

Projects

The following are a few project examples from more than 50 successfully implemented automations.

Project: Automatic Chamber Furnace Line (with time-optimized loading of tempering furnaces for preheating) with a connection to the ams (administration management system).

The following modules were used:

- Logistical tracking of charges and materials (real charges)
- Charge-related recording of process data (real charges in periodically working installations)
- Transport command generation for automatic loading and unloading of the installations (fully automatic transport unit for loading and unloading the installations and the magazine store)
- Data preparation and provision for the super ordinate production planning system (ams)

Project: Continuous Belt Furnace with Charge Tracking and automatic zone-related set point.

The following modules were used:

- Logistical charge / material tracking (real charges)
- Charge-related process data recording (real charges in periodically working installations)
- Automatic zone-related set point

Project: Material Tracking up to Individual Parts in a fully automatic installation consisting of a high temperature furnace, a stored low-temperature furnace, several robotics and automatic test stations for the treatment of aluminum parts.

The following modules were used:

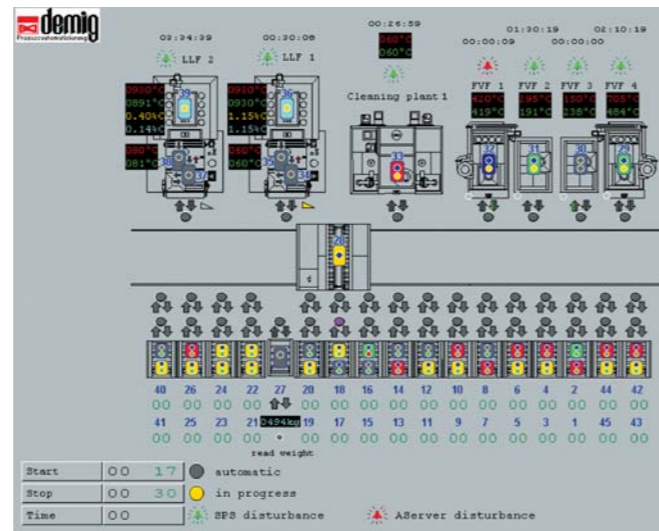
- Logistical charge / product tracking (Real charges with tracking of individual parts)
- Charge-related process data recording (real charges in periodically working installations)
- Individual part-related allocation of test results, data preparation and provision for super ordinate PPS system

Project: Two Automatic Chamber Furnace Lines, one pusher furnace installation and two high-shelf magazine stores, operated by an external transport unit. Furthermore a connection to the internal production planning system (VAX mainframe) is realized.

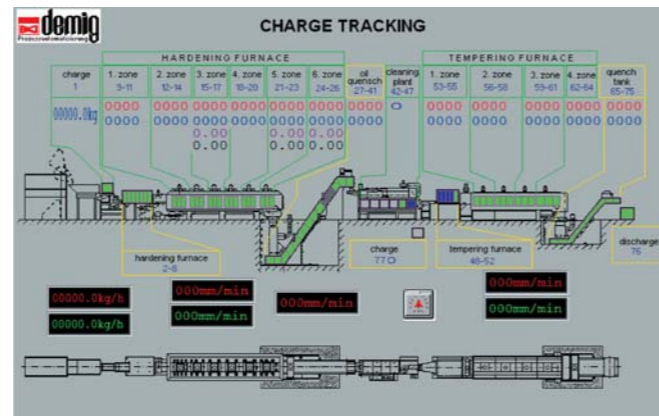
The following modules were used:

- Logistical tracking of charges and products (real charges)
- Charge-related recording of process data (real charges in periodically working installations)
- Transport command generation for automatic loading and unloading of the installations (fully automatic transport unit for loading and unloading of the installations and the magazine store)
- Empty grid management
- Data preparation and provision for the super ordinate production planning system (ams)

An important and interesting aspect here is that each line is independently (self-sufficiently) operational.



Automatic chamber furnace line



Continuous belt furnace



Automatic line for aluminum pieces



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prosys/2 prover/2

The latest control system technology in heat treatment



1977 2005



Over 25 Years of Experience in Heat Treatment

demig Prozessautomatisierung GmbH

We are a process-orientated company with our own hardware and software development. We have a qualified team of engineers and technicians, giving us a good reputation worldwide.

Due to our know-how in process technology and engineering we are a qualified partner of manufacturers.

We support our clients in the realization of installations and processes in the field of control and regulation technology as well as in the field of sensor technology.

We offer our users a complete service spectrum of modernization and automation measures for cost reduction, quality improvement and product innovation.

demig Anlagentechnik GmbH

We plan and project special machines as well as machine parts and process engineering installations for the heat treatment of metals, glass and ceramic, as well as in the chemical and foodstuffs industry.

Together with selected partners, we realize our industrial projects including start-up, training and documentation.

Automation

- Cross-linking using the process control system (**prosys/2**)
- Order and charge tracking with quality verification using ISO 9000
- Fully-automatic heat treatment lines

Modernization

- Exchange outdated control and regulation technology (SPS) for modern variable process systems with an integrated SPS
- Switchgear reconstruction as well as new development using industry standards and different company standards
- administration management system for contract heat treatment workshops (ams) and operating hardenings (ams FBH)

Services

- Development/Configuration
- Installation/Start-up
- Technical and Operator training
- Remote maintenance/Diagnosis
- Replacement parts and repair service
- Hotline and Update/Maintenance contracts

Development

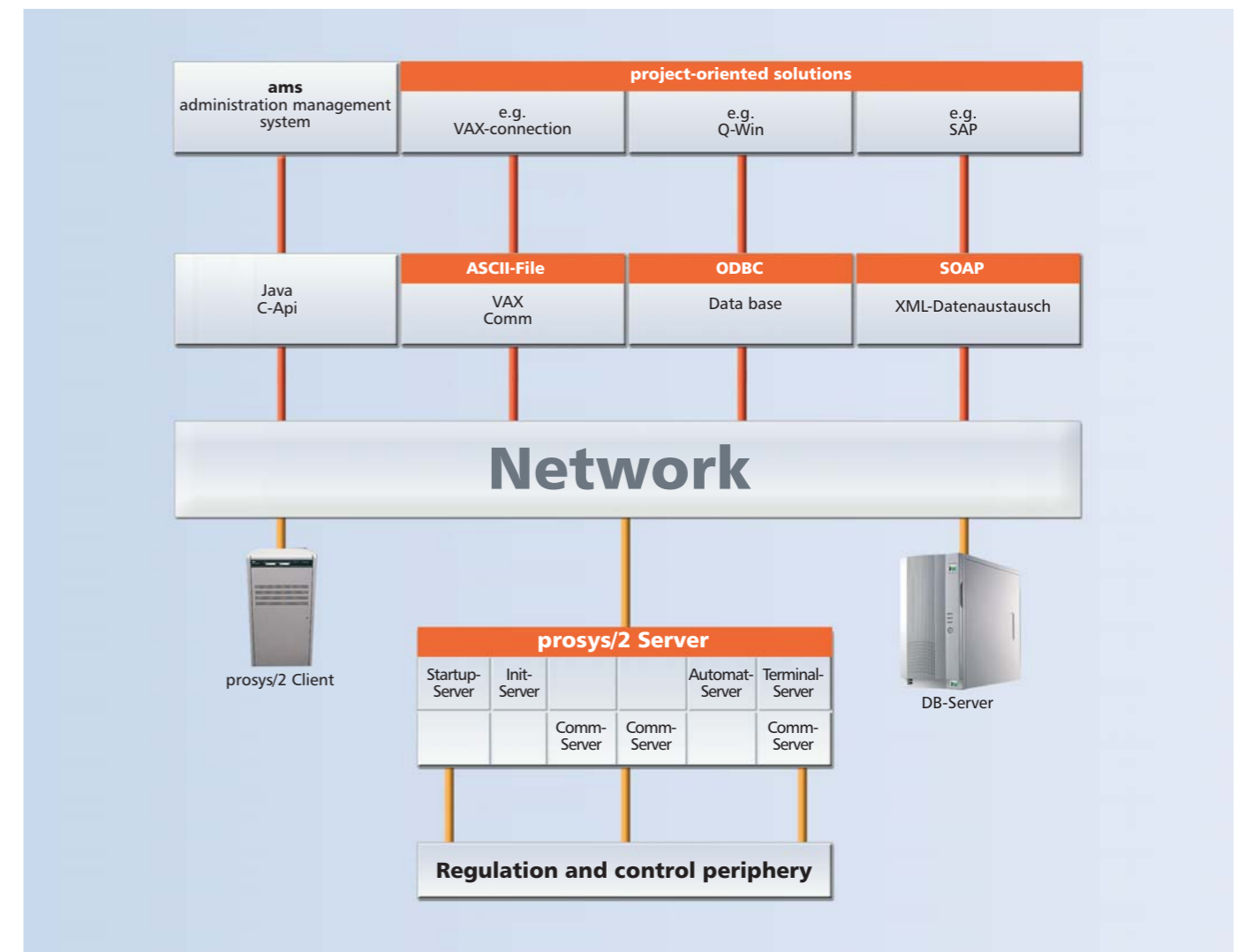
- Development and creation of special application controls for mechanical engineering

prosys/2 – Structure and Design

Along with the process control system prosys/2 that was developed primarily for the application range of demig regulation and control systems (but also linking selected third-party systems), an excellent tool is available to the user that would link the

production sequences of the attached installations to the operational collection of data. For this, the chosen client-server architecture offers the possibility of problem-free networking and can be easily expanded at any time.

prosys/2 Software Concept:



prosys/2 is the user interface for the fundamental tasks of a process control system:

- Installation visualization and process control
- Central creation and administration of treatment programs/recipes
- Remote maintenance and data exchange
- Alarm and message functions
- Recording and archiving process data
- Remote maintenance, service and operation per modem



prosys/2 – Overview of the Functions

Central Visualization and Monitoring

For the visualization of the installations and the process cycle, animated site views of the installations or installation components and work overviews can be generated. Through the simple configuration with signal lamps, color changeovers and data displays, as well as integrated switching surfaces with control functions, the monitoring of the installations and processes from each workstation is made possible.

Central Creation of Treatment Programs

Program creation is made using process-oriented programming (DSP). With this kind of programming, only certain flow sequences are authorized. The programs are created from pre-configured program modules (process segments). The operator is automatically led through the necessary inputs of the variable data. The input range limit is indicated in the footer. Section-dependent fundamental settings such as monitoring and safety functions are already provided. Therefore a more plausible, consistent structure of the programs will be ensured and incorrect inputs will be reduced.

Alarm and Message Functions

The safety regulation defaults are implemented by means of the configuration software during the projection and configuration of the process control systems. The alarm and message system is set up so that certain installation and process related situations activate an alarm or message. These alarms or messages can be assigned individual help texts or instructions. Different possibilities in the form of overviews or lists are available for reporting. The option of transmission via SMS or e-mail is offered (prosytel)!

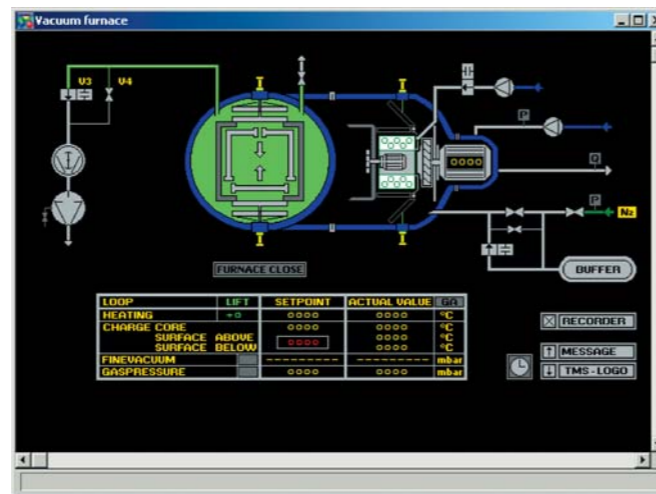
Remote Control and Data Exchange

All connected installations can be operated with the control system prosys/2. Authorized employees may engage in control and regulation processes (modifications of the program/parameters, step sequence control).

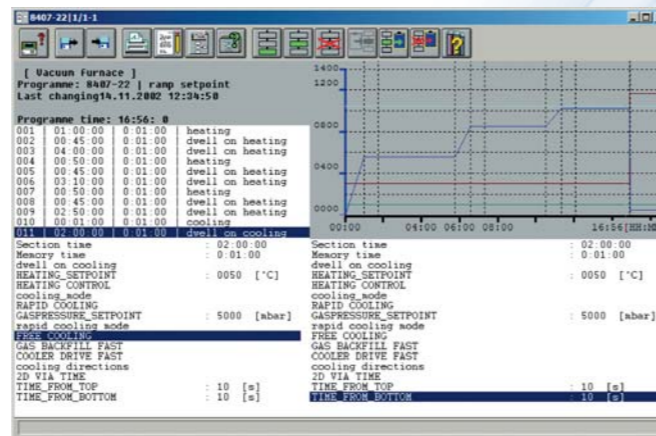
A transfer of the created programs between the control system and the process controllers may be done in both directions.

Auto configuration

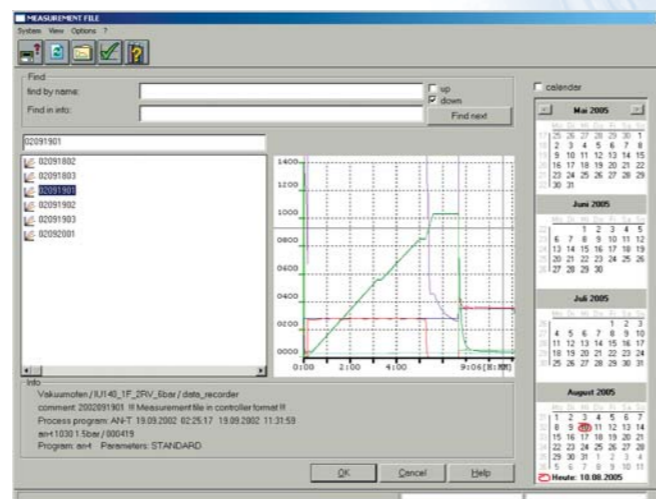
An automatic self-configuration occurs when other demig process control systems are connected to the control system. All above mentioned standard functions including the visualization are then available to the user whereby all texts, designations as well as inspections concerning the program creation correspond with the process control system.



Central Visualization and Monitoring



Central Creation of Treatment Programs



Recording the Process Data

Functions and Modules

Process Documentation as Quality Verification:

All necessary process data for quality management are recorded and archived online. Therefore several recorders may be configured to record different systems or charge-related data with selected time-slot patterns.

These measuring files may be exported to other programs (such as ams or MS-Excel©) or may be printed graphically or digitally. The process documenting and archiving may be used as one part of the quality verification according to DIN ISO 9000ff.

Additional Modules

prosydiff

The additional module prosydiff serves in the creation and optimization of the treatment program of a carburization process without costly test charges. Several parameters (e.g. carburization temperature, duration and atmosphere (C-level)), in combination with the alloy components, the affinity with the diffusion medium, the specialties of the installation and the material geometry, are important for the result of the process.

This program module creates a line graphic of the carburization process via computer simulation. The parameters may be changed until the required result is reached. The final selected program will be automatically adopted in the demig control system (with the module "Online Diffusion Simulation") in the currently running process.

prosyserv

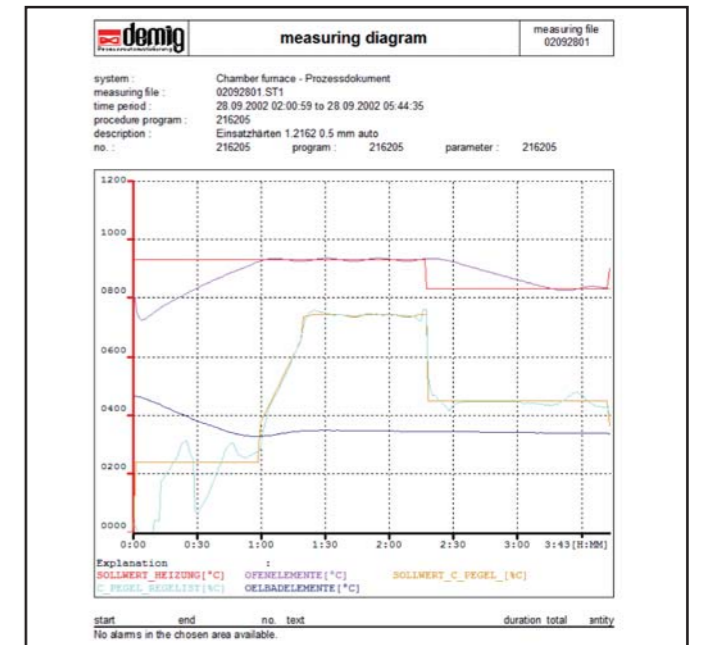
The additional module prosyserv supports the user according to DIN ISO 9000 for the attached installations in all areas of quality assurance. It includes:

- an installation logbook for manual entries and as a means to communicate between different shifts,
- the logbook management for supervisors,
- appointment management for maintenance and preventative maintenance,
- recording of the expected useful life with the workload calculation.

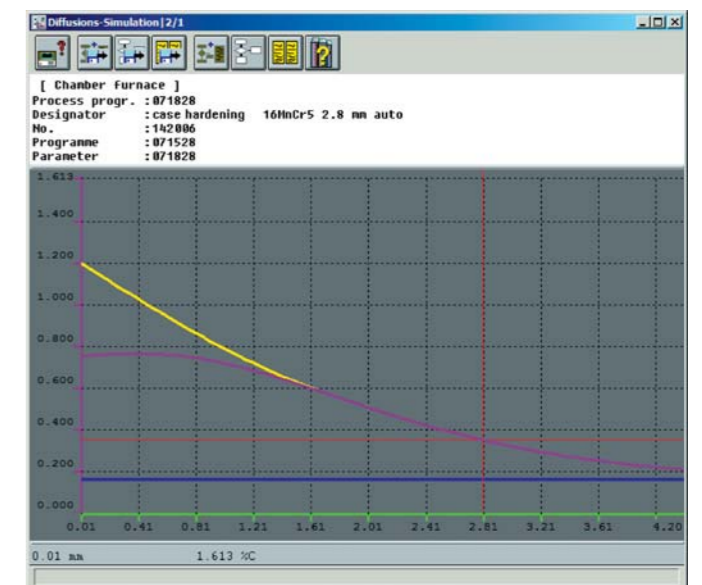
prosytel

The additional module prosytel for prosys/2 offers the possibility to transmit predefined alarms that occur via sms or e-mail to the responsible staff member.

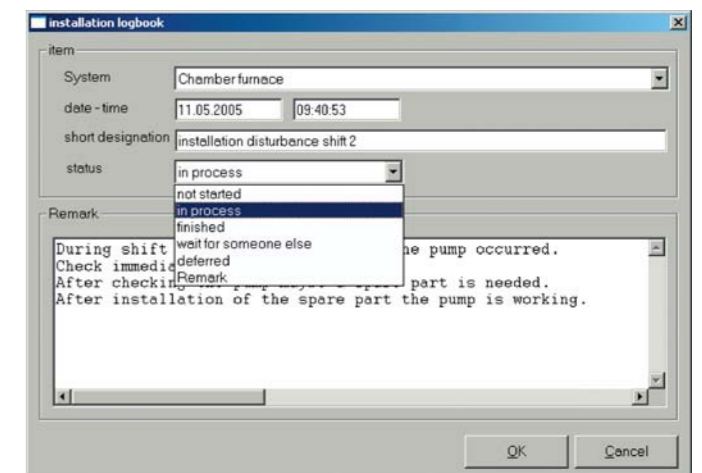
The alarm texts may be allocated to single employees or groups of employees. Using a calendar, periods of responsibility may be fixed.



Measurement Diagram



Diffusion Simulation



Installation Logbook

prover/2 The Automation Solution

For all automation tasks, project-specific solutions are compiled in the program prover/2 by our engineers. Here, standardized modules are used as a basis and then customized specifically for each customer. By doing so, low-priced solutions for all degrees of automation can be offered.

In the expansion of the process control system prosys/2 with an SQL-compatible data base, production data are available on-line at any time, so that all divisions of the company can receive necessary information, transfer data or even directly influence the process.

Concepts

Module 1: Charge/Product Tracking (with Component Part Tracking)

In the basic version, the flow of material is recorded at the charge level. With this charge tracking, basically two kinds of charges are differentiated. They result from the kind of installation charging or from the material flow through the installation. Hence there is a distinction between real and virtual charges. In the expanded version, the size of the trading unit can be changed during the treatment. This goes to such lengths, that ultimately individual parts can be tracked on their way through the installation.

With installations with more than one zone (usually continuous band or continuous flow installations), an optional zone-oriented setpoint can be carried out.

- **Real Charges**
Concrete charge packets (mostly on charge transporters or grids) in defined positions.
- **Virtual Charges**
Abstract charges, which are distributed on several concrete or virtual positions, such as through distributing the heat treatment product on a band.

demig Härterei GmbH Industriestr. 99 - D-57076 Siegen Tel. +49 (0)71 12345 - Fax +49 (0)71 123456			prosys/2 by demig
Production Report			
Order-Data			
Order-No.: 9876543 -01			
Charge-Data			
Charge-No.: 030508002 HT-Cycle-No.: 2590 Grid-No.: 014			
Heat Treatment-Data			
System	Process Program	Measurement File	
Washer 1	1	03050803.ST1	
MZK 1	PRG0001	03050901.ST1	
MZK 1	PRG0001	03050901.ST2	
Washer 1	2	03050902.ST1	
Tempering Furnace 1	19090	03050901.ST1	
Sequence-Data			
System	Entry	Exit	
Line-Entry (Pos. 20)	08.05.03 12:58:53		
Balance 1	08.05.03 13:01:00		
Washer 1			
Washer 1			

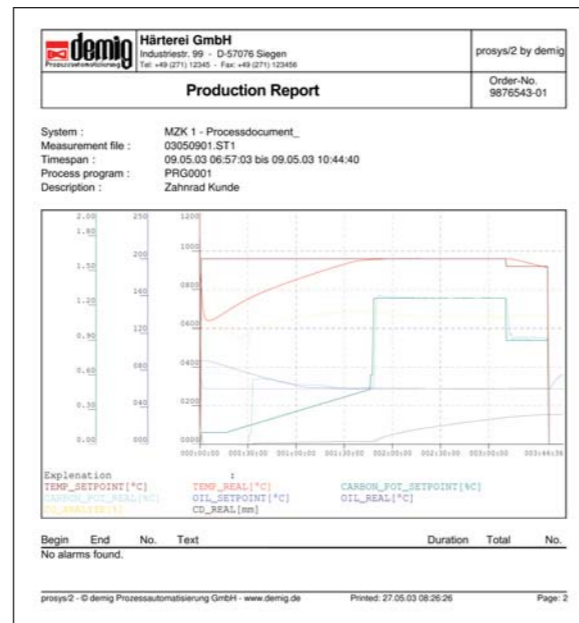
prover/2 is the user interface for the expanded automation tasks, based on an SQL Database Management System:

- Creation and management of heat treatment cycles
- Charge tracking and charge-related process data recording
- Generation of transport commands for an automatic operation
- Test data acquisition

Module 2: Charge-related Process Data Recording

This module is closely associated with the charge tracking. Because of this charge relation, there are also two different principles.

- **Real Charges in Periodically Working Installations**
Depending on the installation where the charge is currently treated, a measurement file is created and the charge allocated. If the charge goes through several installations successively, then such a file will be created and allocated each time. This process can be repeated as many times as needed.
- **Real and Virtual Charges in Continuously Working Installations**
All process variables are recorded first in a central pool. Because of the charge tracking, the system knows the time when the charge was treated in the different installation sectors. From this information, a measurement file will be created to which the charge will be allocated when leaving the installation.



Module 3: Transport Command Generation for the Automatic Loading and Unloading of the Installation

The logistic is based on the information from the charge tracking. For a fully automatic system, the process control system has the ability to generate transport commands for the transport unit (loader, manipulator, shuttle etc.) based on the disposition to load and unload. For the transport command generation there is also an additional option for the time optimized usage of pre-heating furnaces. Likewise, an empty grid management can be integrated, where the empty grids will be taken back to the magazine store and then be managed by the system. The user can request that an empty grid be loaded at any time.

Module 4: Data Preparation and Provision for Superordinate PPS-Systems

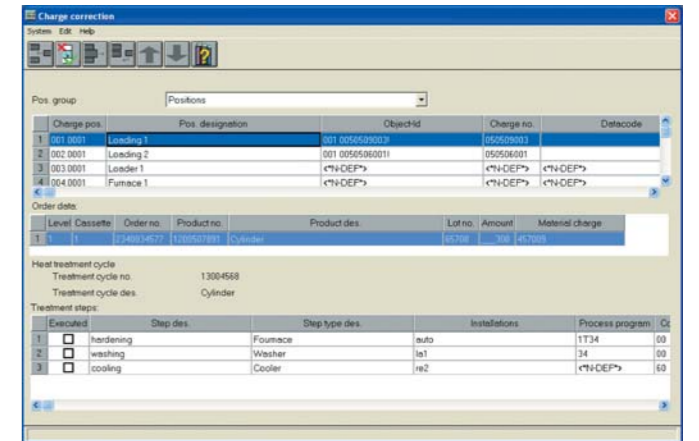
In many heat treatment companies, an administrative system such as the administration management system (ams) is installed in addition to the technical control system. With this system, the production planning tasks as well as the order tracking and the calculation are realized. Therefore the process control system provides the necessary logistical data (charge position, installation's occupancy time etc.), as well as the process documentation for quality verification. Data created during the production planning may be received from the process control system in order to treat the material with the determined programs/recipes.

Module 5: Test Data Acquisition with Deviation Evaluation

This supports the modeling of a test run from individual test steps, which are defined in a test provision, as well as the data to be collected. The processing of these steps and thus the collection of the data are activated by the starting of an inspection order. At the end of such a test process is the evaluation of the determined data, which is supported by the system by an evaluation of the tolerance limits and the color distinction of values within and/or outside of the tolerance.

The result of the test - the release or sealing and/or the scrapping of the parts - can then be acknowledged by the control system. Therefore a continuous linkage of both the process data as well as the test data of a charge is possible.

- Flexible configuration of the inspection criterion and tolerances
- Continuous linkage of the charge, sample, test value and test result
- Data acquisition forms with information about open test sections
- Automatic evaluation of the collected data
- Individual layout adjustment and export interface
- Automatic generation of a test order in the charge tracking



Charge Correction

Specimen from		Carburization charge 041026002, Grid 3		Material test	
Grinding no.	6			Martensite factor 1	1,1
Test part no.	6			Martensite factor 2	1,1
Hardness test		Acquired 09/06		Carbide factor 1	5,3
Hardness factor 1	0,5 HV1	Hardness factor		Carbide factor 2	3,1
Hardness factor 2	500 HV1	Hardness factor		Residual martensite factor 1	4,2
Hardness factor 3	500 HV1	Hardness factor		Residual martensite factor 2	4,2
Hardness factor 4	500 HV1	Hardness factor		Flux factor 1	5,8
Hardness factor 5	550 HV1	Hardness factor		Flux factor 2	5,8
Material test		Acquired 09/06		Flux factor 3	5,8
Martensite factor 1	5,1	Carbide factor			
Carbide factor 1	3,1	Martensite factor			
Martensite factor 2	1,1	Residual austenite			
Residual austenite factor 1	4,1	ROX factor 2			
ROX factor 1	6,0	ROX factor 3			

Test data acquisition

