Learning Resources for the Future of Engineering Education

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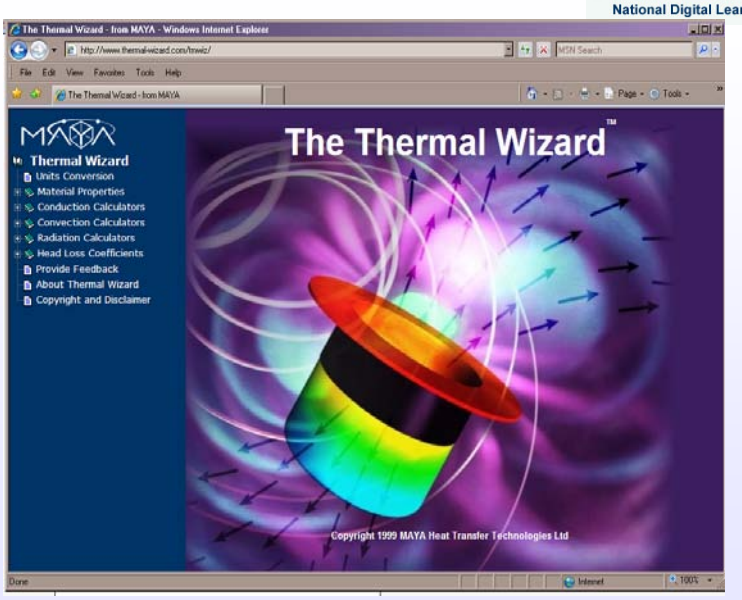
Introduction

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

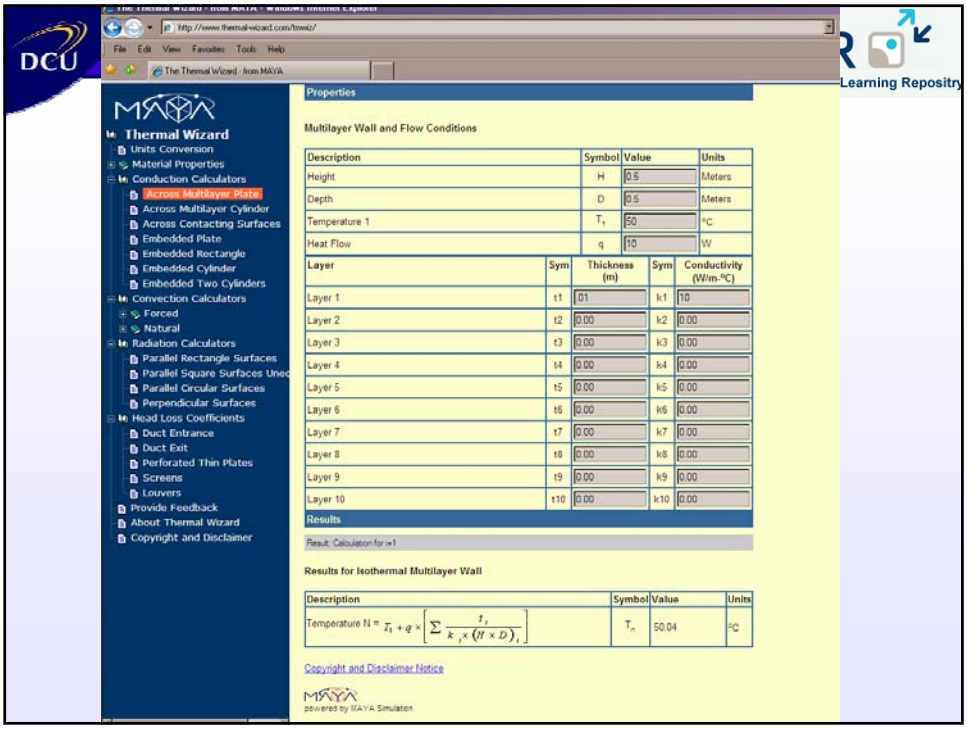
Resources available

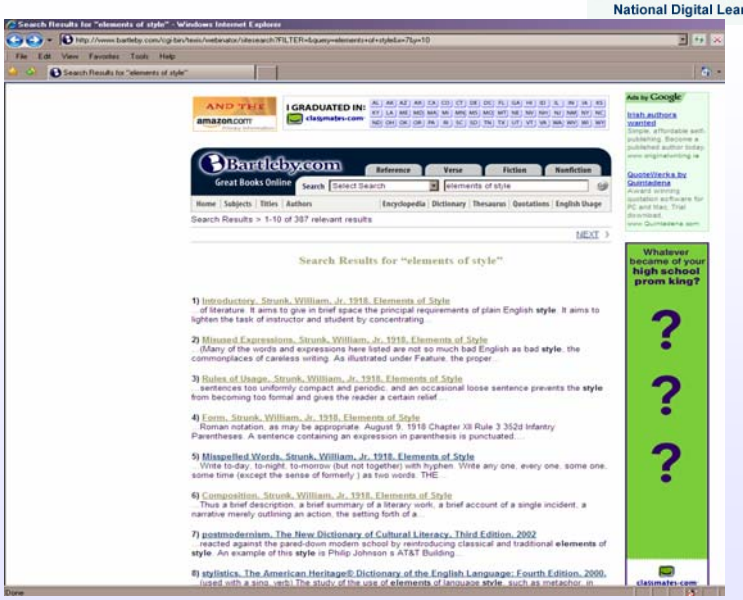
- Unit conversion calculators
- Web dictionaries
- E-books
- PowerPoint presentations
- Photograph, text, audio and video files
- Computer gaming
- Sophisticated modelling applications
- Blogs
- Virtual Learning Enviroments (VLEs)

International Symposium for Engineering Education 2007



International Symposium for Engineering Education 2007





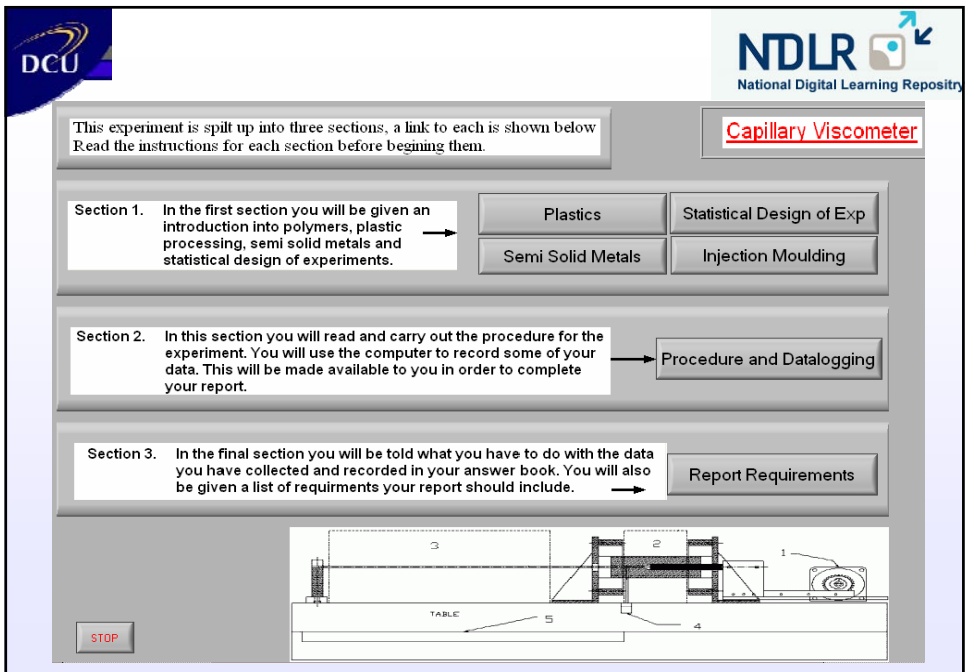
Other resources

- 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

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

International Symposium for Engineering Education 2007



Impetus for Repositories

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

Repository Examples

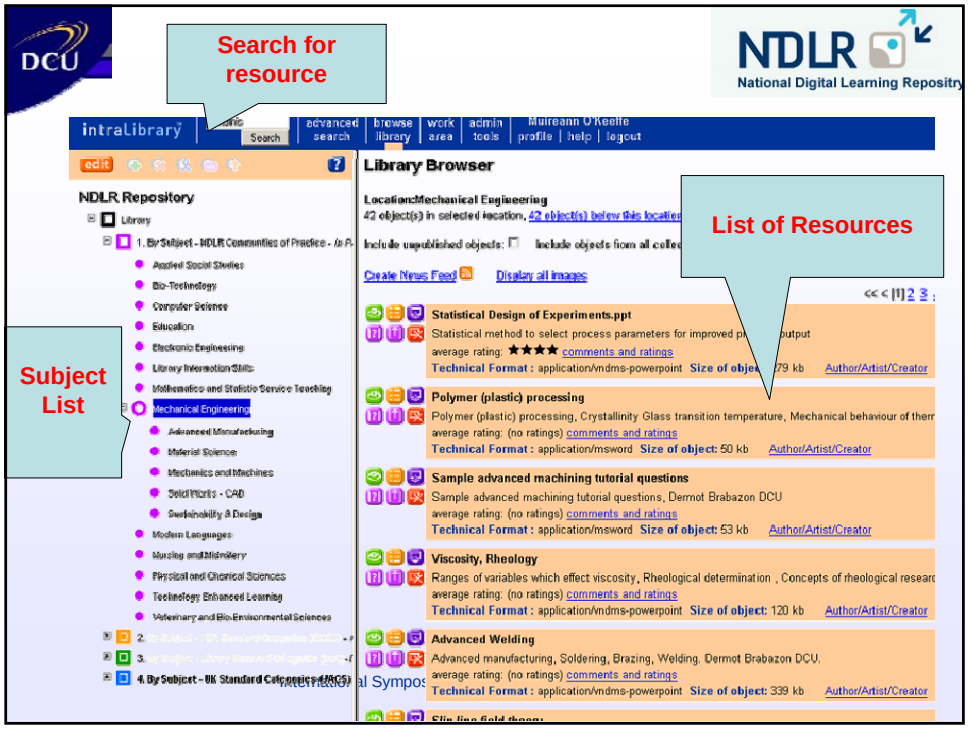
- Canadian repositories: MERLOT, CAREO, POOL , CLOE
- UK: JORUM
- Education Network Australia (EdNA)
- MIT Open Course Ware
- National Engineering Education Delivery System
- EducaNext

Non subscriber catalogue based

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

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



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

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

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

References

- ME CoP Coordinator: Dermot.brabazon@dcu.ie
- NDLR Coordinator: Muireann.okeeffe@dcu.ie
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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, know as rapid prototyping [2], tool cores and cavities, know 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.