

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



TECHNICAL DRAWINGS

TD1: SKETCHING AND DIMENSIONING

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: TD1

Module Title: SKETCHING AND DIMENSIONING

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| Course Content | Sketching Drawing papers. Drawing templates, title block, units, abbreviations, rectangular coordinates, polar coordinates, line types, scale. Projection methods, views. | |
| | Dimensioning Dimensioning lines, arrows and numbers. Guide lines and special marks. Dimensioning systems and types (parallel, angular, chained, offset, using coordinates, combined with the help of charts). Placement of dimensions in manufacturing and assembly drawings. Special dimensions, auxiliary dimensions, absolute dimensions etc. Scales, types and scaling standards. Reasons for tolerance, faults of machines and tools in manufacturing, measuring instruments. Tolerance reading and visualization methods. Tolerance boundaries and fittings: Definition of tolerance and its importance, classification of tolerances; dimensional tolerances (TS 1845, TS 450, TS 1980, TS 1506), shape and position tolerances (TS 1304, TS 1498), ISO 1101) English (BS) and ISO tolerances. | |
| Learning Outcomes | 1.1 | Learners Know drawing papers, letterhead and coordinates, units and basic methods of dimensioning. Know dimensioning lines, arrows and numbers, guide lines and special signs. Distinguish ISO-A and ISO-E projection methods, know revision symbols and meanings in the technical drawings. |
| | 1.2 | Learners Know dimensioning systems and types (parallel, angular, chained, offset, using coordinates, combined with chart). Can place dimensions in manufacturing and assembly drawings. Know the special dimensions as auxiliary dimension and absolute dimension and understands the details in the drawings. Can read scales and knows basic scaling standards. |
| | 1.3 | Learners Know the reasons for tolerance, the fault of machines and tools in manufacturing, the effects of measuring tools, heat-light, personal |

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| | | mistakes and tolerance. Can recognize tolerance, deviation and practice. Can read and display symbols. |
| | 1.4 | <p>Learners</p> <p>Know tolerance limits and fittings. Understands the relationship and importance of tolerance faults with production waste rate. Know size, punch-hole, corner break and shape and position tolerances, can distinguish and comprehend usage requirements.</p> |
| Course hours | 45 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 | |