

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



TECHNICAL DRAWINGS

TD4: GEOMETRIC DIMENSIONING AND TOLERANCING

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: TD4

Module Title: GEOMETRIC DIMENSIONING AND TOLERANCING

Course Content	<p>Geometric tolerance principles</p> <p>Dimensional tolerance applications and sizing of components, subgroups of manufacturing and assembly elements using the relevant BS and ISO standards. The methodology used in the presentation of geometric tolerance, the concept of tolerant element and the formation of tolerance zones.</p> <p>Form and position tolerances</p> <p>Differences of form and position tolerances from other tolerance groups, correct reading / understanding of technical communication and norms, requirements of tolerance concept and elements of geometric tolerance, measurement and evaluation criteria in dimensional and geometric tolerance.</p>	
Learning Outcomes	4.1	<p>Learners</p> <p>Can learn the concept of the geometric tolerance, the concept of tolerance and the formation of tolerance zones.</p>
	4.2	<p>Learners</p> <p>Know the concepts of straightness, flatness, circularity or roundness circularity, cylindricity. They know and applies the principles of measuring and recognizing form tolerances by means of a line, a surface and deviation from the form.</p>
	4.3	<p>Learners</p> <p>Know the concepts of perpendicularity, parallelism and know the principles of deviation, measurement and approval in directional tolerances.</p>
	4.4	<p>Learners</p> <p>Know and apply the concepts of position tolerance, position, concentricity, coaxiality, symmetry and deviations, measurement and approvals in positioning tolerances.</p>

	4.5	<p>Learners</p> <p>Know the Circular runout, total runout tolerances. They know the deviations, measurement and approval principles in runout tolerances.</p>
	4.6	<p>Learners</p> <p>Knowing the concepts of position, position element and position dimension. Know the position of an element or group of elements. A group of elements can be positioned according to another group of elements.</p>
	4.7	<p>Learners</p> <p>Know the maximum material principles, usage areas and requirements used in position and concentricity tolerances. Know the minimum material conditions and application areas.</p>
Course hours	60 min	
V/AR Content	<p>Video / Animation</p> <p>Mobile AR Application</p> <p>VR with HTC Vive app</p>	
Teaching Learning Methods	<p>Teaching Methods for Trainers</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"> - Use general PowerPoint slides to teach theoretical content, - Use /show related video or animation where the related subject presentation to visualization can be shown, - Learners can use their own AR apps to create these subjects as 3D environment if possible, - Or use AR apps via projections to show the details to the learners, - Learners can use their own mobile device to see related VR apps to create these subjects as 3D environment via using VR glasses - Or trainers can use VR apps via HTC vive with the learners to understand related subject as 3D environment <p>Learning Methods for Individual Users</p> <ul style="list-style-type: none"> - Firstly watch related video or animation / visualization and understand basis of the subjects. - Use your AR apps to create these subjects in 3D environment - Use your mobile device to see related VR apps to practice these subjects as 3D environment via using VR glasses 	