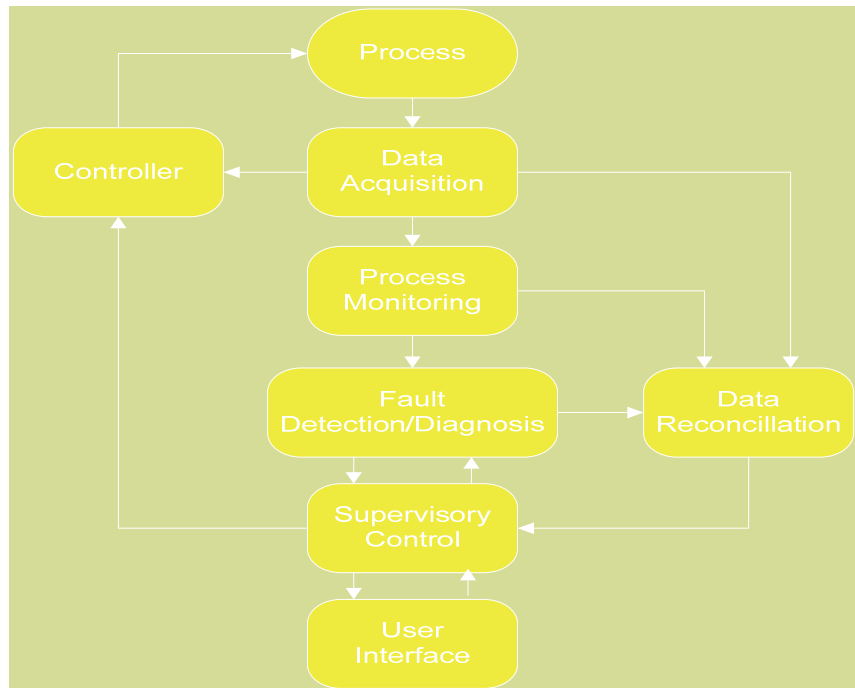


# Process Monitoring, Fault Detection and Diagnosis

## PROCESS MONITORING

- safer operation
- energy efficiency improvements
- improved economic conditions



## Process Monitoring

Through analysis from statistical methods, process monitoring is a tool to ensure that processes are operated at its full potential to produce conforming product. Fault detection and diagnosis are two main parts of process monitoring.

## Fault Detection

Fault detection is recognizing that a problem has occurred, even if you don't yet know the root cause. Faults may be detected by a variety of quantitative or qualitative means. This includes many of the multivariable, model-based approaches. It also includes simple, traditional techniques for single variables, such as alarms based on high, low, or deviation limits for process variables or rates of change; Statistical process control (SPC) measures; and summary alarms generated by package subsystems.

## Fault Diagnosis

Fault diagnosis is pinpointing one or more root causes of problems, to the point where corrective action can be taken. This is also referred to as "fault isolation", especially when emphasizing the distinction from fault detection. In common, casual usage, "fault diagnosis" often includes fault detection, so "fault isolation" emphasizes the distinction.

## Methods

- Statistical process control (SPC)
- Principle component analysis (CPA)
- Partial least square (PLS)
- Linear Discriminant Analysis (LDA)

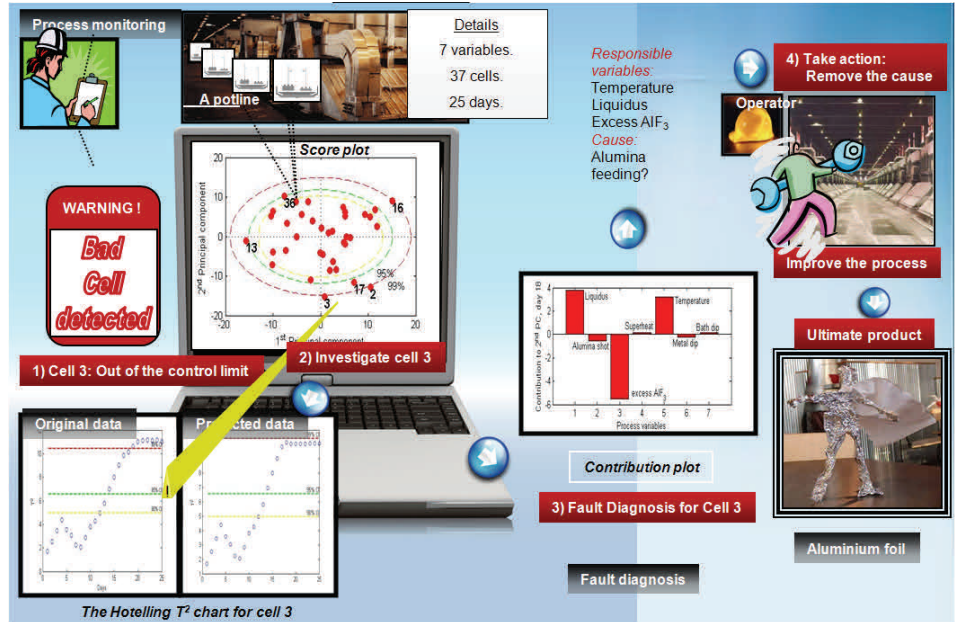
# Process Monitoring, Fault Detection and Diagnosis

## MORE INFORMATION

For more information on any of our products or services please contact the centre directors:

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## Technology Development

Designing, developing and evaluating a new multivariate cascade fault detection and diagnosis system to the field of process control in the area of the aluminium smelting process in the Netherlands.

- A novel framework for fault detection has been developed and applied to the aluminium smelting process.
- A set of abnormal patterns has been discovered using the Discovery from Databases (KDD) approach.
- An alumina feeding cycle treated as a batch operation using MPCA and MPLS is integrated into our novel framework.

## Industrial Information & Control Centre

The Industrial Information and Control ( $I^2C^2$ ) is a joint collaboration between AUT and the University of Auckland and was established in 2007. Our team is multidisciplinary group of chemical, mechanical, and electrical engineers with backgrounds from pulp and paper to dairy, aluminium and biotechnology.

### $I^2C^2$ SERVICES AVAILABLE

- System Modelling
- Software Design
- APC Tuning & Assessment
- Onsite Training
- Software Installation and Setup
- Technical Support

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