MANCHESTER 1824

The University of Manchester

School of Electrical & Electronic Engineering

Preparation for Group Project Work – A Structured Approach

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Background

- Embedded Systems Project (ESP)
  - Major 2nd year student-centred activity – first introduced in 2004-05.
  - Students work in small teams of 4 to 5 throughout semester 2.
  - Design and build a microcontroller-based product.
- Evaluation
  - Students encountered a number of problems in carrying out their first team project.

Aims of the EBL Project

- To develop student skills in:
  - Team working
  - Project planning
  - Group presentations
- Structured series of EBL activities:
  - Organised as part of semester 1 tutorial scheme
  - Group sessions facilitated by tutors
  - Tutors monitor and assess student progress

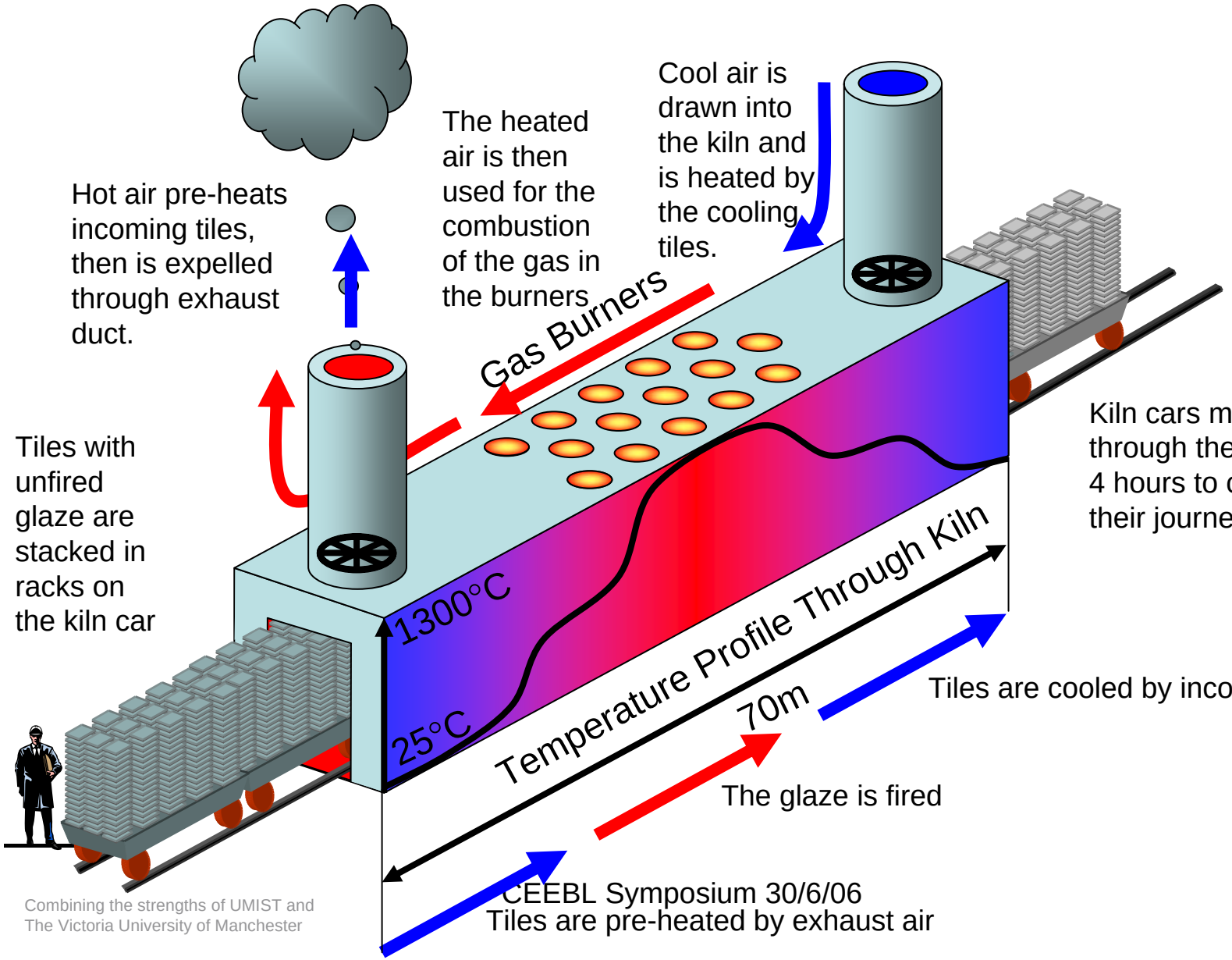
EBL Scenario

- Based on a hypothetical decorative tile company, Baked Earth.
- The company has become aware of inconsistencies in the quality of a new high-temperature glaze.
- Working in partnership with Euro-Tunnel Kilns to find solutions to the problem.
- Need to measure temperature profile in the kiln using portable temperature sensors.
- Agency for Consultancy in Electronics (ACE) has been commissioned to design the electronics.

The Problems

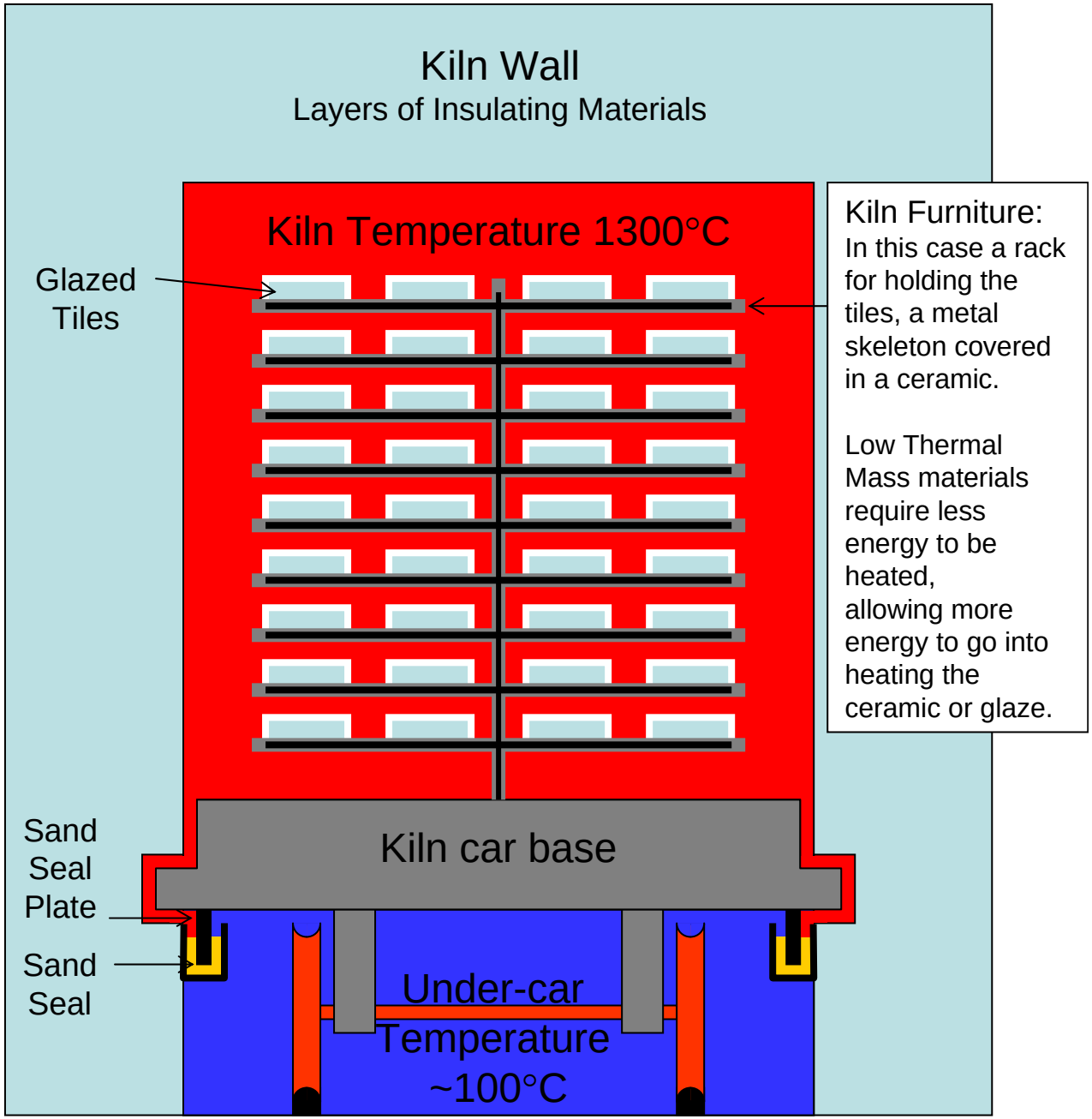
- Problem 1
  - Design a circuit for a thermistor sensor to interface with a PIC microcontroller system
- Problem 2
  - Review the choice of sensor – thermocouples
- Problem 3
  - Produce a viable project plan
- Problem 4
  - Redesign the sensor amplifier – practical considerations
- Problem 5
  - Prepare a group presentation

Euro-Tunnel Kilns - Gehenna Series



Euro-Tunnel Kilns:

Gehenna Kiln Car



Student (& Staff!) Support

- Supporting Documents
  - Problem sheet summaries
  - SEEERS Guides
  - Tutor cover notes and supplementary material
- Supporting Lectures
  - Introduction
  - Searching skills
  - Working in groups
  - Project planning
  - Presentation skills

- SEEERS Guides to:
  - Second Year Tutorials
  - Manchester Steps
  - Small Group and Team Work
  - Searching for Information
  - Project Planning
  - Group Presentations
  - The Marking Scheme

Manchester Steps

Make the problem explicit
Assess existing knowledge
Need to know
Course of action
Home in on resources
Enquiries and/or Experiment
Share results
Theorise
Evaluate
Report, Repeat, Refine, Reflect

The Story So Far ….

- Teams met with tutors every two weeks
  - Tutors assess individual student performance
  - Marks do not count towards end of year assessment
  - Attendance has been patchy – declining as weeks go by
- Student feedback
  - Some areas need attention, but overall experience is positive.
  - Presentations particularly valuable.
  - They value the team working component.
  - Insight into the complexities of a real project (harder than labs).
- Tutor feedback
  - Students are talking about technical issues outside class.
  - A very valuable activity.

Evaluation Method: Integrative Evaluation

… combining a number of evaluation tools to gain insight on the students learning experience …

- Confidence Logs
- Student Process Questionnaire
- Learning Resource Questionnaire
- Perceptions of PBL
- Post Course Questionnaire
- Focus Groups
  - Mid-way through SYT
  - End of SYT
  - End of Team Project (ESP)

Evaluation Results: Quantitative

- Increase in confidence in all areas
  - except presentations
- Study Process Questionnaire (0-50)
  - Deep Learning Attitude (28.3)
  - Surface Learning Attitude (22.9)
- Learning Resources
  - Wide range, Internet primarily
  - Discussions with students and staff also high
- Perceptions of PBL
  - Positive despite recognising more time and responsibility
  - Generally happy with the level of support
  - Still preferred lectures
- Attendance
  - Dropped 92% $\Rightarrow$ 45%

Evaluation Results: Post Course Questionnaire

What did you learn from SYT?

- Team Working
- Project Planning and Management Problem Solving
- Presentation
- Research

What did you not like about the SYT?

- Not marked
- Competing workloads
- Some – dysfunctional teams

Other Comments

- Some – supported the initiative
- A few – use tutorials in a different way

What would you like to see changed about the SYT?

- Adding Marks
- Reducing Workload
- Better Teamwork

Evaluation Results: Qualitative

- Students: Focus Groups
  - Lack of support for **Plan a Project** problem
  - *"We need a lecture on* **<blank>** *before we can do it."*
  - Need for marks
  - Competing workloads
  - **Build a Circuit** problem introducing a sample circuit broke validity of project
  - Wanted to see a project to completion
  - Problems with team working
- Staff: Feedback
  - Worthwhile, high quality activity
  - Needs Credit – danger of bad habits carrying over

What next … (i)

- Adding Credit
  - Increase student (& staff) commitment
- Fine Tune Problems
  - More support for the Project Planning & MS Project
  - Improve the flow of problems, especially Problem 4
  - Balancing workload with other coursework
  - More structure\guidance on dividing problems (tutor notes)

What next … (ii)

- Restructure Problems to be closer to ESP Project
  - Plan a Project
  - Choose a Sensor
  - Design a Circuit
  - Build a Circuit
  - Prepare a Presentation

What next … (iii)

Support Teamwork

- Opening Workshop
  - Introduce Teamwork, its importance and some tools
- Management Report
  - Record team processes
  - Reflect on process
- Closing Workshop
  - Present Management Report
  - Reflect on what they learnt

Acknowledgements

HEFCE Curriculum Innovation Fund

Higher Education Funding Council for England

IET Academic and Industrial Accreditation

Institute of Engineering and Technology

CEEBL www.manchester.ac.uk/ceebl

Centre for Excellence in Enquiry-Based Learning

HEFCE: CETLs Programme

Centre for Excellence in Teaching and Learning

Thank you …