



## Grange Resources

Grange Resources Limited owns and operates Australia's largest integrated iron ore mining and pellet production business, located in the northwest region of Tasmania.

The Savage River magnetite iron ore mine, located 100km southwest of the city of Burnie, is a long life mining asset which is set to continue operation until 2023, with current reserves estimated to extend the life of the mine to 2028. At Port Latta, 70kms



Fired pellets on the conveyor at Port Latta

northwest of Burnie, is Grange Resources' wholly owned pellet plant and port facility. This facility produces approximately two million tonnes of premium quality iron ore pellets per annum with plans to increase the annual production 2.7 million tonnes in the coming years.

## Challenge

At the pelletising plant a balling drum is used to form green balls which are fed into the furnace. The water addition in this process has been done manually which results in wasted energy and water.

## Solution

Cromarty implement a trial fuzzy logic system on the first furnace to automatically control water flow based on recycle weight and green feed moisture

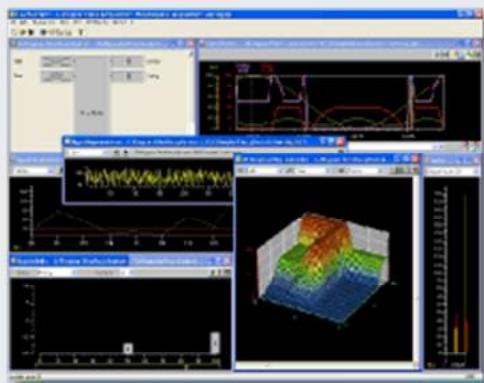
## Results

The outcome of the project was the stabilisation of the balling circuit recycle rate, improvement in green ball quality and reduced air ratio comparing to other furnaces



# SIEMENS

## FuzzyControl++



Boolean algebra, the binary logic on which electronic data processing is based, has one major drawback. In our world not everything is black or white. There are many shades of gray as well as colors. This makes the need to transform analog values and impressions into "digital black and white" all the more complex.

As an extension of classic 0/1 logic, any number of actual values are therefore permissible in the fuzzy logic as indistinct values, thus making it possible to represent statements that cannot be categorized unambiguously as true or false. Process-specific empirical knowledge and colloquially formulated control and regulation strategies can be simulated on computers in the form of simple "if-then" rules, such as "If temperature T is high and pressure P is very high, then close the valve." Fuzzy logic is thus recommended for non-linear controls and for predicting the behavior of mathematically complex procedures in the field of process automation. In other words, it is well-suited for tasks that would be very complicated to solve using conventional means, if they could be applied at all. With fuzzy logic, control systems, regulators, decision-making and diagnostic systems can thus be implemented in a way that is easy to understand.

[http://www.industry.siemens.com/services/global/en/IT4Industry/products/process\\_control/fuzzy\\_control/Pages/default\\_tab.aspx](http://www.industry.siemens.com/services/global/en/IT4Industry/products/process_control/fuzzy_control/Pages/default_tab.aspx)

## Challenge

The pelletising plant at Port Latta produces magnetite pellets using ore concentrate transferred from the Savage River mine. The major part of the process is the formation of green balls by processing green feed in the balling drum. Water added into the balling drum is manually controlled, which has resulted in excessive water usage at times. Uncontrolled water addition can increase recycle rate (the amount of green feed recycled back into the balling drum), water usage and needlessly increase and energy inputs. The aim was to reduce the balling circuit recycle tonnage variation via an automated system.

## Solution

The Cromarty team have been commissioned to implement a trial fuzzy logic system on Furnace 1 to automatically control water flow based on recycle weight and green feed moisture. Moisture meter, control valve and flow sensor have been installed to provide input data and allow controlling of the water flow.

## Results

The outcome of the project was the stabilisation of the balling circuit recycle rate, improvement in green ball quality and reduced air ratio comparing to other furnaces. The furnace also experiences less bed disruptions and stops due to balling drum overloads. Electrical and water energy usage has been reduced and optimised.

The successful project has lead to implementation of fuzzy logic process control on other furnaces as well as other parts of the process at both Port Latta and Savage River sites.



Green pellets in the Balling Drum at Port Latta

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