



EXMENTE

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Physical Address:

Cambridge Park
Building 6, 1st Floor (West)
5 Bauhinia Street
Highveld Techno Park
Centurion, 0157
Gauteng
South Africa

Postal Address:

PO Box 10214
Centurion
0046
Gauteng
South Africa

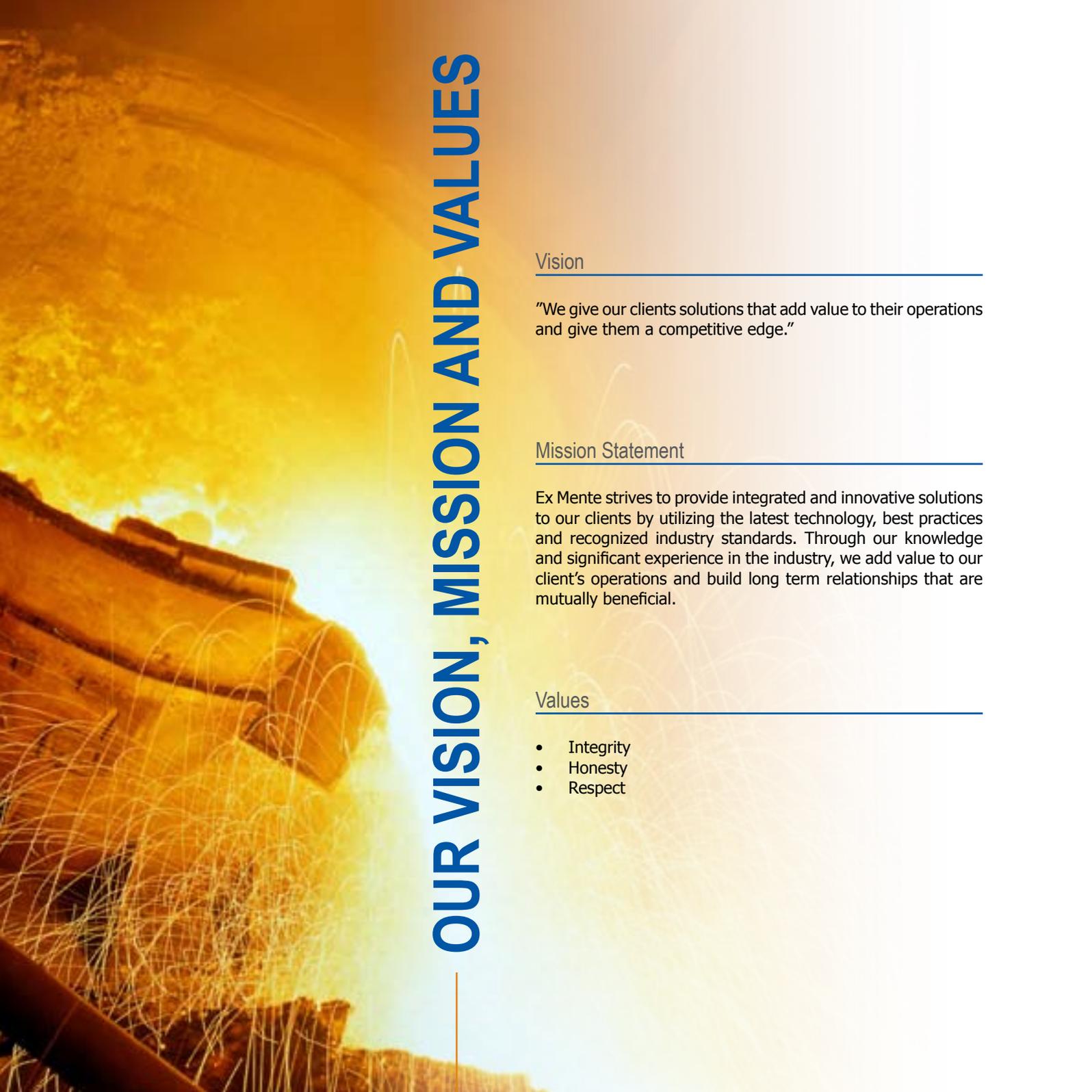
Tel: +27 (12) 665 0939

Fax: +27 (12) 665 0965

Web site: www.ex-mente.co.za

E-mail: info@ex-mente.co.za

COMPANY PROFILE



OUR VISION, MISSION AND VALUES

Vision

"We give our clients solutions that add value to their operations and give them a competitive edge."

Mission Statement

Ex Mente strives to provide integrated and innovative solutions to our clients by utilizing the latest technology, best practices and recognized industry standards. Through our knowledge and significant experience in the industry, we add value to our client's operations and build long term relationships that are mutually beneficial.

Values

- Integrity
- Honesty
- Respect



OUR COMPANY

EXMENTE is a process engineering consulting and systems company. The company was founded in 2001. Our offices are located in Centurion, South Africa. We supply process engineering solutions through consulting services, deployment of in-house developed software systems, and implementations of off-the-shelf software products.

What is the Ex Mente Difference?

We strive for excellence through the application of our extensive knowledge and experience in process engineering, combined with the deployment of process models, simulators and advanced process control systems. These all aim to deliver high returns on our clients' investments. We aim to maximise the value of our clients' plants and processes through the creative use of our knowledge, skills and experience in the following areas:

- metallurgical and chemical process engineering,
- software engineering, and
- systems engineering and integration.

Our company is managed and structured to achieve trustworthy and effective results, even to the most challenging client requirements. This, we believe, forms the foundation for mutually beneficial, long-term partnerships and will ensure that we reach our goal of adding value to our client's processes.

We endeavour to exceed our clients' expectations with the solutions we provide. We aim to price our solutions and services competitively and deliver projects within budget while continuously striving to reduce cost.

What Do We Specialise In?

Ex Mente has a proven track record of successes in the fields of plant and process simulation, optimisation and information systems and has considerable engineering experience in these fields.

We focus mainly on the following industries:

- Pyrometallurgy
- Hydrometallurgy
- Mineral processing

How Can We Add Value To Your Business?

Our Clients' requirements typically include:

- Process Analysis,
- Process Quantification,
- Process Modelling and Simulation,
- Process Monitoring,
- Advanced Process Control,
- Recipe Management and Optimisation,
- Process-Level Information Systems.

OUR COMPANY

The business and systems environment of our typical Clients could be represented as shown in Figure 1 below. From a high-level organisational perspective the business systems infrastructure consists of the following levels:

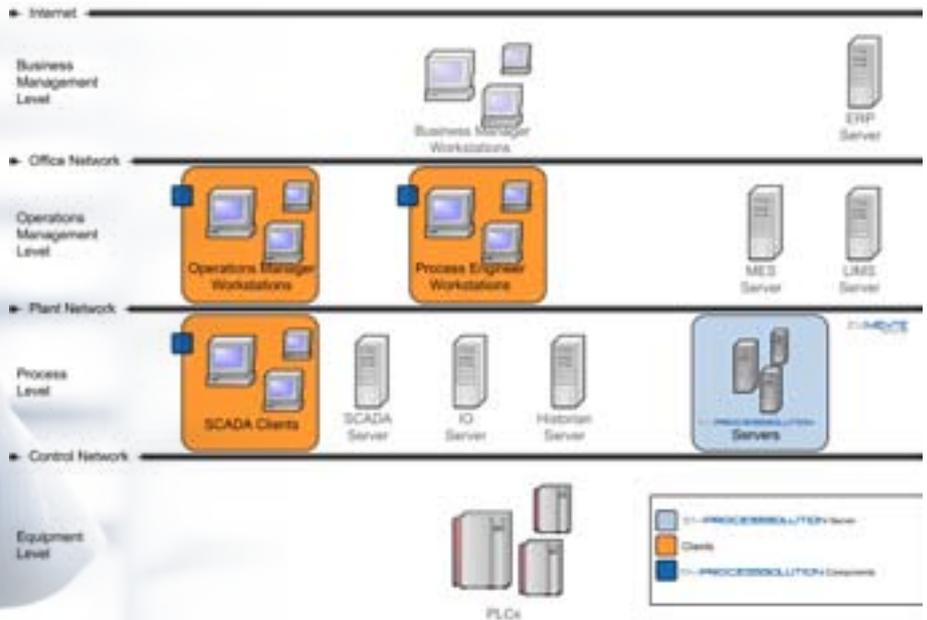


Figure 1

Equipment Level

Basic equipment control is facilitated on this level through the use of PLC and/or DCS systems. Ex Mente's involvement on this level includes functional specification of process-related components that are best implemented in basic control infrastructure, and integration to devices on this level through the use of standard integration interfaces such as OPC.

Some of our advanced control functionality is integrated into the PLC or DCS environment. Relevant parts of our advanced control system user interfaces are made available on the plant SCADA or DCS user interfaces, ensuring a more unified environment for operational personnel.

Process Level – Process Management and Control

Ex Mente delivers the bulk of our services on this level. We strongly believe that extensive process knowledge and understanding is required to deliver quality services and solutions on this level.

The functional components are involved in addressing typical client requirements on this level includes:

- Process-level information management system
- Advanced process analysis and calculation tools
- Advanced process control systems
- Laboratory information management system (L.I.M.S.)
- Down-time monitoring and analysis
- Equipment and maintenance monitoring and analysis

Some of these functionalities could be acquired as off-the-shelf products and others are developed by Ex Mente. It is very important to do a sound systems design, taking into account all user requirements on the process level. This minimises the systems integration risk normally associated with these projects. A standardised interface layer is fixed during the design phase of system implementation on the process level to ensure the successful implementation of functionality on this level and on the operational management level.

The Ex Mente **EMPROCESSSOLUTION™** platform delivers information to SCADA clients, process engineers and operational managers.

Operations Management Level

This level hosts all systems related to operational management. Systems implemented on this level are often referred to as manufacturing execution systems, or MES. The process management and control systems interface with systems on this level, providing it with various types of process information, usually in summarised form. The **EMPROCESSSOLUTION™** platform provides an interface to important operational data and reports.

Business Management Level

The business management level hosts all high-level business systems. Ex Mente's contribution to this level involves the supply of our technical-economic modelling framework (**EMSIM™**) and models based on **EMSIM™**. These models are used in feasibility and costing studies, price negotiations and other applications requiring the translation of detailed technical know-how into information on which business decisions can be based.



OUR SERVICES

Ex Mente has a service-centered approach to adding value to our client's site. We strive to build long-term relationship by continuously adding value to their operations. We do not simply install software and systems; we offer our expertise and extensive process knowledge as an added benefit on a continuous basis as a service. This approach is set out in the figure below:



The purpose of the **EMPROCESSOLUTION™** is to assist the client in improving and adding value to the operation of their plants and processes. The aim of the **EMPROCESSOLUTION™** service-centered approach is to have the benefits realised, far outweigh the service cost.

Components

The combination of components used for a specific client is configured to suit the needs and situation of that client. The benefits realised through delivering the Service to a client will also be dependent on the specific circumstances of the client.



The **EMPROCESSOLUTION™** includes the following components:

EMPROBE

This component represents Ex Mente's consulting services. A **process or plant analysis** is a study of the facility (process or plant) that addresses process, infrastructure and operational aspects. The output of an analysis is a well-structured analysis report of all findings. A structured analysis of a process or plant produces a solid body of data, information and knowledge that can add value on its own (in the case of a post mortem analysis of important events and occurrences), and it can act as a valuable input into modelling, simulation, control, and design projects.

Through process and plant analyses Ex Mente aims to start adding value to client's operations as soon as possible through the application of our process engineering experience and expertise.

EMSIM

A **process model** is a device that mimics the behaviour of an existing or conceptual process. Ex Mente focuses on the development and application of mathematical models (as apposed to physical models) implemented in the form of computer software.

The output of a process modelling development is a process model that can be used to simulate the behaviour of the process and, in some cases, modelling results generated by using the model. Models are valuable tools throughout the life cycle of a process. They can be used effectively during the feasibility-study, design, fault-finding, optimisation and re-engineering phases of a process. Models can be applied for purposes as diverse as economic evaluation, control system commissioning and testing, process design and post-mortem analysis.

With the availability of powerful and relatively inexpensive computer hardware, it becomes feasible to deploy models on-line in the plant. This makes valuable metallurgical/chemical engineering knowledge available to operational personnel around the clock, even when engineers are not present. These on-line models can be used for operator assistance and model-based control to improve the ability of the operation to meet its business-related objectives.

Ex Mente is especially strong in the development of fundamental/phenomenological process models. We do this with modelling tools that have been developed in-house. These tools enable us to produce fully functional models within a very short period of time. These models can be developed to include as much or as little detail as the purpose of the modelling exercise requires.

EMPLIS

The most important by-product of any industrial plant is **data**. Process-level information systems (also known as Process Information Management Systems) assist operational and process personnel in harnessing the vast volumes of data produced, turning it into useful information. These systems can and should be a base from which process engineers learn about, and optimise processes.

OUR SERVICES



Process-level information systems can also act as a vital link that enables advanced control systems to utilise not only continuously monitored data from the plant, but also data that is produced as a consequence of discrete activities that occur on the plant (e.g. taps, inspections, sample taking, analyses, etc.).

Finally, well-engineered process-level information systems act as a data source for the operations management and business management levels.

Ex Mente has developed a generic framework for process-level information systems that can be used to develop and deploy systems that fulfil all of the requirements mentioned above. This approach is especially strong in its ability to be configured successfully in various different environments applying diverse operating philosophies. These systems not only assist operational personnel, process engineers, advanced control systems, operations managers and business managers, but provide them with a powerful competitive advantage.

EMOFT

The second-by-second and minute-by-minute **monitoring and control** of a process are ultimately what determine the performance of that unit. Automated control systems implemented through PLCs, SCADAs and DCSs are commonplace and can provide excellent automation focused on monitoring and controlling of equipment. These basic control systems usually do not address aspects related to the chemistry or metallurgy of the process. This is left to operational personnel and process engineers, and normally controlled by hand based on experience. Ex Mente focuses on the development of control systems that manipulates processes on the chemical or metallurgical level, and not the equipment level. These systems encapsulate process knowledge that can be obtained from operators, process engineers and theoretical literature.

These systems are not able to replace an operator or process engineer, but they rather handle some tasks that are usually the responsibility of operating and process personnel, but where an automated system can yield superior results.

The result could be tighter control of certain process parameters that can make it possible to operate the process closer to its limits, and thereby increase throughput and improve utilisation of the equipment.

Ex Mente prides itself in our ability to focus on the control problem first and the implementation second. We aim to thoroughly study and analyse the control problem by using plant data and in-house simulators. With our extensive experience on a wide range of implementation platforms (Gensym G2, Wonderware InControl), we are also able to assist Clients in making choices about the best platform for their specific problem, and then implement a solution on their platform of choice.

OUR SERVICES



OUR SERVICES

EMEQUIP

The importance of **process training** is to close the gap between process documentation and the actual operational process. As part of the **EMPROCESSSOLUTION™** service, Ex Mente provides training that will provide enough information to allow personnel to apply the system within the context of a variety of operational requirements. Training is a key step in the implementation of any new technology solutions. IT training is important but people are often trained only in IT applications and how to navigate the user interface. Without knowledge of how their tasks fit into the bigger processes, people cannot make correct judgments in dealing with non-standard situations. Our process training gives people enough context to enable them to access the consequences of the decisions they make in executing processes.

An additional benefit of good documentation and training is improved continuity. Personnel will be able to refresh their knowledge on how to use the System by quick and easy access to system documentation.

EMSUPPORT

An integral part of the **EMPROCESSSOLUTION™** concept is building long-term relationships. This is achieved through continuous maintenance and support provided to our clients. Support contracts range from 3 to 10 years. The **support and maintenance** service components include support for the system that is implemented, as well as having access to all updates that become available during this period.

An additional benefit is having access to our extensive knowledge and experience during this period and it is almost like having an extra metallurgical or chemical engineering expert on your payroll. Our engineers will do regular operational assessments to see if there is any additional room for improvement on the operation and will make recommendations accordingly. This is the true value of **EMPROCESSSOLUTION™**.

Benefits

The benefits of **EMPROCESSSOLUTION™** are summarised below:

Improved Yield

By optimally calculating process recipes it will be possible to minimise the amount of raw materials that need to be added to the feed mix. This can result in lower waste material volumes and potentially improved saleable product yield.

Improved Productivity

Reduced raw material additions resulting from optimal furnace recipe calculations can reduce the amount of energy required to process the feed and produce product. This effectively makes more power available, which can eventually mean that the product production rate can be increased.



OUR SERVICES

Improved Efficiency

An optimised feed recipe can result in lower raw material consumption and lower power consumption. By actively and consistently managing these consumables based on the best available data and knowledge, the efficiency of the process can be improved.

Prolonged Refractory Lining Life

Specifically in smelting processes, compatibility between slag and refractory lining can be used as one of the constraints in optimising recipe calculations. This will ensure that the refractory lining is protected while striving for other benefits such as improved throughput, efficiency and yield.

Reduced Risk

By automating process calculations and recipe calculations the risk of human error is reduced.

Embedded Process Knowledge

Knowledge involved with preparing recipes to ensure successful operation and doing important process calculations can be captured and embedded into the proposed mass and energy balances and process calculation tools. This ensures that the knowledge is available and active continuously no matter the time of day, the time of the week, or whether specific personnel are unavailable.

Ease of Use

Sophisticated process tools and calculations are built into user-friendly software components to ensure that process engineers and operational personnel can effectively use it to operate the plant and improve its performance.

Improved Continuity

By using a computer system to embed knowledge into the plant, by providing easy access to related documentation and by providing regular user training for the system, it is possible to improve continuity on the plant. The effects of personnel moving to different positions in the organisation or of personnel leaving the organisation can therefore be reduced.

Improved Consistency

By automating mass and energy balance calculations, recipe calculations and other process calculations, consistency are introduced. Consistency is one of the greatest assets on any processing plant, since it makes it possible to identify problems quicker and more reliably. This makes it possible to improve the process at a higher rate.

GTT-Technologies

GTT-Technologies has specialised in the field of technical thermochemistry and pioneered the practical application of thermochemistry to analyse industrial problems. They are located in Technology Park Herzogenrath (TPH), Herzogenrath, Germany.

GTT-Technologies offers a wide variety of products and comprehensive data services through their extensive resources and partner associations. This includes: Complete Databases from internationally recognised sources, especially from SGTE, FACT, and OLI.

GTT-Technologies have worked in the field of Technical Thermochemistry since 1983 and with their extensive experience in the field, they offer consulting services which range from data services to custom software for particular applications. They also undertake contractual work. GTT-Technologies, as a spin-off from an academic institution, maintains strong relations across various research institutes enabling them to provide Clients with information regarding the services offered by institutions thereby connecting industry and research. GTT-Technologies employs well established people in the field, which makes it the company for specialised solutions.

GTT-Technologies and Ex Mente have worked in association since 2001. Ex Mente is an authorised distributor of the GTT-Technologies range of products. We have successfully utilised these products in the development of in-house process modelling tools that are now being applied to the benefit of all our Clients.

Wonderware

Wonderware is an operating unit of the Production Management Division of Invensys plc and produces software that quickly integrates your plant data and gives you plant intelligence. Their mission is to power intelligent plant decisions in real time.

In order to make the most intelligent business decisions, you need immediate access to your plant information. Wonderware simplifies this process by converting your plant data quickly and easily into vital information also known as plant intelligence. Founded in 1987, Wonderware pioneered the use of Microsoft Windows-based, human machine-interface (HMI) automation software for manufacturing operation systems.

Wonderware software is well known for being exceptionally easy-to-use and integrate, making it easier for you to run your plant. They also have an established reputation for reliability and outstanding integration capabilities. Their goal is to integrate your data and provide the information you need in the most intelligent and accessible format, empowering you to increase your plant's efficiency and make fully informed business decisions. Unlike other automation software offerings, Wonderware is an independent producer of plant automation and information software, not a hardware company providing software specifically designed for their hardware products. On the contrary, Wonderware software is open and extensible, providing you with simple, robust and effective plant information solutions that are able to connect to diverse hardware products and provide a unified platform for the data received from these hardware products.

Wonderware integrates all the data in your plant, enabling you to transform this to industrial intelligence. Based in Lake Forest, California, Wonderware has regional sales and development offices throughout North America, Europe, Latin America and Asia. Wonderware provides support to its network of more than 160 distributor offices and has approximately 300,000 licenses in 100,000 plants worldwide, which is about 30 percent of the world's 335,000 plants with 20 or more employees.

STRATEGIC ALLIANCES

Ex Mente is a systems integrator of Wonderware products. We have been promoting the Wonderware range of products since 2001, and have achieved significant successes through the implementation of these products. Most noteworthy of these are the application of InControl in advanced control system implementations and InSQL as the basis of process-level information systems.

Matrikon & Moore

Matrikon provides complete software solutions and professional services to leaders in oil & gas, power, petrochemical, mining, pulp & paper, chemical and other industries. One of their solutions is Control Performance Optimizer™. Control Performance Optimizer™ (CPO) is a complete solution for the design, development, simulation and implementation of advanced process control strategies. Studies have shown that using advanced process control technologies can help plants achieve savings of between 5% and 15% of their operating costs without any further capital investment. Control Performance Optimizer™ is an industry-proven advanced process control design and implementation platform that can help Clients achieve these goals quickly and easily.

Control Performance Optimizer™

Traditional process control approaches (feedback PID control) adequately handle 80% of a plant's typical control problems. The remaining 20% of control problems are best handled by advanced process control technologies (IMC, MPC, Fuzzy Logic, Kalman Filtering, etc.) that use quantitative process knowledge to provide better control performance. Some typical situations where traditional control underperforms include:

- Coupled multivariable systems (e.g. distillation columns)
- Systems with long time delays (e.g. feeders and conveyors)
- Non-linear systems (e.g. continuous casting)
- Time-variant systems (e.g. SAG mills)
- Systems with noisy signals (e.g. continuous casting)
- Systems with infrequent measurements (e.g. bleach plants)

To take advantage of the latest process control technologies available, control engineers need a simple way to test and fine-tune different advanced process control strategies and then implement the final solution as a part of the existing control architecture. Control Performance Optimizer™'s rapid prototyping capability, coupled with its powerful suite of advanced process control technologies, allows control engineers to design and test alternate scenarios before implementing the best strategy on-line with the click of a button.

Ex Mente is a reseller and implementer of Control Performance Optimizer™. We have been in partnership with Moore and Matrikon since 2007.

Microsoft

Ex Mente is a Registered Microsoft Partner and enrolled in the Microsoft Empower ISV Program. Registered Partners are organizations with a specific level of expertise in Microsoft technologies that align themselves closely with Microsoft.

Ex Mente personnel are skilled in .Net Framework software development, SQL Server and MS Office. These skills and tools are used to develop custom solutions for our Clients and ensure that the solutions are easy-to-use and to integrate with other technologies.