:00	06:00	12:00
Module 3: Use of 3D printer and scanner	08:00	09:00	17:00
Total Duration	**15:00**	**15:00**	**30:00**

Module Details

Module 1: Introduction of course and industry

Terminal Outcomes:

- Discuss about course and automobile industry.

Duration: 01:00	**Duration: 00:00**
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Discuss about course structure and its objective. • Discuss about automobile industry and career opportunities in it. • Explain about Indian automotive market. • List various automobile Original Equipment Manufacturers (OEMs) and different products/ models manufactured by them.	
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films	
Tools, Equipment and Other Requirements	

Module 2: About 3D printing and reverse engineering

Terminal Outcomes:

- Understand about 3D printing and reverse engineering.
- Understand about various 3D printing technologies.

Duration: 06:00	**Duration: 06:00**
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe 3D printing and reverse engineering. • Describe importance and need of 3D printing and reverse engineering in industry. • Discuss applications of 3D printing in various industries. • Explain various 3D Printing technologies such as Fused Deposition Modelling, StereoLithography etc. • Explain features of each 3D Printing technology. • Describe process of reverse engineering. • List various types of 3D printers and scanners available. • Describe working mechanism of 3D printing machine and scanning machine	• Show comparison between various 3D Printing technologies e. • Demonstrate various 3D Printing technologies by showing a video. • Demonstrate use of 3D printer and scanner.
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films	
Tools, Equipment and Other Requirements	
3D printer and scanner	

Module 3: Use of 3D printer and scanner

Terminal Outcomes:

- Demonstrate process of 3D printing and scanning.

Duration: 08:00	**Duration: 09:00**
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain selection criteria od 3D printer and scanner as per work requirement. • List machine operating parameters such as room temperature range, air cleanliness and their impact on 3D printing. • Explain standard tesselation language (.stl) code file and its selection criteria for machine operation. • Describe part orientation and its selection criteria for 3D printing. • List steps for operating 3D printer and scanner	• Show how to set the 3D printing and scanning machine and its parameters as per SOP/WI. • Demonstrate organizational specified procedure of starting and operating the 3D printing and scanning machine for printing of automotive components. • Show how to stop the machine during an unwanted situation. • Apply appropriate ways to identify and rectify errors in machine during the machine operation. • Demonstrate how to remove the printed part and support structures from the machine carefully.
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
3D printer and scanner	

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
B.E./B.Tech	Mechanical/ Automobile	3	3D Printing	1	3D Printing	NA

Trainer Certification	
Domain Certification	**Platform Certification**
Certified for Job Role: "Basics of 3D Printing" mapped to QP: "ASC/MCr-0001", v1.0. Minimum accepted score as per SSC guideline is 80%	MEP/Q2601, v2.0 Trainer (VET and Skills). Minimum accepted score as per SSC guideline is 80%

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training/Assessment Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
B.E./B.Tech	Mechanical/ Automobile	4	3D Printing	1	3D Printing	NA

Assessor Certification	
Domain Certification	**Platform Certification**
Certified for Job Role: "Basics of 3D Printing" mapped to QP: "ASC/MCr-0001", v1.0. Minimum accepted score as per SSC guideline is 80%	MEP/Q2701, v2.0 Assessor (VET and Skills). Minimum accepted score as per SSC guideline 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.
- The 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.
- An assessor must be ToA certified & the trainer must be ToT Certified.
- The 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 trainingperiod.
- Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos.

5. Method of verification or validation:

- A surprise visit to the assessment location.
- A 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 / accessedfrom Cloud Storage.
- Soft copies of the documents & photographs of the assessment are stored in the HardDrives.

References

Glossary

Term	Description
Declarative Knowledge	Declarative knowledge refers to facts, concepts and principles that need tobe known and/or understood in order to accomplish a task or to solve a problem.
Key Learning Outcome	A key learning outcome is a statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. Aset 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 completespecified hours of training on-site
OJT (R)	On-the-job training (Recommended); trainees are recommended thespecified hours of training on-site
Procedural Knowledge	Procedural knowledge addresses how to do something, or how to perform atask. 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, understandand be able to do upon the completion of the training.
Terminal Outcome	The 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 ofterminal outcomes help to achieve the training outcome.

Acronyms and Abbreviations

Term	Description
NOS	National Occupational Standard (s)
NSQF	National Skills Qualifications Framework
OJT	On-the-job Training
QP	Qualifications Pack
PwD	People with Disability
PPE	Personal Protective Equipment