



**Australian Government**

# **ICPPTD301 Manipulate 3D files in preparation for 3D printing**

**Release: 1**

# ICPPTD301 Manipulate 3D files in preparation for 3D printing

## Modification History

| Release   | Comments                                                                                     |
|-----------|----------------------------------------------------------------------------------------------|
| Release 1 | This version first released with ICP Printing and Graphic Arts Training Package Version 3.0. |

## Application

This unit describes the skills and knowledge required to assess and rectify errors and convert files to a usable format for three-dimensional (3D) printing.

It applies to individuals in a range of industry sectors who have technical skills in 3D printing technologies and provide 3D printing services to internal or external clients.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

## Unit Sector

Three-Dimensional Printing

## Elements and Performance Criteria

| ELEMENT                                          | PERFORMANCE CRITERIA                                                                                                                                                                                                                                                                                                                            |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Elements describe the essential outcomes.</i> | <i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>                                                                                                                                                                                                                                          |
| 1. Assess design file                            | 1.1 Receive file and identify and document precision, quality, and materials requirements for 3D file in accordance with client specifications<br>1.2 Review and document faults, imperfections and errors of file and assess against client specifications<br>1.3 Provide recommendations to client, and agree on alterations to be undertaken |
| 2. Determine work requirements                   | 2.1 Select software required to perform adjustments according to file requirements<br>2.2 Calculate and document time and cost of work required to rectify identified faults, imperfections and errors                                                                                                                                          |

|                                      |                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                      | <p>2.3 Evaluate and document potential waste, build and support materials</p> <p>2.4 Inform client of work requirements and obtain approval for planned work</p>                                                                                                                                                 |
| 3. Prepare a precision 3D print file | <p>3.1 Manipulate file to remove imperfections and errors</p> <p>3.2 Prepare output file according to printer specifications</p> <p>3.3 Review file quality with client and obtain sign off</p> <p>3.4 Save file in a format appropriate for 3D printing according to organisational policies and procedures</p> |

## Foundation Skills

*This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.*

| Skill                | Description                                                                                                                                                                                                                                                                                                                                       |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reading              | <ul style="list-style-type: none"> <li>Analyses graphic files and specifications to determine requirements</li> </ul>                                                                                                                                                                                                                             |
| Writing              | <ul style="list-style-type: none"> <li>Names data files using appropriate naming conventions</li> </ul>                                                                                                                                                                                                                                           |
| Oral communication   | <ul style="list-style-type: none"> <li>Presents complex information using clear and persuasive language, and appropriate tone and pace for the audience and purpose</li> </ul>                                                                                                                                                                    |
| Numeracy             | <ul style="list-style-type: none"> <li>Performs mathematical calculations appropriate to graphics software to ensure accuracy, scale and tolerances are being met</li> <li>Estimates works requirements</li> </ul>                                                                                                                                |
| Interact with others | <ul style="list-style-type: none"> <li>Understands what to communicate, with whom and how, in routine work situations</li> </ul>                                                                                                                                                                                                                  |
| Get the work done    | <ul style="list-style-type: none"> <li>Accepts responsibility for planning and sequencing complex tasks and workload, negotiating key aspects with client</li> <li>Uses problem solving techniques to evaluate errors and manipulate graphics images</li> <li>Uses digital technologies and applications to manage and manipulate data</li> </ul> |

## Unit Mapping Information

| Code and title<br>current version                                     | Code and title<br>previous version                                                | Comments                                                                       | Equivalence status |
|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------|
| ICPPTD301<br>Manipulate 3D files<br>in preparation for 3D<br>printing | ICPPRP495<br>Manipulate 3D<br>graphics files in<br>preparation for 3D<br>printing | Updates to elements,<br>performance criteria<br>and assessment<br>requirements | Not equivalent     |

## Links

Companion Volume Implementation Guides are available from VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a74b7a0f-a253-47e3-8be0-5d426e24131d>

## Assessment Requirements for ICPPTD301 Manipulate 3D files in preparation for 3D printing

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### Performance Evidence

The candidate must demonstrate they can perform the following according to the standards defined in the elements, performance criteria and foundation skills of this unit.

The candidate must demonstrate the ability to manipulate 3D files in accordance with workplace procedures to meet required outcomes a minimum of 2 times. This includes demonstrating the ability to:

- communicate with client to identify needs
- confirm client requirements for three-dimensional (3D) print output
- determine work requirements and obtain client approvals
- recognise faults, imperfections and errors in 3D printer files
- use software to rectify errors in 3D printer files
- save files in required format.
- 

### Knowledge Evidence

The candidate must be able to demonstrate the following knowledge to effectively complete the tasks outlined in the elements and performance criteria of this unit, and to manage tasks in the context of the work role:

- common manifold errors in 3D printer graphics, including the effect on:
  - proposed printed material
  - printing technology
  - wall thickness
  - file resolution limits
  - conversion between software
  - support structure
- possible errors, including:
  - reversed surfaces
  - components without volume

- internal edge and face errors
- the relationship between 3D modelling software and 3D image software, including:
  - file types
  - function of the software
  - main image editing tools
  - scale and units
- “Cartesian coordinate system” and how it relates to 3D graphics file manipulation
- the purpose of “slicing” in the preparation of G-Code for 3D object build
- the effect of setting resolution and deposition thickness in 3D graphics on 3D print output quality
- work health and safety (WHS) requirements and workplace procedures relevant to 3D printing technologies
- intellectual property and copyright laws and requirements in relation to 3D printing.
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## Assessment Conditions

Assessment must be conducted in a safe environment where evidence gathered demonstrates consistent performance. Noise levels, production flow, interruptions and time variances must be typical of those experienced in the pre-media field of work and include access to:

- a range of model files and image files with errors
- a computer with industry-standard 3D software packages
- a 3D printer or 3D printer specifications
- organisational policies and procedures relating to use and storage of data and files.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

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