

E U E R A S M U S V R / A R



# TECHNICAL DRAWINGS

## TD5: SURFACE ROUGHNESS

### Authors

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# Introduction

This module addresses the use of low cost mobile Virtual and Augmented Reality (V/AR) tools developed with the support of animation and simulation tools alongside text based teaching methods. This unit was produced by the results of an international needs analysis of Technical Drawings training requirements conducted to determine the subject areas lacking in teaching the concepts of basic, advanced standards and principles used in manufacturing and engineering.

The main purpose of this curriculum development study was to develop a competency-based and target-oriented Technical Drawings training programme with the collaboration with the academic and the industrial partners. That's is why it was concluded that not only current teaching methods have led to a deficit in the quality of Technical Drawings training but also using up to date V/AR and animation technologies could help to improve it.

It is envisaged that the use of V/AR technologies, which will help to gain skills for visual memory during these advanced studies, will make a significant contribution to the learning performance of the trainee.

## How to Use

### **Use of Animations:**

Users first watch related video or animation/visualization to understand basis of the subjects.

**Use of AR apps:** A virtual object would be superimposed over a live video feed from a camera of a mobile device. The use of ARCore can only work with new mobile phones that have (Android 7.0+).

**Use of VR apps:** The requirements for the student/teacher for VR apps would be: HTC VIVE Virtual Reality System or VR Glasses

These animation and A/VR applications can be found at the project web site and can be downloaded free.

<http://vrindesign.org/>

# VRINDESIGN TECHNICAL DRAWINGS

**Module Code: TD5**

**Module Title: SURFACE ROUGHNESS**

<b>Course Content</b>	<b>Surface Roughness</b>	
	<p>Reasons and limitations of roughness on the surface in manufacturing. Using appropriate symbols of the surface according to working type of the part. Surface roughness symbols and types. Information added to symbols in surface treatment marks. Different roughness values such as Rzmax, Rz1max given in different standards with surface treatment marks (Ra, Rz, Rmax, Pt and others.)</p> <p>Surface roughness values and roughness class numbers. Specification of surface roughness in the technical drawings and specification of the manufacturing method. Specification of Main Length and roughness, Surface treatment traces and properties of manufacturing methods, Display of surface treatment allowances, Display of special treated surfaces in the drawings.</p>	
<b>Learning Outcomes</b>	5.1	<b>Learners</b> Know the reason for the roughness that occurs in the manufacturing surfaces and the reasons for the restriction and the manufacturing surface are required to indicate the appropriate surface treatment marking to the part's task.
	5.2	<b>Learners</b> Can recognize, read, or write different roughness values such as Rzmax, Rz1max given in different standards with surface markings (Ra, Rz, Rmax, Pt and others)
	5.3	<b>Learners</b> Know or found on the table the surface roughness values and the roughness class numbers. Understands in the drawings the manufacturing method from the surface roughness mark.
	5.4	<b>Learners</b> Know the details such as Main Length and roughness, read the surface treatments and read specially treated surfaces from the mark.

<b>Course hours</b>	60 min
<b>V/AR Content</b>	<b>Video / Animation</b> <b>Mobile AR Application</b> <b>VR with HTC Vive app</b>
<b>Teaching Learning Methods</b>	<p><b>Teaching Methods for Trainers</b></p> <p>These applications and animations should be used as supporting materials during theoretical lecture to teach the course content. Suggested methods are:</p> <ul style="list-style-type: none"> <li>- Use general PowerPoint slides to teach theoretical content,</li> <li>- Use /show related video or animation where the related subject presentation to visualization can be shown,</li> <li>- Learners can use their own AR apps to create these subjects as 3D environment if possible,</li> <li>- Or use AR apps via projections to show the details to the learners,</li> <li>- Learners can use their own mobile device to see related VR apps to create these subjects as 3D environment via using VR glasses</li> <li>- Or trainers can use VR apps via HTC vive with the learners to understand related subject as 3D environment</li> </ul> <p><b>Learning Methods for Individual Users</b></p> <ul style="list-style-type: none"> <li>- Firstly watch related video or animation / visualization and understand basis of the subjects.</li> <li>- Use your AR apps to create these subjects in 3D environment</li> <li>- Use your mobile device to see related VR apps to practice these subjects as 3D environment via using VR glasses</li> </ul>