

The Engineering Design Process

This and the next class session will introduce MET 352 students to the engineering design process including

1. Problem Statements,
2. Design Requirements, and
3. Design Constraints.

Each group will prepare a problem statement with requirements and constraints for our next meeting.

Additional details

Initial Example Problem Statement

Freeport McMoRan would like to see if the Concentrate Leach Plant (CLP) at their Morenci mine would be a feasible addition to another site. The design for the plant addition will be modeled after the Morenci CLP and use material from an existing copper concentrator and feed into the existing copper solvent extraction electrowinning circuit. A Scoping Study Report will be used to determine if the design has some merit before performing full feasibility studies and detailed engineering.

Initial Example Design Requirements

Freeport-McMoRan requires the design to be modelled like an existing CLP used at their Morenci Location. The Morenci CLP is designed to process 400 ton/day from the crusher. This process will alleviate production from the concentrator and allow minerals to be sent through the CLP process line. Ms. Green requires a feasibility analysis and report to be conducted on this idea for a specific high-sulfur grade of ore found at a certain mine location.

Initial Example Design Constraints

As of now there are no necessary expenses for this project, but if costs are incurred later, Freeport has a small amount of funding available. If any concentrate is needed for test work, Freeport will transport the material to us at their cost.

All design work must be completed within the current school year, ideally before the Design Fair in April. The final report and video documentary must be done by the end of spring semester.

For the design to be considered by Freeport, it must have a payback period of three to five years based only on copper extraction. It must also have a copper recovery rate of at least 98.5% and an 85% uptime. If operational costs prove this to be unfeasible, then the project will not go ahead.