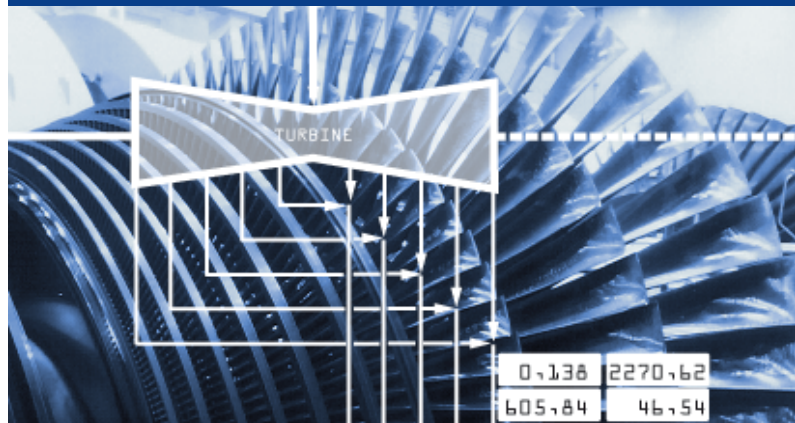


# The online system



**PROCESS PLUS™**  
[POWERED BY VALI FROM BELSIM]

**PROCESS PLUS™ provides unique visualisation and extensive analysis possibilities of plant processes**



**The PROCESS PLUS™ Online system is an application for the process visualisation and optimisation of technical processes based on VDI 2048.**

The PROCESS PLUS™ Online system is used in numerous nuclear and conventional power stations as process monitoring system.

It guarantees synoptic and clearly structured process visualisation as well as the provision of information applicable to the specific needs of the individual organisational units.

**OBJECTIVES OF INSTALLING THE PROCESS PLUS™ ONLINE SYSTEM**

- Continuous monitoring of technical processes and their systems or components.
- Minimizing measurement uncertainties and consequently determining the ‘real’ process values.
- Utilisation of the reconciled values as calibration standards
- Fast detection of internal leaks.
- Fast detection of condenser fouling.
- Immediate determination of measurement drifts and process changes.
- Creating awareness of reconciled process data for a large number of employees.
- Data democratization. This means the incorporation of a major part of the organization in the circle of information recipients.

**PROJECT DURATION**

Modelling of plant process, data reconciliation, integration of PROCESS PLUS™ Online in the existing IT infrastructure, fine-tuning and approval of the system as well as training of employees takes

approximately 15 weeks. Installation of the PROCESS PLUS™ online system does not require downtime of the plant and can therefore be performed during operation.

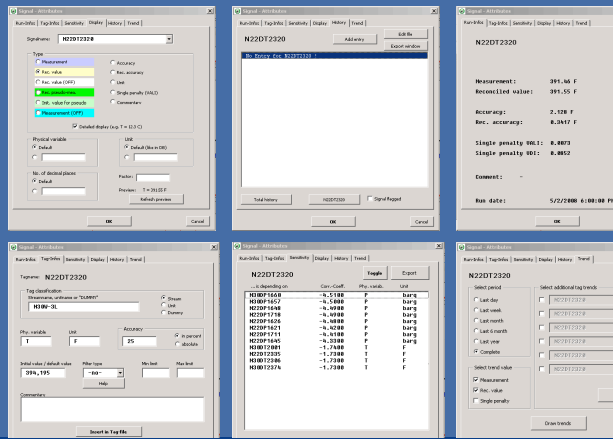
**PROCESS PLUS™ ONLINE SYSTEM SCOPE OF SERVICES**

- + PROCESS PLUS™ client (based on MS Visio)
  - Key Performance Indicator (KPI) overview
  - Suspected tag list
  - Calibration list
  - Operation mode
  - Characteristics
  - Component monitoring
  - Process image
  - TreeView (suspected/filtered tags)
  - Sensitivity analysis
  - History
  - Heat balance sheet
- + PROCESS PLUS™ Server
- + PROCESS PLUS™ Graph
- + Software package VALI 4 (company Belsim)
- + Modelling of plant in VALI 4
- + Modelling of plant in PROCESS PLUS™ + Installing application/software in existing IT environment, connection to process control computer (OSI PI/XU/etc.)
- + Fine-tuning of models
- + Model documentation
- + Training of 5 employees respectively á 2 days



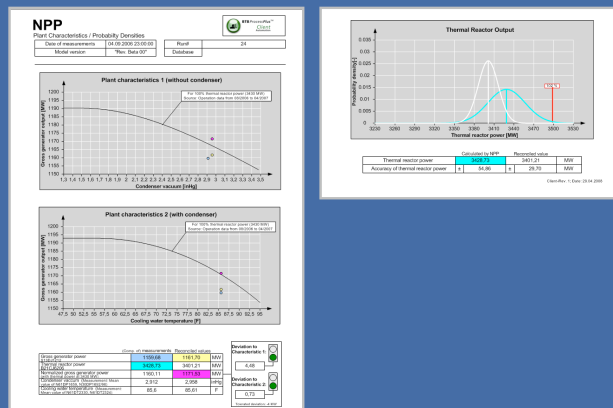
VISUALS

PROCESS PLUS™ PROCESS VISUALISATION - PROPERTIES OF THE MEASURING POINTS



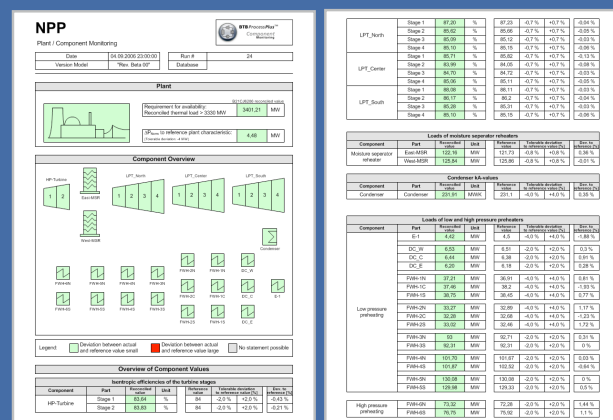
After double-clicking on any measurement, an overview of information on the respective measuring point is opened. The bandwidth of information stretches from visualisation options, characteristics history, details of reconciliation runs, measurement trends within a specific period of time, to sensitivity analyses of the selected measurement with reference to other measuring points in the process.

PROCESS PLUS™ PLANT CHARACTERISTICS OVERVIEW



The plant characteristics overview is at a higher detail level than the process visualisation. It informs the user about the current 'real' plant capacity compared to the design specification. In addition, another screen displays the measured and reconciled power with the associated uncertainties. At the same time, the screen shows, e.g. for nuclear power plants, the potential for safe power increase up to the emergency cooling limit of 102%.

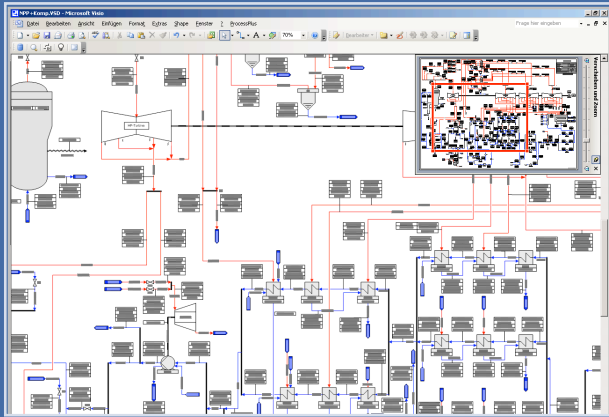
PROCESS PLUS™ COMPONENT MONITORING



This application represents the highest and most global level of process monitoring. Individually specified tolerance bands for selected process values trigger the green coloring of the components (correct operation) or a red coloring (operation not optimal). As soon as a component is colored red, the respective person responsible should initiate analyses and diagnostics with the tools available from PROCESSPLUS™. PROCESSPLUS™ customers in the field of nuclear power use a direct connection of PROCESSPLUS™ component monitoring with a binary signal (control room lamp), to visually warn the shift staff.

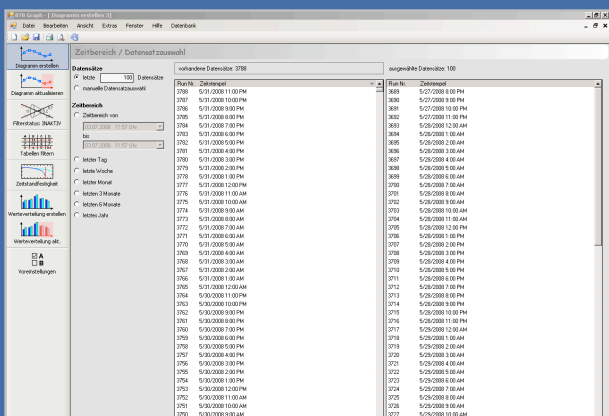
VISUALS

PROCESS PLUS™ HEAT BALANCE SHEET



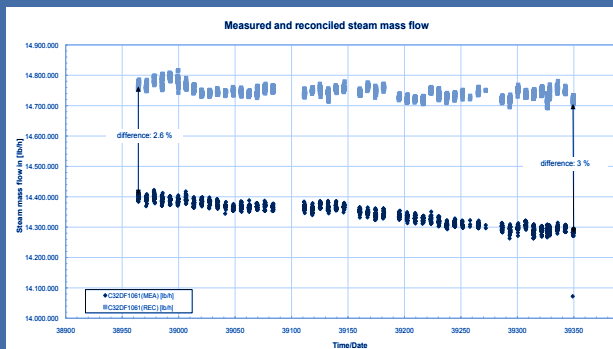
The PROCESSPLUS™ Heat Balance Sheet is a standard visualization within the online system. It offers plant employees a quick overview of thermodynamic variables such as enthalpy or steam moisture content. In this view, only reconciled data is displayed.

PROCESS PLUS™ GRAPH



Trend analysis and presentation over specific time intervals, presentation of measurement drifts or process changes can be generated quickly and easily with the aid of PROCESSPLUS™ Graph. The application comprises an intuitive function for data selection and standard analyses for a selection of plant types. The flexible design also provides the user with the possibility to create individual analyses with other diagram types.

PROCESS PLUS™ PROCESS ANALYSIS



PROCESSPLUS™ graph provides evaluations of the reconciled thermal load, efficiencies, feed water mass flow, normalized gross powers, etc. for a continuous view on the behavior of process values and calculated parameters.

## PROCESSPLUS™ Online system project steps, duration and customer input.

The average duration to a successful installation of the PROCESSPLUS™ system is 15 weeks with an average input of 20 man days by the customer.

### REQUIRED DATA AND DOCUMENTATION

- + Piping and instrumentation diagrams (P&ID) for allocation of measuring points in the model
- + List of all measuring points from the process control computer
- + Heat balance sheets at approx. 100% load
- + Pump characteristics
- + Plant characteristics (generator load over condenser pressure)
- + Operating data or one-hour averages at 100% load over 4 weeks

The extent of the required process data and documentation is limited due to the basic approach followed by the reconciliation methodology. This way e.g. information on the characteristics of individual components is not required.

In the past BTB Jansky has successfully implemented several online versions of their data reconciliation system PROCESSPLUS™ both in nuclear and fossil power plants. The installation of additional measuring points is not required.

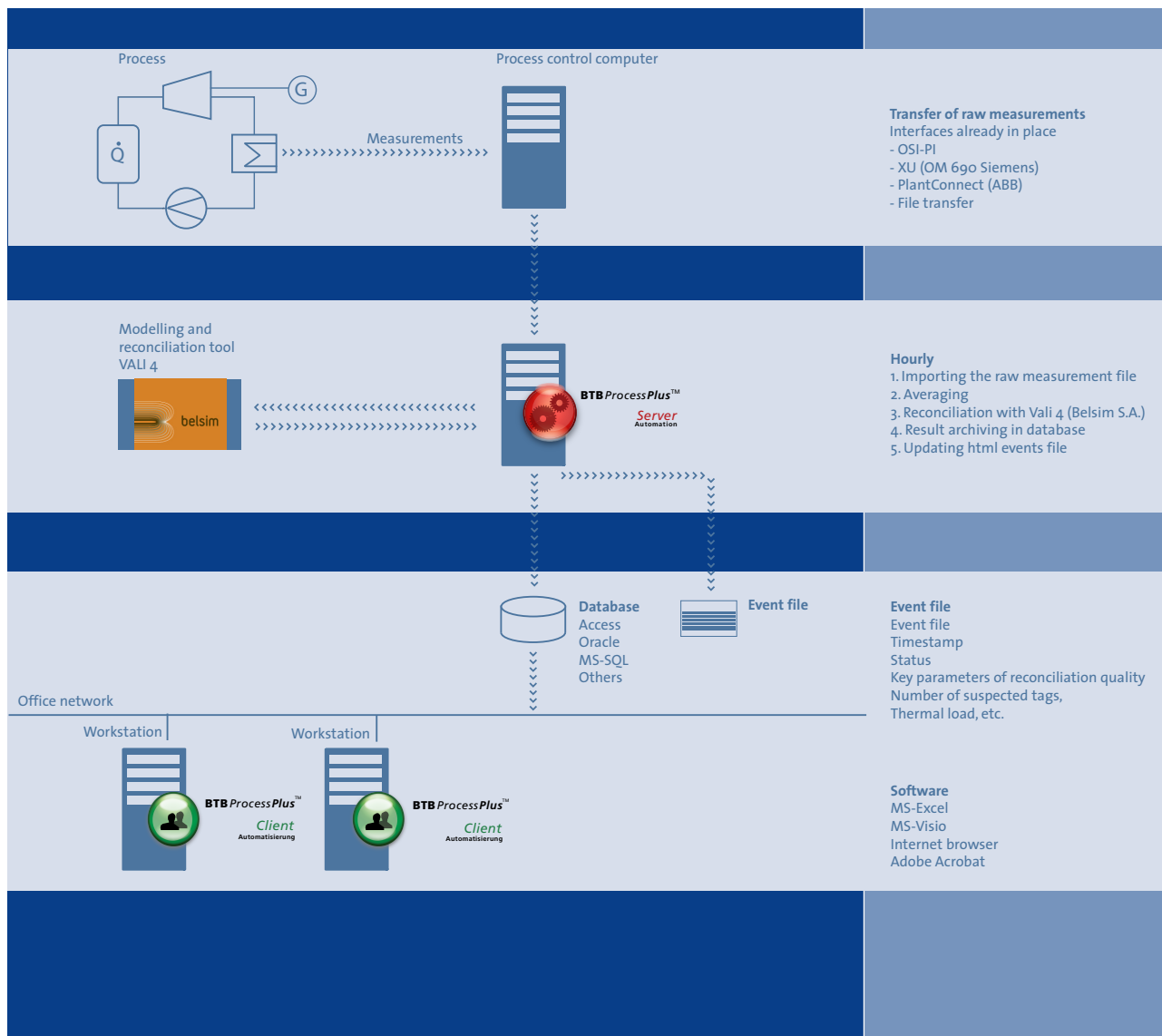
PROJECT STEPS, DURATION AND INPUT BY THE CUSTOMER																	
	PROCESS PLUS™ project plan for power plants	Utility labor input in man days	Week														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Process data analysis	Sending of all required documents, drawings, data and heat balance sheets	2	■	■													
	Inspection of forwarded data			■													
	Requesting missing data	1		■	■												
	Model creation			■	■	■											
Implementation	Finalization of plant model in VALI4 and PROCESS PLUS™				■	■	■										
	Installation and IT integration	2						■									
	Training, 5 persons, duration two days	10							■	■							
	Create to do list									■	■						
	Fine-tuning of model/processing of to do list	5										■	■	■	■	■	

## Integration of the PROCESS PLUS™ system including VALI4 into existing IT environment

The PROCESS PLUS™ system has already been integrated into numerous IT environments with various interfaces to process control computers such as Siemens XU, OSI-PI, PlantConnect, etc. Thereby the PROCESS PLUS™ system has proven itself as very flexible, in order to comply with the high safety requirements in the power plants.



Example of an IT integration with the PROCESS PLUS™ online system



# Creating Transparency

## Technical consulting

- Process data reconciliation
- Acceptance tests
- Process optimization
- Recovery of 'lost' megawatts
- Ageing management
- Optimization of maintenance cycles
- Finite element analyses
- Damage analyses
- Vibration measurements
- Technical expertises
- Plant refurbishment concepts
- Infrared images
- Scanning electron microscope analyses

## Management/ Organisation consulting

- Organisational restructuring
- Process benchmarking
- Efficiency benchmarking
- Optimization of business processes
- Plant integration/synergy projects
- Detailed plant process cost analysis

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