

Mining and Minerals SIG Student Prizes

Assessment criteria

- **Relevance:** The project report must apply chemical engineering principles and be relevant and value-adding to mining or minerals processing, aimed at improving mineral prospects, life of mine, operations, processes, products, or life cycle. [Weighting: 10%]
- **Feasibility:** The report must present a well-considered approach, applying chemical engineering concepts to develop a technically sound, comprehensive, contextually-appropriate solution. [Weighting: 20%]
- **Background and approach:** The report must clearly describe the problem being addressed, as well as the state of the art (what is known and key knowledge gaps), explain and justify the approach taken to solve the problem, including which chemical engineering and other principles were applied to solve the problem. [Weighting: 30%]
- **Methodology and results:** The report must explain and justify the use of methods and key resources, including standards and established methodologies, to explore potential solutions, analyse results and evaluate these. For research reports, the report should explain how its outcomes have potential to impact on the scientific community, society or industrial practice. [Weighting: 30%]
- **Presentation:** The project report should be clearly written, well structured, and easy to follow for the target readership, which may include scientists, policy makers, and the general public. [Weighting: 10%]

Note: IChemE does not plan to publish the winning entries, but may wish to share the executive summary of a winning entry. IChemE and the sponsors make no claim on the intellectual property in the reports.

Project Report – Guidance

The lists below provide examples of content, but are not prescriptive.

Relevant background, data, findings and solutions

- Project background, objective, and scope
- Nature and use of the product
- Market survey / analysis
- Plant location / site selection
- Alternative process technologies / major screening studies
- Decision criteria and selection procedure for chosen technology / flowsheet
- Chemistry / thermochemistry / thermodynamics related to the process
- Basis of design / design criteria
- Process flow diagram and explanation of the process
- Mass and energy balance summary, including feed and product / by-product specifications; brief explanation of flowsheet modelling issues and software used
- Process integration / optimisation
- Utility usage summary for the whole plant and for each section
- Major equipment items (summary)

- Materials of construction with justification
- Site layout / plot plan
- Review of major hazards and safety issues associated with process materials and operations
- Environmental impact statement, including pollution control and waste disposal
- Sustainability issues
- Key issues related to start-up, shutdown, routine operations and maintenance
- Overview of emergency shutdown facilities and procedures
- Overall economic summary: capital costs, operating costs, profitability analyses, sensitivities
- Project plan for carrying out the project

Example of design project report structure and contents

Introduction

- Equipment processing objective and constraints; scope of design work
- Description of the plant with reference to the PFD
- PFD of plant, mass and energy balance tables, utility summary

Process design/detailed process description

- Summary of the design methods and assumptions used
- Summary of the design data used
- Explanation of the calculations involved, with a (partial) sample calculation
- Sizing / specification of peripheral equipment, including pumps, piping, ...
- Schedule of equipment involved in plant area, giving key sizes and specifications
- Layout drawing of the plant area showing equipment items and main dimensions

Operational design

- HAZAN (detailed for major process units, brief for minor ones), HAZOP (only for major units)
- Operating procedures, e.g. start-up, shutdown, normal operations, ... (detailed for major process units, brief for minor units)
- Control system design
- Piping & Instrumentation Diagram (P&ID) of the plant area

Mechanical design

- Materials of construction
- Pressure vessel design (using AS 1210 or suitable alternative for major process units, only estimated wall thickness for minor units)
- Pressure relief system (qualitative for minor units)
- Supports and foundations (only for major units)
- Mechanical drawing of the main equipment item with dimensions

Overview

- Equipment specification sheets
- Critical review of the design
- Selected reference materials used, e.g. MSDSs, equipment manufacturer's brochures.
Appendices
- Detailed calculations.
- Information about process simulations, spreadsheets, drawings and other files created in the design work
- Selected reference materials used, e.g. MSDSs, equipment manufacturer's brochures, etc.

Note: Do not include confidential information: all sources must be in the public domain.