Joseph Sabatini

Joseph Sabatini is an expert in metals and industrial minerals markets, production technology and operations. He is the Managing Partner and Founder of the Innovation Network; a management consulting firm that assists clients to resolve strategic business issues principally in the mining, metals, chemicals and materials industries. Prior to founding the firm, he was a Director of Technology and Innovation Management for Arthur D. Little. He spent approximately 14 years with the firm and several years as Vice President of Operations for a commercial products company. Early in his career, he conducted production and product development research in the metals and materials industries for the US government and for a leading titanium producer. He has consulted to industry leading metals and mining firms in Asia, Europe and the Americas.

During his career, he has visited over 200 metallurgical plants on five continents. He has conducted due diligence reviews of approximately 50 production locations. His previous experience includes senior management responsibilities in research, manufacturing, and engineering. He has been a consultant to major corporations in such areas as business strategy, operation improvement, technology assessment, technology commercialization and market development, mergers and acquisitions, and environmental compliance and sustainability. For government entities he has consulted on subjects such as industrial development policy, industrial diversification strategy, cluster development, energy efficiency, environmental management and life cycle analysis. He has managed or participated in projects across most of the major metals segments including, mining, beneficiation, smelting and refining, extrusion, forging, rolling, casting, coating, forming, joining and recycling. Examples of his metals and mining projects follow:

New Business Opportunities

- For a group of investors, he is participating in the establishment of several small gold and copper mines in Chile and in development of the processing plant. The plant will utilize unconventional technology due in part to the high concentration of arsenic in the ore.
- For an investment bank, he provided operations and market support for an investment decision in secondary zinc and nickel plants.
- For a domestic steel company, he assessed the opportunity for production of polymer-coated steels for use in packaging applications to replace tinplate. In addition, he participated in operations improvement work to increase productivity of the tin mill.
- For a large mining company that had recently acquired another miner and their significant research organization, he valued novel technologies for copper recovery utilizing hydrometallurgical processes.
- For a major aluminum producer, he evaluated the opportunity for establishing a large diameter extrusion plant in Canada. The focus was on developing the transportation opportunities especially in truck trailer, city bus and light rail markets. In addition, he developed a partner strategy for the producer.
- For government of Qatar, he participated in the development of the strategic plan for the diversification of their principal industrial city into specialty polymers, metals, small scale manufacturing and services. The strategic analysis included investigation of more than 50 chemical and metallurgical facilities leading up to recommendations on the development plan. The strategic plan was incorporated into the Master Plan to determine land, infrastructure and investment requirements and projected financial returns for more than 25 chemical and metallurgical facilities.
- For a Middle Eastern Government, he participated in a project to assess diversification options into the aluminum and steel value chain. He evaluated market opportunities and

conducted cost studies on 10 different metallurgical facilities including DRI, hot mills, cold mills, wire mills, smelting and die-casting.

- For the government of Bahrain Economic Development Board, he was the principal technical advisor on industrial opportunities and diversification that led to a new industrial policy for the country. He championed the development of new opportunities for manufacturing within the country, specifically the evolution of the aluminum industry value chain in the country. In addition, the team advised on privatization options for the aluminum industry.
- For a GCC government agency, he participated in a major feasibility study of the production economics for steel and aluminum value chains including production of downstream products including automotive parts and appliance production and upstream to mining and smelting operations.
- For several investors, he assessed the opportunities for recycling steel mill wastes including flue dust, pickle liquors, and slags.
- For a major trade organization, he participated in several studies of emerging iron making processes.
- For a domestic mining company, he is developing a consortium of investors to develop and operate a global scale iron ore deposit in West Africa.
- For a domestic mining company, he is assisting them in raising capital to initiate mining of a significant industrial minerals deposit in the Western US
- For a domestic mining company he is developing a consortium of investors for a major alumina development in West Africa.
- For a major South American iron producer, he participated in a feasibility study for the establishment of an iron carbide production plant along the US Gulf Coast.
- He is assisting in the redevelopment of a shuttered steel site (coke plant and steel shop) into a production location for chemicals and distillate from coal gasification.
- For a leader in industrial control technology, he managed a project to identify new and emerging trends in minerals processing, especially in the non-ferrous metals sector.
- For a leading supplier of kilns, ball mills and crushers, he assessed the competitive position and strategic direction of the company, including cost reduction opportunities and technology improvements.
- For multiple investors, he has conducted feasibility studies to reclaim catalysts using thermal methods.
- For a leading private equity firm, he is assisting in the definition, business strategy, operations plan, and growth strategy for a new recycling business.
- For a leading zinc producer, he participated in a strategic review of their business operations commissioned by the Board to identify options for future growth.
- For a leading private equity group, he assessed the opportunity for acquisition of the North American assets of a major copper and zinc producer.
- For a major European zinc producer, he developed a process and business model for the conversion of a smelter waste into pigments and magnetic materials.
- Assessed the market opportunities for variable speed drives, superconducting motors, advanced refractory systems, process control instrumentation in the domestic steel industry.
- Assisted a major supplier of ferroalloys with a new pricing strategy.

- Assessed the market availability and demand for recycled magnesium from automobile scrap to support the development of a secondary magnesium business unit for a major magnesium producer.
- For the largest lead producer, he assessed availability and collection mechanisms for automotive batteries in Mexico, Brazil, and the southeastern US. In each case, he prepared a pre-feasibility study for a smelter.

Technology Management and Development

- For a consortium of aluminum processors, he assisted in the development of a technology research center in Canada to commercialize aluminum compact extrusion applications for automotive applications.
- For the gas utility industry he completed a study of the opportunities for gas use in the aluminum industry. The study included assessments of emerging technology in metal melting, casting, recycling and salt slag processing.
- For the largest integrated steel producer in Asia, he developed their technology strategy and was part of a major restructuring of their R&D organization. The work focused on the redeployment of over 600 researchers into higher value added steel products, home grown steel production efficiency projects and from process development and non-steel oriented R&D projects.
- For a domestic steel producer. He assessed their steel product development portfolio and assisted in the redeployment of the technical team into fewer more value added projects and advised the client on shutting down non-effective projects.
- Assisted in the development of a gas based melting furnace for home scrap to augment molten steel needs in foundries and steel mills. The technology utilized submerged combustion of natural gas. Evaluated gas injection in steel to assist in carbon level tuning in steel baths.
- For an investor, he assessed the cost tradeoff of dismantling and relocation of a North American magnesium production facility to Asia.
- For a recycling company, he is developing a process to reclaim the metals values from process slags.

Market Analysis

- Price forecast for aluminum, zinc, lead, silver, and copper
- Market accessibility of reclaimed aluminum as a ferroalloy reductant, steel inoculants and for powder applications.
- Impact of new aluminum smelter capacity on global aluminum price
- Supply-demand balance in the nickel powder industry
- Pricing strategy for ferroalloys
- Pricing strategy for copper powders
- Availability of junk lead acid batteries in the Southern US, Mexico and Brazil
- Availability of magnesium in the automotive scrap stream
- For the forge producing up to 100 ton forgings, he assessed the markets for hydroelectric and ship shafts, rolling mill rolls, and other very large forged parts as part of an overall business assessment.
- Assessed markets for furnace repair and rebuilds in North America for a major industrial furnace manufacturer.

Environmental Projects

- Member of an assessment team that defined the impact of tailing discharges into the Pacific Ocean from the largest steel mill in Western South America.
- Conducted due diligence in support of the acquisition of several domestic and European ferroalloys plant by a major South African producer.
- Conducted an environmental audit of a major taconite mine.
- Performed a feasibility study of several processes for ferroalloy and steel melting furnaces to recycle spent drycell batteries
- Performed an assessment of technologies for the recycling of steel dusts.
- Designed a wastewater treatment process for a tungsten carbide manufacturer.

Operations Improvement Projects

- Developed new work rules and operating procedures for several hot dip galvanizing lines to increase production efficiency on average 8% with no capital investment, resulting in an additional 60,000 tons of capacity available with the same product mix.
- For steel shop, investigated carbon additions in scrap to increase energy efficiency in melting
- Assessed the impact of several coals on blast furnace injection rates.
- For a major utility, assessed pricing strategies for power to copper smelters in Arizona.

Mergers and Acquisitions Due-Diligence Projects

Acquisition Support:

for US Aluminum Producers

Electrode Plant - Netherlands
Aluminum Rolling Mill – US
Aluminum Rolling Mill - Germany
Aluminum Smelter - Iceland
Extrusion Plant - Hungary
Aluminum Smelters - Italy and Spain
Recycling Plant - France
Power Plant - Italy
Aluminum Rolling Mill – France
Secondary Smelter – US

for US Lead Battery Recycler

Smelters - Brazil
Smelters - Mexico
Collection and Processing-Mexico

Investor Due Diligence:

Phospho-gypsum processor – US
Zinc Recycling Plant – US
Steel Dust Plant - Turkey
Catalyst Recovery Plant – US
Catalyst Recovery Plant – Italy
Catalyst Recovery Plant – India
Salt Slag Processor – Canada
Dross Processor – Canada
Drop Forge – Canada
Solar Energy Technology - US
Nickel Waste Recycler – US
Copper Smelter – Namibia

for German Recycler

Steel Dust Recycler – Germany

for German Financial Institution

Carbon Black Plant – Germany

The Innovation Network

for South African Manganese Producer

Chemicals Plants - US
Ferroalloy Plant – Belgium
Manganese Dioxide Plant- US

for Swiss Mining Company

Zinc Smelter – Italy
Lead Smelter - Italy
Steel Dust Recycler – Sweden

for UK Private Equity Firm

Rechargeable Battery Producer – France

for US Private Equity Firm

Glass Fiber Manufacturer – US

Post Acquisition Assessment

Copper Powder Business – US
Zinc Smelter – US

Customer Due Diligence

Battery Recycler – US
Battery Recyclers – Belgium, France, US, Germany

for Private Equity Fund

Steel Dust Recyclers – Germany, Sweden, France

He has published papers and industry reports on topics such as recycling of spent drycell, electric vehicle and industrial batteries, technology and economic analysis of processes to recycle steel industry wastes, reclaim metals for automotive and consumer electronic waste streams, novel technologies for increasing energy efficiency in metals processing, technologies to utilize natural gas in metal melting and forming, environmental compliance costs across different countries, and production methods for novel materials. He has been the keynote speaker at industry conferences on recycling and non-ferrous metals marketing initiatives.

He received a BS in Chemical Metallurgy from the Henry Krumb School of Mines at Columbia University, New York and an MS in Materials Engineering from Northeastern University, Boston. In addition, he has taken graduate and executive level courses in various business topics at Harvard University and the University of Virginia. He is a member of the Minerals Metal and Materials Society and the Association for Iron and Steel Technology.