

## Process Control System

Process values such as measured values and system status should be represented on the process visualization system, and relevant data stored in the database.

Process visualization should ensure intuitive operability through the use of isometric authentic images of the system. To navigate, click on the desired section of relevant detail and/or the corresponding clearly marked navigation elements.

The process control system should also fulfill the following requirements:

- Operation of SCADA and PLC as a harmonized system
- The system should permit object orientated development of software
- Basic objects (ventilators, valves) should be able to contain data, visualizations graphics and PLC logic
- Because of the uniformity of symbols, objects should be described in XAML ( for graphics as well as programs and functions) alternatively, generation through XAML should be possible.
- It should also be possible to generate and import graphics with external tools such as Microsoft Blend
- A PLC control should be integrated into the leading system for higher level control from the leading system. It should be possible to program this higher level PLC both in IEC 1131-3 as well as in high level language (.Net-> C#).
- Communication between the main server, PLC and clients should take place via IEC60870-5-104, web services (WCF) and OPC UA.
- The system must be developed according to the latest technologies (.NET) It must not contain any unmanaged code.

- Applications generated from the system must be compiled via Standard compiler (Microsoft) and are not to be interpreted.
- MS Office must be integrated for parameterizations as well as operation. It must be possible to parameterize all objects via MS Excel (mass parameterizations tool).
- Each communication service can operate separately as a data node on its own distributed system.
- Transmission of basic objects must be possible in the course of software compilation.
- The chosen programming environment should support polymorphism.
- Dynamic graphics should be applied as 100% vector graphics in visualization.
- Graphics should be carried out entirely as vector graphics and should be freely zoom able. Operation via touch- or multi touchscreen should be ensured.

An open database model on the basis of Microsoft SQL Server 2008 R2 should be applied.

- Any desired number of locations for user terminals (clients) should be possible in the system.
- Personnel should be capable of installing the basic software and database backup ready to run on any PC (basic knowledge of MS Windows is prerequisite).
- The system must run on several, freely delineable levels of operation, with password protection. A developmental environment with administrator access should be available in the system.
- The control system should support the decentralized distribution of PLC logic amongst several subsystems and administrate their internal communication automatically.
- Shock free switchover when changing the decentralized distribution of logic (online change) must be supported.

- It must be possible to transfer control logic at any time to any other configured system for maintenance purposes. Switchover to the backup system must be shock-free and under protection of data consistency so that any intelligent controller hardware can be switched off.
- Crosslinking of all control systems must happen automatically and under administration of the system itself.
- Industrial standard components are to be used for both field level and management levels.
- Maintenance planning for individual system subunits must be integrated within the system
- A logbook must be integrated for the documentation of defects, with automatic notification of the responsible persons via text or email. An alarm system is optional!
- All values which are measured must have variable absolute notification threshold limits, warning limits and alarm limits at administrator level, as well as monitoring an excessively fast rise or drop in measured values. It must be possible to substitute values in the case of a failed measurement
- Circuit diagrams must be executed in E-plan, and include at least wiring diagrams, cable lists, terminal diagrams, material lists and construction plans.
- The control system must have a minimum of 4GB RAM.
- Redundant design of the control system as well as SCADA must be possible— optional position
- The system's circuit diagrams are to be stored as dynamic objects in the process control system.
- If required, the chosen control system should be able to show up any alarm that has been generated automatically on the corresponding circuit diagram.
- In the course of each alarm, it is necessary that the display shows duration and frequency of each alarm (Pareto system). The precise moment of occurrence, clearing of faults, acknowledgment together with the user who was logged in at that time.

- All user activities must be registered automatically and stored in the database.
- Text message or email alarm must be possible in plain text, easy to configure and workable on several levels.
- User interfaces should be identical on all touch panels, monitors and also multi monitors.
- Configuration of trends in measuring values for analysis from the visualizations must be simple, per drag and drop.

Recommended model: invlution