

## School of Electrical & Electronic Engineering

# Preparing for a team project

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# Background

- Embedded Systems Project (ESP)
  - Major 2<sup>nd</sup> 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.

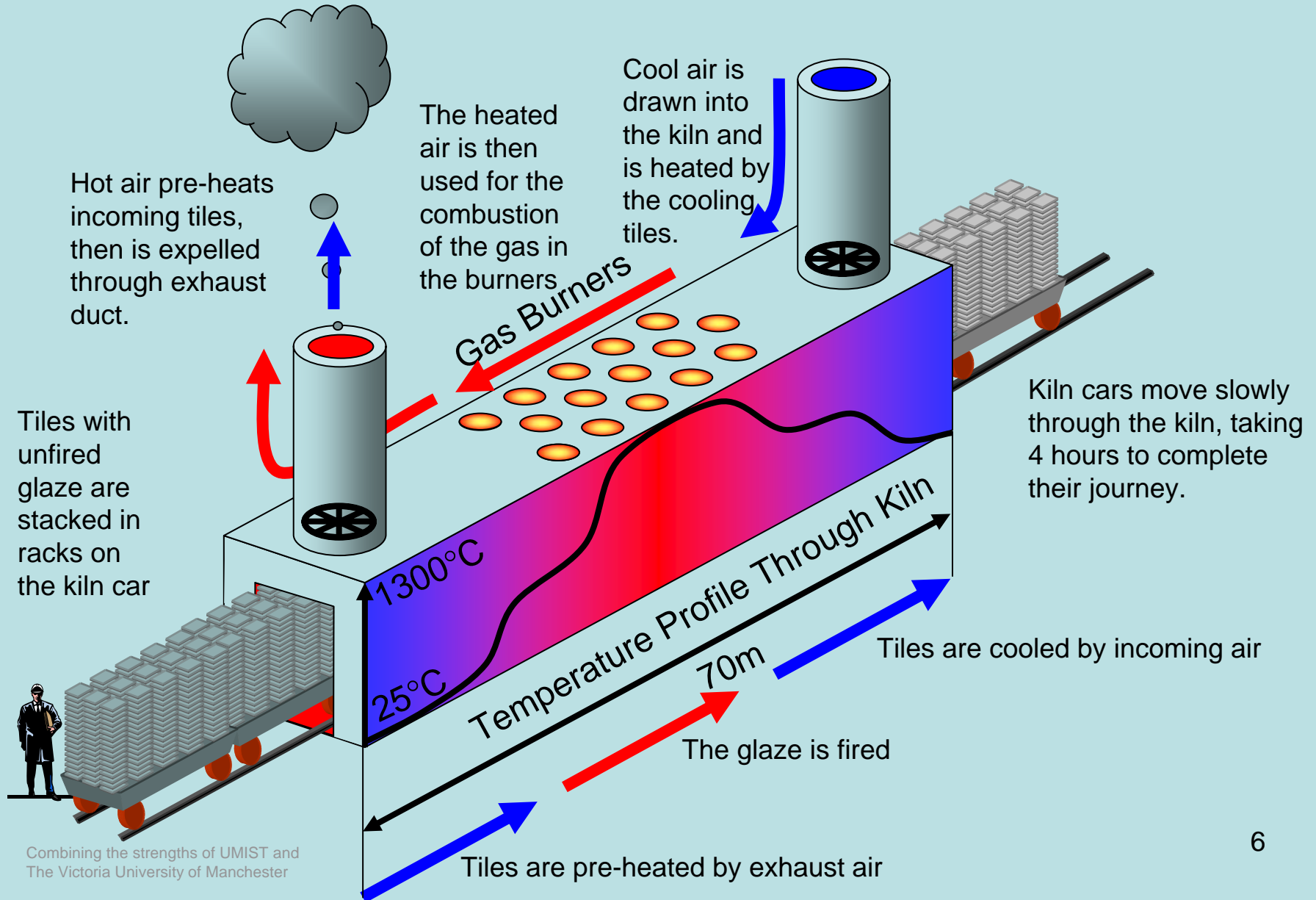
# The Problems



- 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

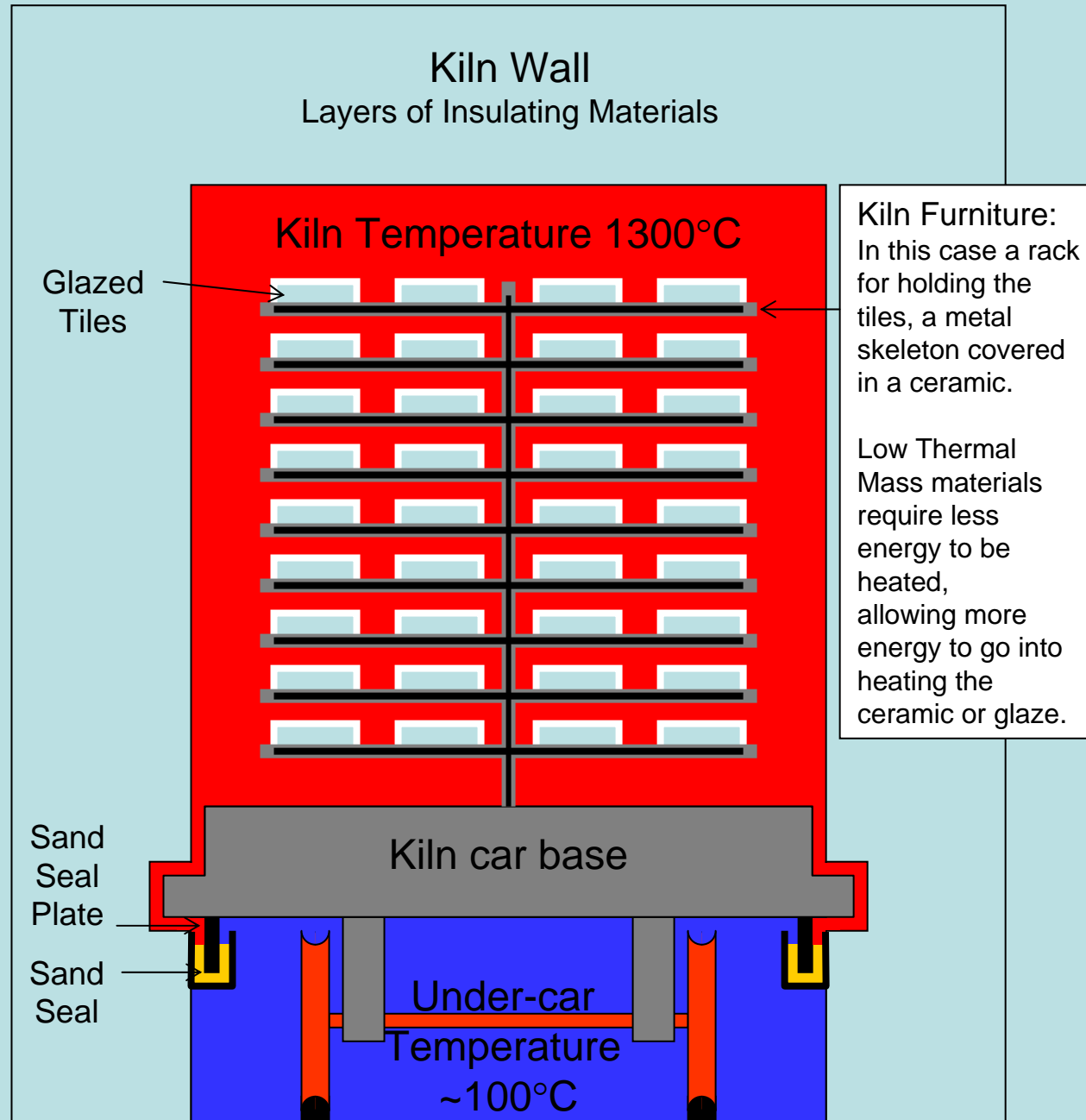


# Euro-Tunnel Kilns - Gehenna Series

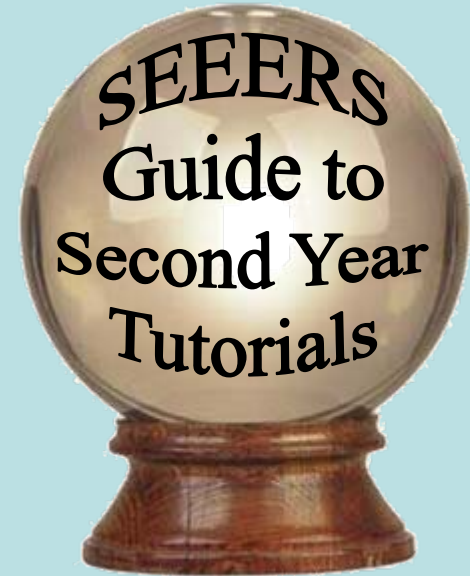


# Euro-Tunnel Kilns:

# 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

- M**ake the problem explicit
- A**ssess existing knowledge
- N**eed to know
- C**ourse of action
- H**ome in on resources
- E**nquiries and/or Experiment
- S**hare results
- T**heorise
- E**valuate
- R**eport, Repeat, Refine, Reflect



# Assessment

## Individual Assessment (IA)

Each tutorial the students' contribution are assessed:

0: Absent

1: Unacceptable

2: Poor

3: Average

4: Very Good

5: Excellent

## Project Mark (PM)

Presentation:

25% Preparation

25% Delivery

25% Content

25% Questions

$$SM = PM \left( \left( \frac{IA - AIA}{2AIA} \right) + 1 \right)$$

# Delivery

- 2005-06
  - 131 students in 24 groups of 4-6
- 2006-07
  - 147 students in 29 groups of 4-7
- 2008-09
  - 130 students in 24 groups of 4-6

# Evaluation Method: Integrative Evaluation

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

- Confidence Logs (1&2)
  - Modest but significant improvement in relevant skills
- Observations of Tutorials and Presentations (All)
  - Varying degrees of tutor or student led discussion
- Student Process Questionnaire (1)
  - Deep (28.3) & Surface (22.9) Learning Attitudes (10-50)
- Learning Resource Questionnaire (1&2)
  - Internet, discussions with students and tutors
- Perceptions of PBL (1)
  - Very much in favour of PBL, particularly teamwork aspect
- Post Course Questionnaire (All)
- Focus Groups/Group Discussions (All)

# 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 enough credit for the work
- Competing workloads
- Some – dysfunctional teams
- Not enough detailed information

*What would you like to see changed about the SYT?*

- Increasing credit
- Reducing Workload
- Better Teamwork
- More Information

*Other Comments*

- Some – very supportive of the initiative
- A few – use tutorials in a different way

# 2005-06 Delivery

Delivery as described

- Good feedback from students and staff that engaged in activity and evaluation
- Concern that it was a significant amount of work for no credit

BUT ...

- Attendance very poor
  - From 92% down to 45%
- Some groups opted out of presentation altogether
- Seen as optional and easy to ignore

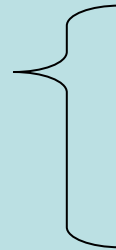
# 2006-07 Delivery

Added:

- 1 Credit
- Teamwork Workshop
- Reflective Essay
- 'Ask the Consultant' sessions

Response: (Attendance 85%)

- Some resented that it made the activity difficult to ignore
- Some appreciated, but found activities difficult
- Some vocally felt insulted that they were being taught about teamwork
- Seen as an additional burden at a busy time of year
- Live sections didn't work and were too late in project
- Keen students sent lots of e-mails



# 2007-08 Delivery

## Dropped:

- Teamwork Workshop
- Reflective Essay
- Hardcopy SEEERS guides
- Components Show and Tell

## Response: (Attendance 92%)

- Avoid initial poor reaction
- Useful but burdensome
- Too much soft-skills handouts
- Confused students

Compressed to 6 weekly tutorials, finished in week 8

- Increase intensity of activity
- Avoid peak workloads
- Could make earlier

## Feedback:

- low response but positive

# Some Telling Quotes

*We need a lecture on <blank> before we can do it!*

Overall good practice  
for next semester

Overall this was a great experience and was placed at a good time in the semester as it would really overcome my presentation weaknesses before more serious presentations such as for placement opportunities, and it has really helped in boosting my confidence.

Overall, an excellent exercise giving a good introduction to the team skills needed for the ESP project including experience of potential pitfalls and problems.

# 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/ceebbl](http://www.manchester.ac.uk/ceebbl)

Centre for Excellence in Enquiry-Based Learning

HEFCE: CETLs Programme

Centre for Excellence in Teaching and Learning