BASF
We create chemistry

BASF Intelligent Mine

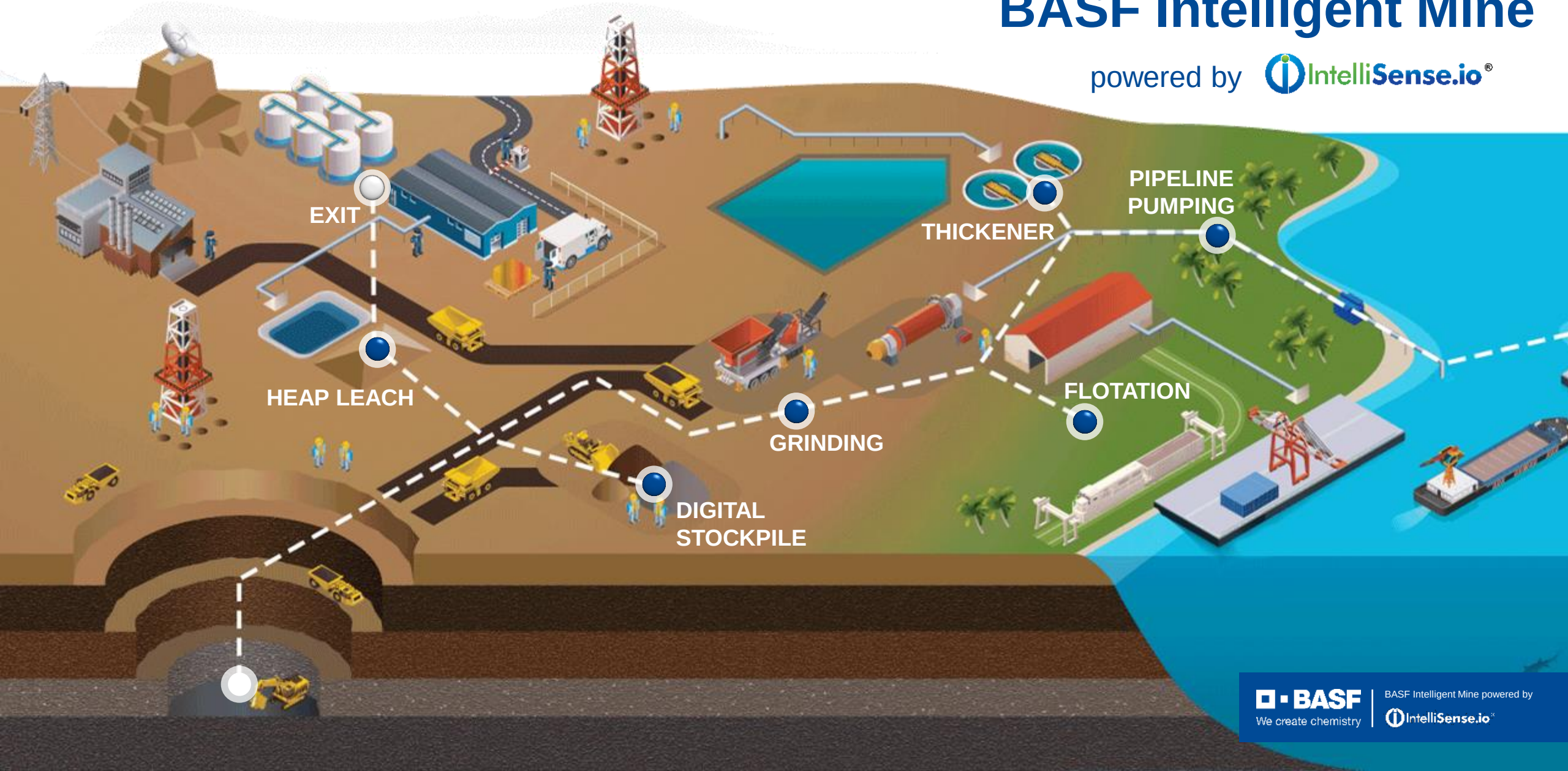
Product Brochure

powered by

IntelliSense.io®

BASF Intelligent Mine

powered by IntelliSense.io®



brains.app platform features

Digital Twins
The virtual equivalent of physical assets created through AI or physical models using historical and live data sources. These are made available from the brains.app platform as 'Digital Assets'. These Digital Assets then deliver financial and operational KPIs in real time.

Virtual Sensors
brains.app provides a series of data derived from its calculations. Most of this newly generated data assists operators and engineers to have a broader view of the process without the necessity of installing new sensors, resulting in a larger capex savings for the client.

Simulation Environment
For every application we have 'Digital Process Models' which are simulated process environments that deliver process performance predictions over a defined time horizon. The process simulator can be used to test the accuracy of predictions, simulate “what if” scenarios and act as a time machine for training and impact evaluations. “Opportunity Lost” and “Prediction Accuracy” assessments are key outputs.

Decision Optimizer
A real-time decision optimizer is incorporated which provides recommendations on expected performance of the mine process, based on the ore properties. These targets can also be a combination of operational and financial KPIs which are typically set by the customers and the system can then be run in an autonomous model or provide recommendations to the end operators to target these KPIs.

CONTACT US

Thickener Application

SOLUTION

The brains.app platform and Thickener optimization application provides:

- Future performance prediction and gives control recommendations to achieve the optimal future. Working to achieve underflow density and other KPIs while balancing circuit safety and mechanical limits and operational costs. All these parameters are configurable in real time by the user to reflect changing conditions and priorities.
- An integrated suite of real time and predictive models which ingest existing sensor and lab data
- A combination of machine learning (AI), statistical, and physics-based models captures the expertise of the team and combines it with advanced statistics and modelling so that your best operator is controlling the thickener 24/7. The application can supply live recommendations to operators or be linked directly to the control system in closed loop mode.

The application includes essential components to enable a step change in thickener operations:

- The Material Model tracks material quantity and quality coming into and out of the circuit, adding additional information vital to circuit stability and optimization.
- The Financial Model gives the real time costs and benefits of the circuit for the first time, enabling decisions to be made on total value.
- The Virtual Operations Simulator allows historical or real time operations to be simulated. It completes simulations in seconds so it can be used for "what if" scenarios, training, and testing of new parameters.
- A full set of data lake historian, dashboarding, reporting, and analytics tools allows thickener data and decisions to be combined in one place.
- Hybrid deployment options mean that mines can take advantage of secure cloud computing to train the most advanced models, whilst operationally critical models can be run onsite in real time.

BENEFITS

- ✓ **Achieve underflow density targets worth whilst keeping within stable operating ranges**
- ✓ **Decrease variability in the thickener circuit operations**
- ✓ **Increase water recovery and optimized chemical usage**
- ✓ **Control the thickener with complete information, including real time financial performance and other missing measurements**
- ✓ **Diagnose issues, report, and upskill your team with the simulator, analysis tools, reporting, and historian.**

CONTACT US

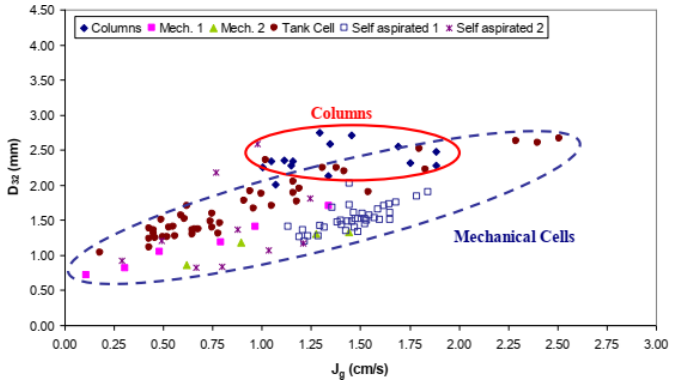
Flotation Application

SOLUTION

IntelliSense.io configures the brains.app platform and Flotation optimization application that:

- Predicts changes in the material inputs (ore mineralogy and PSD) and resulting flotation circuit performance and their collective impact on mineral grade, throughput, and recovery.
- Provides optimal set points of key control variables in the flotation circuit to balance throughput, grade, and recovery in the flotation circuit from both an operational and financial perspective.
- Create a virtual sensor providing real time view of the amount of gas being held up in the column cells.

Measured Eg vs Modeled Eg



BENEFITS

- ✓ Higher throughput and efficiency through improved recovery
- ✓ Optimal particle size enables more valuable metal to be extracted
- ✓ Recommendations manage the streams inside of the floatation circuit to optimize performance
- ✓ Avoids running empty on reagents (in special pH modifier, limestone) and identifies the correct dosage of reagents depending on ore characteristics

BASF We create chemistry | BASF Intelligent Mine powered by IntelliSense.io

Pipeline Pumping Application

SOLUTION

IntelliSense.io configures the brains.app platform and Pipeline Pumping optimization application which provides:

- Dynamic AI-based control schedule to optimize energy consumption and reduce pump switches for several hours of operation
- Optimization at the entire pipeline level as opposed to existing cascade control logic which looks at the upstream tank levels individually
- The best possible specific power for stable demand
- Proactively seeks the strategy with minimal possible number of pump switches
- Adaptive control: quickly react to unexpected change and offer a new strategy
- Safety: doesn't allow tanks to go below or above specified limits

BENEFITS

- ✓ **Energy reduction**
- ✓ **Reduced pump switches**
- ✓ **Predictive maintenance leading to lower maintenance costs**
- ✓ **Increase automation and stability**
- ✓ **Pipeline stability**
- ✓ **50%* less pump switches**
  ***Representative number**
- ✓ **Cost-effective alternative to a VFD-based control loop**

CONTACT US

Heap Leach Application

SOLUTION

IntelliSense.io configures the brains.app platform and Heap Leach optimization application which provides:

- Correlations between residual moisture with the different types of mineralogies and geometallurgical units fed from the mine and mine stocks using historical data
- Recommendations to optimize handling, reclamation and transportation
- Root cause analysis for residual moisture in final gravel of heap leaching process
- Early warning alerts about the material stacked in the different modules and plots of the leaching cells presenting problems due to the residual moisture of the rubble, once the drainage cycle is over
- Optimized irrigation strateg to optimize the transfer of ore to the solvent extraction stages

BENEFITS

- ✓ **Support (trucks) for reclaim of the gravel from the heap leaching pads is reduced**
- ✓ **Mineralogy and volume of matter that reaches the heap leach process can be predicted**
- ✓ **Material handling can be optimized to minimize the residual moisture in the final gravel from the heap leaching process**
- ✓ **Blending strategy can be optimized from mine and mine stocks, in order to reduce/ mitigate the impact of the materials that increase the residual moisture**

CONTACT US

Grinding Application

SOLUTION

IntelliSense.io configures the brains.app platform and Grinding optimization application which provides:

- Mill prediction 20 mins into the future to prevent overload events.
- Dynamic ball charge and liner wear condition status, enabling a reduction in mill stoppages and increased throughput
- Provides optimal set points of key control variables in the grinding circuit to stabilize the feed, balance throughput, grade, and specific energy consumption from both an operational and financial perspective.
- Ball gran composition which helps identify how many balls of each type enter the Mill

BENEFITS

- ✓ **Higher throughput and a reduction of specific energy consumption**
- ✓ **Optimal particle size enables more valuable metal to be extracted**
- ✓ **Recommendations are generated to manage the streams inside of the grinding circuit in order to optimize performance**
- ✓ **Reduction in mill stoppages through accurate ball charge prediction**
- ✓ **Extended liners life**
- ✓ **Automatic report generations and alerts sent to users, identifying areas that will present problems**

CONTACT US

Digital Stockpile Application

SOLUTION

IntelliSense.io configures the brains.app platform and Digital Stockpile application that:

- is a real time integrated stockpile management system. It tracks material quantities and properties in 3D through to the plant: from the haul trucks to dumping onto the stockpiles, stockpile contents, dozing, and reclaiming.
- Integrates data from the Fleet Management System, scans, existing onsite sensors, and lab tests to deliver the most accurate information possible.
- Delivers real time 3D Block Models of the stockpiles for mine planning and optimization, as well as reporting, predictions, and alerts to allow stockpiles to be managed for the first time as an integrated system.

BENEFITS

- ✓ **Plan your plant feed with complete information, allowing you to have control to optimize throughput and recovery**
- ✓ **Optimize your blending strategy and get feedback about its effectiveness**
- ✓ **Know exactly where material is, where it came from, and where it's going to, reducing material dumping and reclaiming errors**
- ✓ **Have full material flow and stockpile histories for analysis and performance comparisons to drive continual improvement**

CONTACT US

BASF

We create chemistry

BASF Intelligent Mine powered by

IntelliSense.io®