

ASME Ontario Section

Annual General Meeting 2007

Featured presentation:

"Design, construction and commissioning of a slurry pre-heat system for Lihir Gold, Lihir Island, Papua New Guinea"

Speaker's Biography:

Murray S. Pearson, P. Eng.
Principal Mechanical Engineer
Autoclave Technology, Non-Ferrous

Murray has eighteen years of experience in mechanical engineering design of specialty chemical and metallurgical process plants, including a diverse background in mechanical design, instrumentation, estimating, procurement and project engineering. Project assignments include feasibility studies, basic engineering and detailed design of autoclave plants and related processes for the oxidation and/or extraction of non-ferrous metals such as gold, nickel, cobalt and copper.

Presently the principal mechanical engineer within Hatch's Autoclave Technology Group, Murray specialized in mineral slurry rheology, agitation design, slurry pumping systems, and the custom design of pressure letdown vessels, gas handling systems, direct and indirect contact slurry heat exchangers, and associated safety relief and IEC61511 compliant emergency shutdown systems.

Assignments have included extensive site work on a variety of projects for alkaline earth metals (Sr refining), TiO₂ purification, and Cu/Co leaching, as well as polymer, paint, anti-oxidants, and organic acids production. Field experience includes construction inspection and commissioning of several chemical process (CPI) facilities, troubleshooting of QIT's Fer-et-Titane's UGS pressure leach facility, construction inspection, commissioning and start-up of a pressure oxidative leach circuit for AVMIN's COSAC Project.

Countries of project work experience: Australia, Brazil, Canada, Dominican Republic, Indonesia, New Caledonia, Papua New Guinea, South Africa, and USA.

Murray graduated with a B.E. Mechanical Engineering from University of Saskatchewan, Saskatoon in 1989. He is also a licensed Professional Engineer in Ontario and an active member of the American Society of Mechanical Engineers.

"Design, construction and commissioning of a slurry pre-heat system for Lihir Gold, Lihir Island, Papua New Guinea"

LIHIR Management Company Limited (LMC) operates a refractory gold mining operation on Lihir Island, an active volcano located on the equator in Papua New Guinea. The gold extraction process incorporates pressure oxidation of the ore at 200 °C and 35 bar(g) for sulphide sulphur removal. The original plant design assumed autogenous operation of the autoclave reactors, as the sulphide sulphur content in the run-of-mine ore was sufficiently exothermic enough to maintain the operating temperature. However, as mining of the caldera progressed, the average sulphide sulphur grade in the ore began declining, requiring the injection of high-pressure boiler steam to maintain operating temperatures and oxidation kinetics in the autoclave. The unexpected additional operating costs and difficulty in using start-up boilers for continuous duty led LMC to approach Hatch Ltd. for possible solutions to the problem.

Hatch prepared a trade-off feasibility study, outlining capital and operating costs, for three different heat recovery concepts, utilizing the energy from the autoclave discharge slurry to pre-heat the feed slurry before pumping it into the autoclave vessel. LMC decided to proceed with the first option presented – the installation of three (3) direct-contact slurry/steam condensers.

Hatch provided Engineering, Procurement and Construction Management (EPCM) services for the LIHIR Heat Recovery Project. The project objective was the supply and installation of three direct-contact heat recovery vessels, slurry pumps, ductwork, and associated piping equipment, in a timely manner, utilizing Hatch's best methods for minimizing schedule, from engineering through procurement to construction and commissioning, while maintaining quality. Since construction was occurring in and around an operating plant, Hatch's construction experience in operating plants and in Papua New Guinea was key to the success of the project. This presentation outlines the technical, commercial, practical and social challenges of executing a fast track, brown-field project in one of the most unique regions of the world.