

PILOT PLANT DESIGN, FLEXIBILITY AND MODULARITY

FLEXIBILITY AT SGS' APPLIED RESEARCH AND TRAINING FACILITY: "PLUG AND PLAY" DESIGN

Pilot testing is a dynamic business. SGS has many years of experience supporting the mining industry and we have brought our decades of safe operations and functional, logistical and organizational experience to the design and operation of our Applied Research and Training Facility.

Pilot testing for SGS and you our client starts with safety. Our site health and safety policies and procedures have been developed to protect:

- Our staff, and you, our client.
- The environment that surrounds our facilities.
- Our reputation as well as your reputation.

SAFETY AND LOSS MANAGEMENT PROGRAMS

SGS is committed to operational safety in all our workplaces. The Safety and Loss Management Program includes:

- The required permits needed to ensure safe work for all parties involved.
- The isolation, lock-out and tag-out of equipment.
- The management of change policies.
- Workspace and environmental monitoring.
- A joint health and safety committee that oversees health and safety on a daily basis.
- Full time safety management to ensure all health and safety issues are dealt with.
- A full HAZOP review of all our activities.

PLANT DESIGN FOR FLEXIBILITY AND QUICK MODULARITY

Our pilot plant is purpose-built to be modular and flexible.

This allows us, SGS, and you, our client to:

- Quickly configure your flowsheet to address your needs.
- Link your unit operations together quickly and efficiently
- with minimal set-up and tear-down time.
- Readily swap in various pieces of test equipment to allow optimization.
- Effectively use your plant time to develop data and
- Evaluate options.

The SGS "plug and play" approach to piloting means our facilities, services, utilities and equipment are designed to allow quick additions or swap-outs, electrical and instrumental quick connects and services, while maximizing safety. We know pilot plant needs constantly evolve and we have provided for this in a way that is cost and time effective.

We expect that the oil sands industry will want to test different flow sheets, operational considerations and a variety of unit operations. No doubt you will want to test different ore types and ore grades and will therefore need a range of easily adapted operating conditions, equipment and reagents. So we have to be flexible and adaptable.



Our facility has been engineered for modularity. We can configure our plant quickly because we have:

- Wide-open spaces that is fully configurable.
- Strengthened floors that can support heavy equipment.
- Spill containment system that can include sloped floors and deep sumps that can accommodate any spill event.
- All plant discharges are transported from site by certified waste disposal companies.
- Skid-mounted process equipment modules for ease of movement and assembly.
- Services and utilities that are easy to connect to, but out of the way of daily activity.
- A reliable system of spares and maintenance.

INTRODUCTION TO FACILITY

Our pilot plant is designed for safety, environmental sustainability, and operational efficiency. Let's see how this works from Ore storage to Bitumen extraction to Froth Treatment.





SOUTH END, BITUMEN EXTRACTION BUILDING

The Bitumen Extraction Building is a 12,500 sq feet of fully configurable open space. Process activities are performed at the north end, and the south end (shown right) houses the utility services, such as reagent mixing and water supply. Large roll-up doors allow easy access for equipment, delivery, etc.



REMOVABLE BLOCKS AND COLD STORAGE

Our Ore Storage facility is a wide-open building that can be quickly configured to separate different ore types in a -10°C environment prior to pilot campaigns. These cold temperatures minimize ore oxidization and moisture loss.



DURABLE FLOORS

The floor of the Bitumen Extraction Building is 10 inches thick and heavily reinforced. Built to withstand point-loading stresses, it is strengthened to ensure that modular process and utility skids can be placed anywhere in the plant.

LAY, SKID-MOUNTED EQUIPMENT

The epitome of our flexible system is the skid-mounted nature of our process equipment and utility modules. With very few exceptions, every piece of our equipment, from primary separation cells to pumps is skid-mounted. These skids are like pallets and so can be easily moved throughout the plant. We can position large pieces of equipment, swap in new equipment, replace jammed or plugged pumps, or otherwise respond with ease to the varying needs of any pilot plant.

INSTRUMENT TRAYS

Once the equipment is in place, its power source and control components must be connected to the electrical mains and the Distributive Control System, (DCS).

CABLE PANELS

The cabling for these systems enters the plant about 15 feet off the ground and is distributed in a series of cable trays that encircle the perimeter of the building. The electrical cables are in the lowest trays, then the DCS cables then, water, compressed air and natural gas and finally the HVAC duct work is on top.



PLUG AND PLAY INSTRUMENT PANELS

All electrical and instrument services are readily available and easily accessible. Panels are available approximately every 4 metres and are terminated at a quick-connect fitting for power or instrumentation.

ELECTRICAL AND INSTRUMENTATION PANELS

Pilot plant equipment requires a variety of voltages and amperages. So, our power supplies address these needs. All of the power supply boxes have three voltages; 600V, 3 Phase; 115V, Single Phase; and 208V, 3 Phase



PLUG AND PLAY QUICK CONNECT

The Applied Research and Training facility offers a system of swap-in spares and equipment skids. This means when there is a maintenance problem, new components can be easily swapped in, resulting in minimal downtimes due to equipment failure or maintenance. Sumps

The floor of the Bitumen Extraction Building has an extensive sump system to contain spills. The floor of the pilot plant slopes gently inward to the central sump. If any tank in the pilot plant were to rupture, the sump system can contain the contents and an additional 10%, thus ensuring no environmental issues.



ADDITION OF NEW EQUIPMENT

SGS' facility can easily receive and deploy new equipment. For example, equipment such as mechanical flotation cells are received, checked for operational suitability and then adapted to our quick-connect system. Once completed, the unit can then be put into service.

SUMMARY

In summary, the Applied Research and training Facility is well engineered for safety, flexible, modular operations. The combination of our open-space concept, accessible, versatile utility systems and skid mounted equipment means our plant truly is 'plug and play'. The resulting cost and time efficiencies make your piloting activities faster, much more cost effective, and more fruitful.



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