Under Control.

WTCS

Wind Tunnel Control System

Distributed Supervisory Control Integration Platform

WTCS is an open system platform that achieves integrated solutions for test bed control with regard to both hardware and software. In order to maintain high performance, the software can be distributed to multiple computers on the network, thereby safeguarding easy expansion of computing capabilities. A sophisticated redundancy concept makes sure of high availability and data safety.

The network-based communication scheme of the client/server architecture does not impose any limitation on the number of workstations for operators, customers, administrators and technicians.

In equal measure, any number and type of subsystems can be connected to the system. Owing to the open interfaces, exchanging wind tunnel components or expanding the overall system is easy to do. WTCS is ready for integration into enterprise-wide test process management or data archiving systems.

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Integration platform for wind tunnels

WTCS is a modular platform for test bed control systems consisting of core modules and customer-specific extensions. The core modules provide standard functionality, which is independent of specific applications and enables configuration, operation and maintenance of the test bed:

- Management of tests and measurements
- Configuration management
- Standardized subsystem integration
- Full manual control of the test bed
- Automatic test sequencing
- Centralized data storage
- Online data distribution
- Online calculations (math library)
- Online and offline data visualization
- Process data acquisition
- Test process integration

Combining the core modules' flexibility with the options for modification and extension makes the facility fit for the future. The most common customizations include individual visualizations of test bed schematics, interfaces to proprietary devices or specialized math functions to expand the standard libraries. Typical custom-specific modules are:

- Offline test preparation
- Customizable analysis functionality
- Configurable report generation
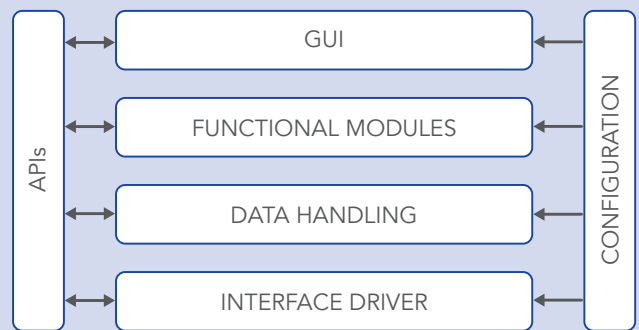
WTCS capabilities

Subsystem Integration

Open interfaces enable integration of simple to intelligent measurement and subsystems. A hardware abstraction layer allows adding or dynamically exchanging subsystems without changing the overall system. Standardized communication via TCP/IP or data block access to S7 PLCs enables configuration of subsystems using guided dialogs. Industrial bus systems like CANBus and deterministic links via EtherCAT are supported as well as direct analog or digital input and output modules. Status and configuration information, measured data and commands are exchanged. WTCS collects result files from the subsystems. The subsystem drivers also enable manual control of a subsystem.

Data acquisition and distribution

Acquired data and data documenting the test execution are accessible in WTCS. For parameter coupling and interlocks, data obtained by one subsystem can be distributed online to other components.

Test and configuration management

WTCS offers full control over all test bed settings and run maps. For each execution of a session run maps, setups and devices under test can be assigned. Configurations are stored for reuse in a database ensuring traceability and reproducibility.

Test execution

The core sequencer features a comprehensive set of steps. Run map validation ensures compatibility with the facility setup. An advanced sequencer allows complex procedures with parallel processes and branching as well as automated background processes like preconditioning. WTCS standard interfaces even enable users to integrate their own specialized sequencing tools.

Visualization

A homogeneous user interface of generic dialogs is readily available without customization to configure, operate and monitor the test bed. User-configurable graphical visualizations can easily be created from templates for detailed layouts for subsystem control, test bed schematics or configuration dialogs. Of course, such customizations are also part of the services we offer. Administrative dialogs monitor all processes and states and allow re-configuring the software to adjust to changes of the system.

Data management

Raw and meta data as well as statistical values can be supplied in various file formats. WTCS synchronizes the timestamps of all subsystems and allows upsampling or downsampling of data. The data management ensures consistency of data and meta information, rights and roles, linking data to user groups and protect data from unauthorized access. Any parameter can be stored in a database for the long term or fault analyses.

Archiving

WTCS offers archiving of data either in WTCS or in the customer's existing infrastructure. Also a test process management system like HyperTest® can be connected to perform further processing of data in the context of a test project.

Mathematics and analytics

Derived parameters allow for the calculation of characteristic and statistic values, derived quantities or unit conversion by various functions and including quantities from multiple sources.

WTCS provides online analysis of data during and right after a test run. Comparing current and reference data sets is also possible. Automatic analyses at the end of a test step validate the test results. Integrated report generation promptly provides visual and documented feedback on the experiments.
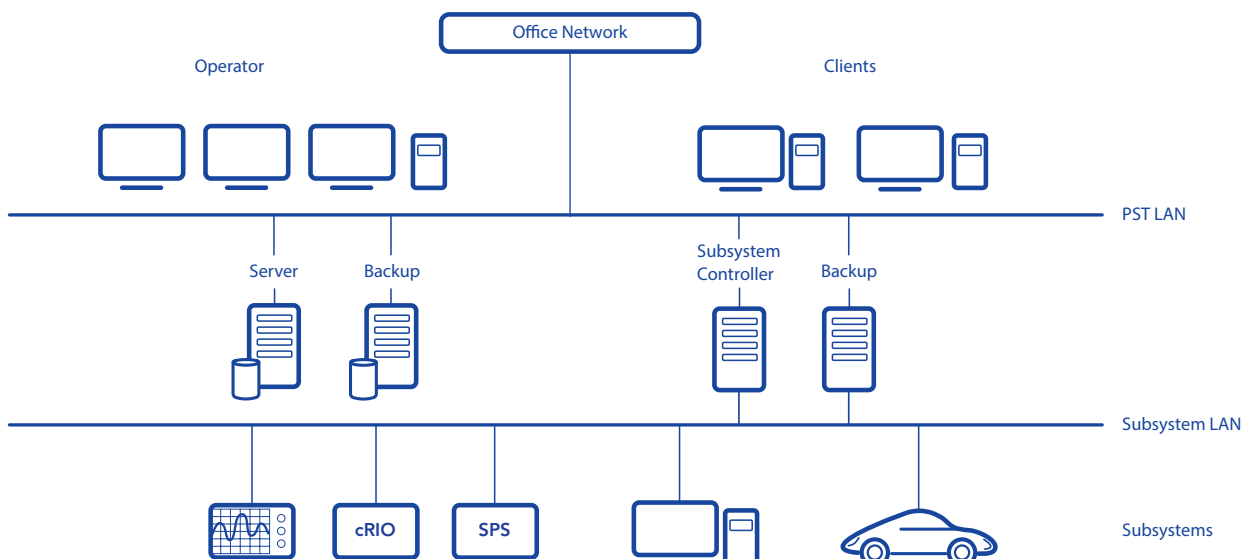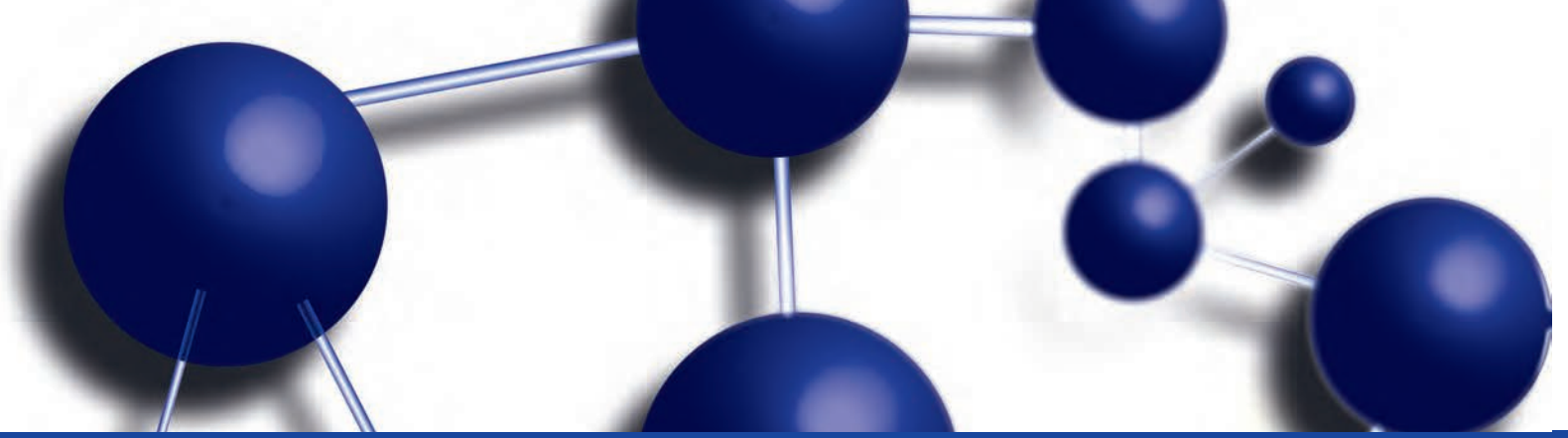
Test Processes
efficient and reliable

Modern products are calling for increasingly complex test and verification procedures in the course of their life-cycle. In the processes of developing and manufacturing innovative products meaningful test data have to be either simulated in the system or generated on the test bench before they are processed, analysed, evaluated and archived, for example for quality management purposes. Monitoring the test and measurement process is essential in equal measure in order to take early and adequate actions in case of problems, thus minimizing downtimes.

Smooth communication of data and information is one of the key factors for success in modern, globally operating enterprises. Structures are increasingly decentralized whilst the variety of customers and products keeps growing at the same time. Therefore, data and information are required to be instantly available with adaptable and efficient access rights control in place to protect them. What distinguishes successful enterprises is that their different divisions are interlinked by a network ensuring continuous data communication between them.

Treating testing as a holistic process is a key to success.

References

Audi AG

- Aeroacoustic Wind Tunnel
- Climate Wind Tunnel
- Thermo Wind Tunnel

BMW Group

- AVZ Aerodynamics Test Center
- EVZ Energy Efficiency Test Center

Volkswagen AG

- Aeroacoustic Wind Tunnel
- Climate Wind Tunnel

FKFS

- Model Wind Tunnel

Non-disclosed customer

- Aeroacoustic Wind Tunnel

Non-disclosed customer in motorsports and series vehicle industry

- Aeroacoustic Wind Tunnel
- Motorsport Wind Tunnels

WTCS at a glance

- Integration platform for all components of test facilities
- Centralized monitoring and control system
- Flexible test sequencing
- Management of tests and configurations to ensure traceability
- Well-structured data management
- Strict access control
- Distributed system
- Hardware off the shelf
- Standard interfaces / API
- High system availability and high data throughput

About Werum Software & Systems AG

With a workforce of over 130, Werum Software & Systems AG is one of the largest independent employers for IT professionals in Germany. For more than 50 years, Werum has been implementing sophisticated software and systems for customers all over the world, among them many renowned companies from the automotive and aerospace industry as well as scientific institutions and public authorities.

Werum's activities focus on the support of customer-specific processes in the core areas of test data and information management, earth observation, eGovernment and enterprise information management. The software solutions are based on platforms specially developed for these areas.

Diversity, reliability, flexibility and fairness are part of our philosophy and create the basis for sustainable customer relations. Werum offers its international customers well-founded application know-how as well as the knowledge and experience gained in many years of implementing most diverse projects and IT solutions. Already in the run-up to project implementation Werum assists customers in advisory capacity with regard to any IT-related aspects of the specific task setting. Long-term mainte-nance audi servicing of the solutions supplied are a matter of course for Werum.

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