

Learning Resources for the Future of Engineering Education

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International Symposium for Engineering Education 2007

Introduction

- Web-resources
- Re-usable learning objects (RLOs)
- Impetus for Repositories
- National Digital Learning Repository (NDLR)
- Mechanical Engineering Community of Practice
- ISEE 2007 / 2008

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Resources available

- Unit conversion calculators
- Web dictionaries
- E-books
- PowerPoint presentations
- Photograph, text, audio and video files
- Computer gaming
- Sophisticated modelling applications
- Blogs
- Virtual Learning Enviroments (VLEs)

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Links - Engineering Tools



Calculator.org

Free online calculator and conversion tables.

www.calculator.org

Cheresources

Study Aids for Chemical Engineering. Some free. Fee for premium content.

www.cheresources.com/indexzz.shtml

Design Aids Freeware

Huge number of useful programs for all Engineering Disciplines.

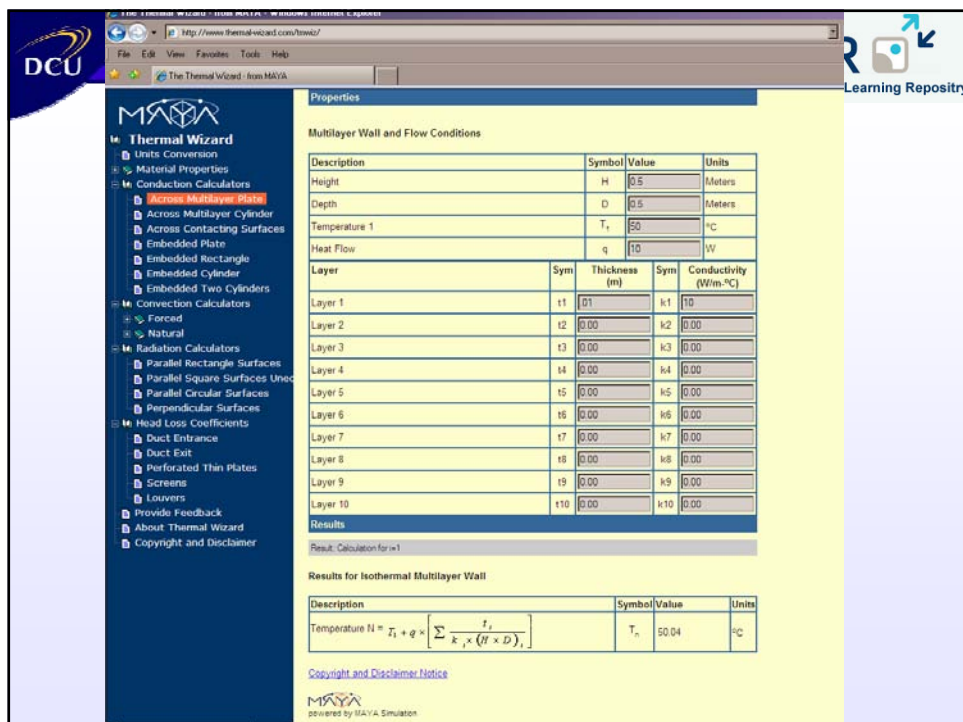
www.designaids.com/freeware.html


EEVL's Ejournal Search Engines - Engineering


Search the content of over 160 freely available full-text engineering ejournals.

www.ee vl.ac.uk/ee se/ee se-eng.html

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 National Digital Learning Repository



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 National Digital Learning Repository

Other resources

- E-Mentoring via society web-site
 - Student directly in contact with practicing engineer
 - Not limited by geographic boundaries

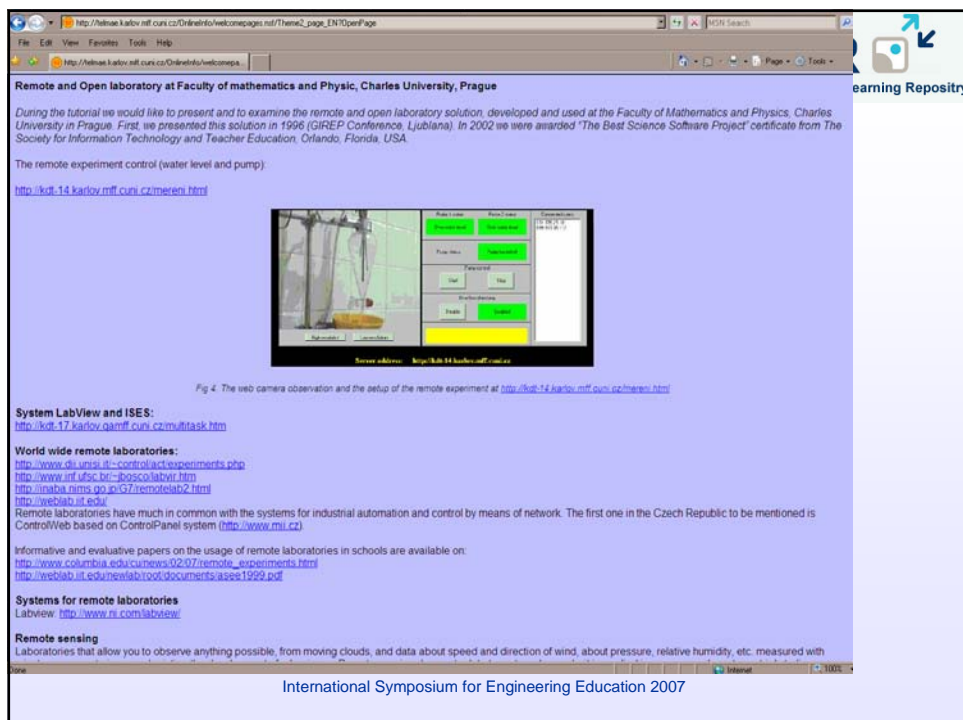
- Distance learning courses available internationally
 - American Society of Materials
 - American Society of Mechanical Engineers
 - Society of Manufacturing Engineers

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Remote Laboratory Virtual Instruments

- Readily be made available via the internet
- Studies show
 - better results achieved when used as a learning aid during the lab
 - remote use produce similar results compared to traditional mode
- Examples
 - Charles University, Prague
 - Dublin City University

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Remote and Open laboratory at Faculty of mathematics and Physics, Charles University, Prague

During the tutorial we would like to present and to examine the remote and open laboratory solution, developed and used at the Faculty of Mathematics and Physics, Charles University in Prague. First, we presented this solution in 1996 (GIREP Conference, Ljubljana). In 2002 we were awarded 'The Best Science Software Project' certificate from The Society for Information Technology and Teacher Education, Orlando, Florida, USA.

The remote experiment control (water level and pump):
<http://kdt-14.karlov.mff.cuni.cz/mereni.html>

Server address: <http://kdt-14.karlov.mff.cuni.cz/mereni.html>

Fig 4. The web camera observation and the setup of the remote experiment at <http://kdt-14.karlov.mff.cuni.cz/mereni.html>

System LabView and ISES:
<http://kdt-17.karlov.mff.cuni.cz/multitask.htm>

World wide remote laboratories:
<http://www.de.univie.ac.at/controlact/experiments.php>
<http://www.inf.ufsc.br/~boscolo/labview.htm>
<http://naba.nims.go.jp/G7/remotelab2.html>
<http://webdab.ut.edu/>


Remote laboratories have much in common with the systems for industrial automation and control by means of network. The first one in the Czech Republic to be mentioned is ControlWeb based on ControlPanel system (<http://www.mji.cz>)


Informative and evaluative papers on the usage of remote laboratories in schools are available on:
http://www.columbia.edu/cu/news/02-07/remote_experiments.html
<http://webdab.ut.edu/news99b/root/documents/ases1999.pdf>

Systems for remote laboratories
 Labview: <http://www.ni.com/labview/>

Remote sensing
 Laboratories that allow you to observe anything possible, from moving clouds, and data about speed and direction of wind, about pressure, relative humidity, etc. measured with

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 National Digital Learning Repository

This experiment is split up into three sections, a link to each is shown below
Read the instructions for each section before beginning them.

Section 1. In the first section you will be given an introduction into polymers, plastic processing, semi solid metals and statistical design of experiments.

Plastics

Statistical Design of Exp

Semi Solid Metals

Injection Moulding

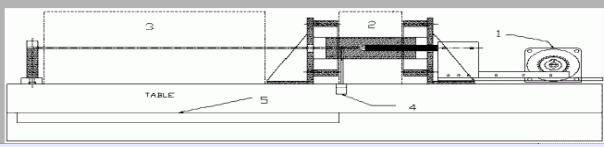
Section 2. In this section you will read and carry out the procedure for the experiment. You will use the computer to record some of your data. This will be made available to you in order to complete your report.

Procedure and Datalogging


Section 3. In the final section you will be told what you have to do with the data you have collected and recorded in your answer book. You will also be given a list of requirements your report should include.


Report Requirements

STOP



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 National Digital Learning Repository

Impetus for Repositories

- Minimise the workload to the individual
- Minimise cost to the organisation
- Improve educational standards
- Larger range of resources to each lecturer

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Repository Examples


- Canadian repositories: MERLOT, CAREO, POOL, CLOE
- UK: JORUM
- Education Network Australia (EdNA)
- MIT Open Course Ware
- National Engineering Education Delivery System
- EducaNext

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Non subscriber catalogue based

- World Lecture Hall
- EEVL
 - including Intute contains 114,689 RLOs
- Bubl Information Service
 - catalogues engineering internet resource

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NDLR
National Digital Learning Repository

National Digital Learning Repository (NDLR)

- HEA pilot project
- Irish Universities & Institutes of Technology
- Online resource repository
- Sharing of teaching and learning resources
- Encourage collaboration within subject communities
- Quality control by members of the Communities

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NDLR
National Digital Learning Repository

Search for resource

Search | [advanced search](#) | [browse library](#) | [work area](#) | [admin tools](#) | [Mureann O'Keefe profile](#) | [help](#) | [logout](#)

NDLR Repository

[Library](#)

1. By Subject - NDLR Communities of Practice - A-Z

- [Applied Social Studies](#)
- [Bio-Technology](#)
- [Computer Science](#)
- [Education](#)
- [Electronic Engineering](#)
- [Library Information Skills](#)
- [Mathematics and Statistics Service Teaching](#)
- [Mechanical Engineering](#)
- [Advanced Manufacturing](#)
- [Material Science](#)
- [Mechanics and Machines](#)
- [SolidWorks - CAD](#)
- [Sustainability & Design](#)
- [Modern Languages](#)
- [Music and Musicology](#)
- [Physical and Chemical Sciences](#)
- [Technology Enhanced Learning](#)
- [Veterinary and Bio-Environmental Sciences](#)

2. By Subject - UK Standard Categories (AACSB)

3. By Subject - Library Association Subjects (JACS)

4. By Subject - UK Standard Categories (AACSB)

Library Browser

Location: Mechanical Engineering
42 object(s) in selected location. [42 object\(s\) below this location](#)

Include unpublished objects: ☐ Include objects from all collections: ☐

[Create News Feed](#) [Display all images](#)

Statistical Design of Experiments.ppt

Statistical method to select process parameters for improved process output

average rating: **★★★★** [comments and ratings](#)

Technical Format: application/vnd.ms-powerpoint **Size of object:** 79 kb [Author/Artist/Creator](#)

Polymer (plastic) processing

Polymer (plastic) processing, Crystallinity Glass transition temperature, Mechanical behaviour of thermoplastics

average rating: (no ratings) [comments and ratings](#)

Technical Format: application/msword **Size of object:** 50 kb [Author/Artist/Creator](#)

Sample advanced machining tutorial questions

Sample advanced machining tutorial questions, Dermot Brabazon DCU

average rating: (no ratings) [comments and ratings](#)

Technical Format: application/msword **Size of object:** 53 kb [Author/Artist/Creator](#)

Viscosity, Rheology

Ranges of variables which effect viscosity, Rheological determination , Concepts of rheological research

average rating: (no ratings) [comments and ratings](#)

Technical Format: application/vnd.ms-powerpoint **Size of object:** 120 kb [Author/Artist/Creator](#)

Advanced Welding

Advanced manufacturing, Soldering, Brazing, Welding. Dermot Brabazon DCU.

average rating: (no ratings) [comments and ratings](#)

Technical Format: application/vnd.ms-powerpoint **Size of object:** 339 kb [Author/Artist/Creator](#)

List of Resources

Subject List

Using NDLR resources

- Reusable Learning Objects (RLOs): resources that can be reused for teaching and learning purposes
- Learning resources from NDLR can be incorporated into
 - VLE (Moodle, WebCT, Blackboard)
 - Lecture notes
 - Student assignments
 - Student Practical
 - Resources can be re-customised

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Mechanical Engineering CoP

- Members include everyone who teaches any aspect related to mechanical engineering at higher level
- AIM: Promotion of best practice for development, delivery and sharing of mechanical engineering education
 - Development of RLO's
 - Sharing of RLOs in NDLR
 - Regular meetings
 - Workshops
 - Events for engineering educators - ISEE 2007: 17th – 19th Sept
 - ISEE 2008: 2nd week Sept – call for papers; deadline: June 2008

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ME CoP Learning Objects

- Over 50 mechanical engineering resources
- At least 200 resources by Dec 2007
- Remote Laboratories (shown by Dermot)
- [Gear animation](#) - UL
- [Solid work tutorial](#) (Fascia) UL
- [Temperature Volume](#) diagram for water NUIG

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References

- ME CoP Coordinator: Dermot.brabazon@dcu.ie
- NDLR Coordinator: Muireann.okeeffe@dcu.ie
- NDLR: <http://www.ndlr.ie>
- ME CoP: <http://www.ndlr.ie/mecheng/blog>
- Links in this presentation: <http://webpages.dcu.ie/~brabazod/IMC07.html>
- http://en.wikipedia.org/wiki/Community_of_practice, accessed 10/04/2007
- Pegler, Chris. Re-usable learning objects, Teaching and Learning Day; UCD, 2007
- Downes, Stephen. <http://www.downes.ca/cgi-bin/page.cgi?topic=146> accessed 19/07/2007
- Holden, Colin. "From Local challenges to a Local Community: Learning and Repositories and the Global Learning Repositories Summit. 2003

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RAPID MANUFACTURING – A BUSINESS CASE FOR DEVELOPING REUSABLE MULTIMEDIA FOR ENGINEERING EDUCATION

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ABSTRACT

Rapid Manufacturing (RM) is the name given to the production of ‘series’ or ‘end-use’ component parts made using ‘Additive Layer Manufacturing’ (ALM) processes. ALM processes take three dimensional Computer Aided Design (3D-CAD) data and directly ‘print’ or ‘grow’ parts in a variety of materials.

Although RM remains in its infancy, with up-take restricted almost exclusively to large scale OEM’s and technology focused research firms, the technology has been cited as leading towards a ‘second industrial revolution for the digital age’, where it could have a significant impact on business, society, the economy and the environment.

Because RM has the potential to change the paradigm of global manufacturing, it is undoubtedly of increasing importance in both further and higher education. To-date however, RM focused learning tools have been restricted to printed materials, static web based resources and on-line multimedia content produced by technology vendors to stimulate sales.

This paper discusses the development of a commercial business model, “RM-Media”, which is dedicated to the brokerage of reusable learning resources focused on RM, including digital video, audio, process animations and digital photographs. The paper addresses the development of educational content within the RM-Media product offer, in addition to global market segmentation, data and content brokerage mechanism and web based procurement.

INTRODUCTION

Rapid Manufacturing (RM) is one of a number of applications for component parts made using ‘Additive Layer Manufacturing’ (ALM) processes [1]. Other commercial applications for ALM within industry, include the manufacture of prototypes, known as rapid prototyping [2], tool cores and cavities, known as rapid tooling [3], and in the manufacture of patterns for a range of casting processes, known as rapid casting [4].

In recent years however, there has been an increase in the number of additive layer manufactured parts used for end use applications or RM. Examples of RM applications include aerospace components [5], automotive applications [6], medical applications [7], motor sport parts [8], and consumer products, such as light shades [9], furniture and football boots [10]. However, although RM has been identified as the possible catalyst for a ‘new industrial revolution for the digital age’ [11], wide spread knowledge of RM remains limited within both academia and industry.