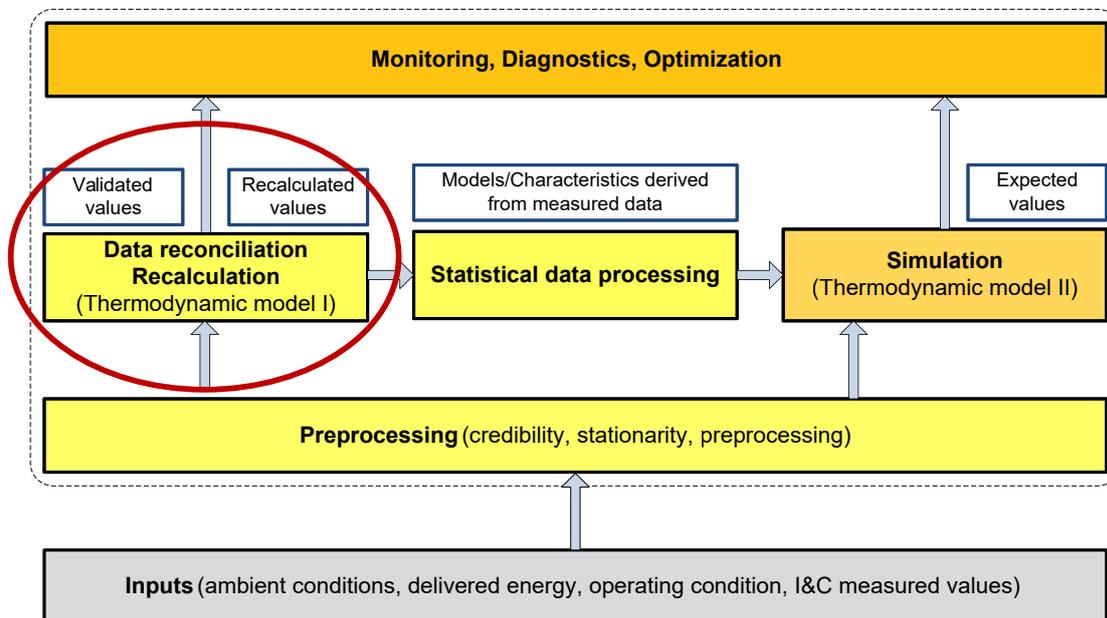# PowerOPTI – Thermal Cycle Efficiency Control

Data Validation: Measurement Reconciliation, Recalculation, Data Credibility Improvement

BENEFITS

Deeper insight into the technological process, data transformation into information

Measurement quality improvement, process monitoring and evaluation
- Measurement reliability improvement; identification and elimination of gross errors
- Increase of parameter accuracy and correctness; decrease in standard deviation
- Calculation of non-measured parameters, including standard deviation; virtual sensors
- Calculation of indirectly measured values and parameters, including standard deviation
- Acquisition of consistent data for operating economy

Instrumentation diagnostics and calibration:
- Sensor degradation detection
- Sensor soft calibration
- Measurement system maintenance cost optimization

Technological process and equipment diagnostics:
- Equipment degradation detection and identification
- Leakage and erroneous operation configuration detection and identification

Measurement system design:
- Measurement system optimization; sensor quantity, location and accuracy

DESCRIPTION

Advanced data processing, analytical relationship between parameters used to determine values

Method, prerequisites:
- Measurement values must comply with laws of physics (mass and ic-energo conservation, etc.)
- Use of mathematical statistics to determine the most probable value
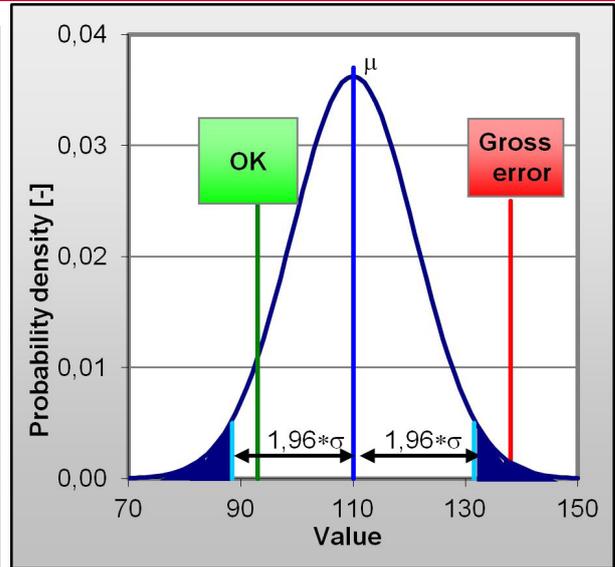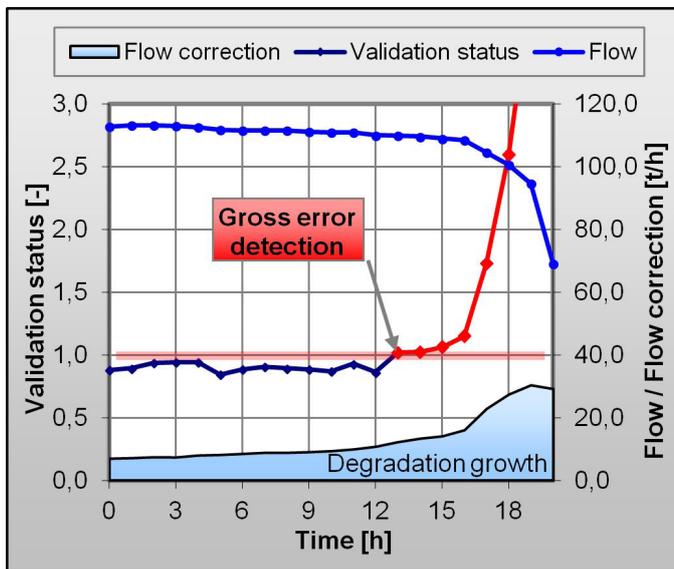- Analytical measurement redundancy, technological process may be considered quasi-stationary

Validation model:
- Graphics editor for design, tuning and analyses
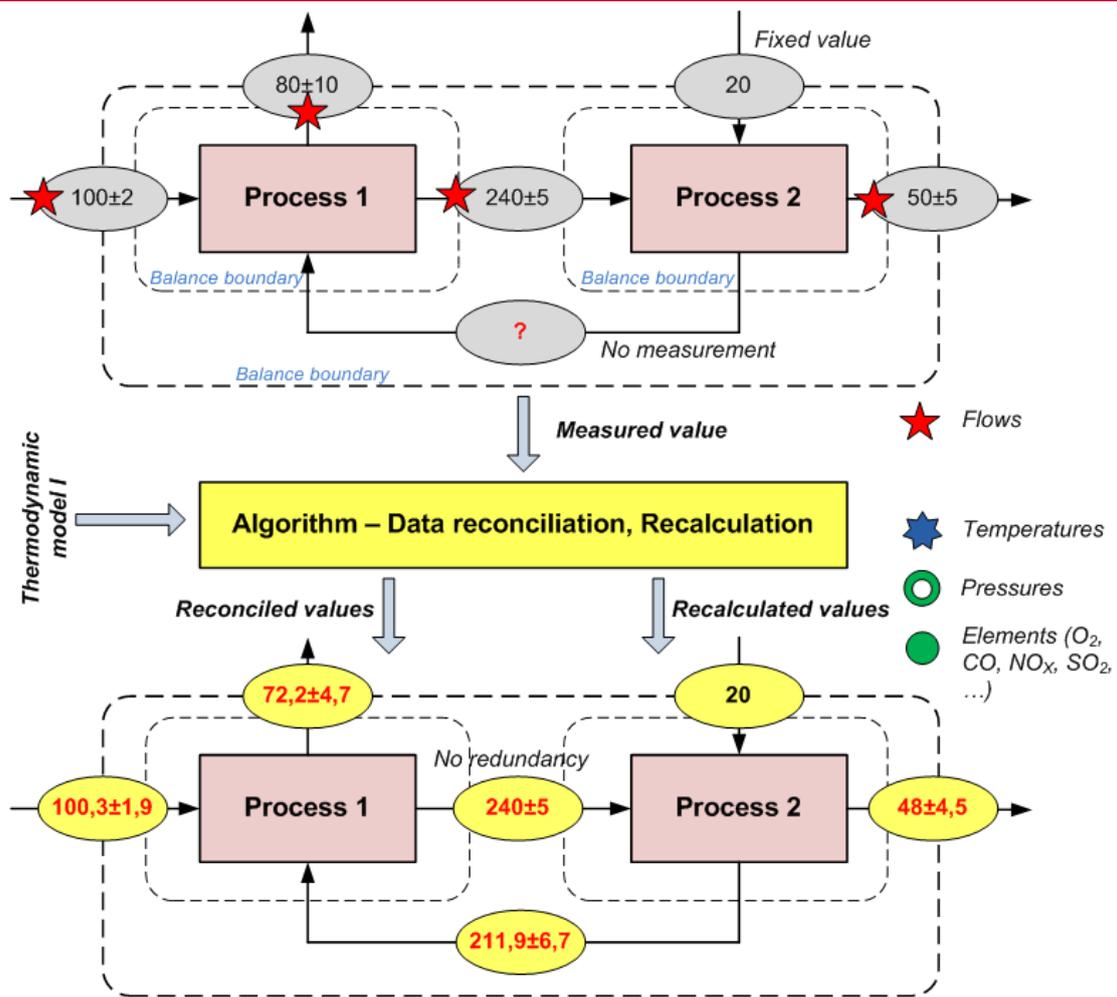- Model is represented by a set of nodes and streams and their related measurements

Measurement soft calibration
- Correction of important parameter values in DCS/PLC (set point)
- Monitoring and elimination of sensor degradation effect

Gross Error Detection and Identification, Measurement Reliability Improvement

Flow correction — Validation status — Flow

Gross error detection

Degradation growth

Validation status [-]
Flow / Flow correction [t/h]
Time [h]

Probability density [-]
μ
OK
Gross error
$1,96*\sigma$ $1,96*\sigma$
Value

Measurement Improvement, Equipment Performance Monitoring in Real Time

Fixed value

80±10
20
100±2   Process 1   240±5   Process 2   50±5
Balance boundary   Balance boundary
?   No measurement
Balance boundary

Measured value

★ Flows

Thermodynamic model I

Algorithm – Data reconciliation, Recalculation

Reconciled values   Recalculated values

★ Temperatures
○ Pressures
● Elements (O$_2$, CO, NO$_X$, SO$_2$, …)

72,2±4,7
20
100,3±1,9   Process 1   No redundancy   240±5   Process 2   48±4,5
211,9±6,7

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