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ZF Test Systems
Wind power transmission test rigs

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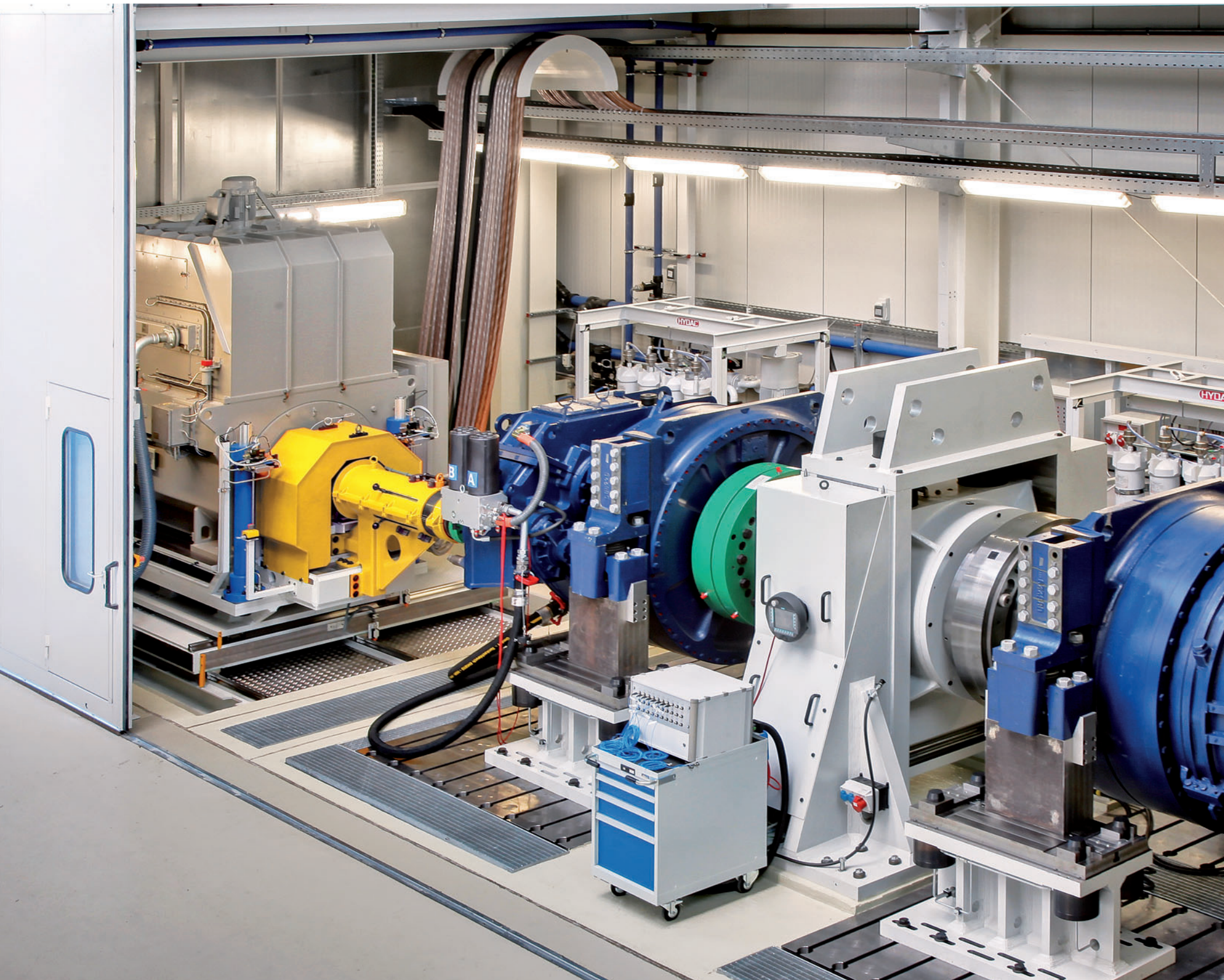
With Energy.

IT / Windpower 2010 / E



Driveline and Chassis Technology

ZF innovation: Wind power transmission test rig



ZF Test Systems, the independent system supplier for test systems, is offering test rigs for wind power transmissions as turnkey whole facilities with CE-marking, thus obviating any safety risks and customer's need for expensive interfaces.

Decades of experience and know-how gained in the production of development and series test rigs for vehicle and industrial transmissions in the high power range provided an excellent basis for getting quickly and successfully established in the wind power market.

ZF wind power transmission test rigs are used for research and development as well as for series production and service.

Testing functions of development test rig

- Endurance strength
- Overload behavior
- Efficiency
- Service life and wear
- Temperature behavior
- Structure-borne noise
- Air-borne noise

Testing functions of series/service test rig

- Function
- Run-in test under load application
- Noise
- Cleaning of oil circuit

4 MW wind power transmission test rig
with damping foundation and noise protection cabin

Advantages of the ZF wind power transmission test rigs

Power input

Because of the electric twist principle, power input is only required for losses and dynamic procedures.

Flexibility

Highly flexible adaptation of motor and generator unit to test unit geometries.

Output

A back to back arrangement of the two test units allows parallel test sequences.

Tooling times

The automatic clamping concept reduces tooling times to a minimum.

Fixtures

Individual combination of test units with a minimum of fixtures required.

Test results

Special test unit fixture as a basis for reliable test results close to reality.

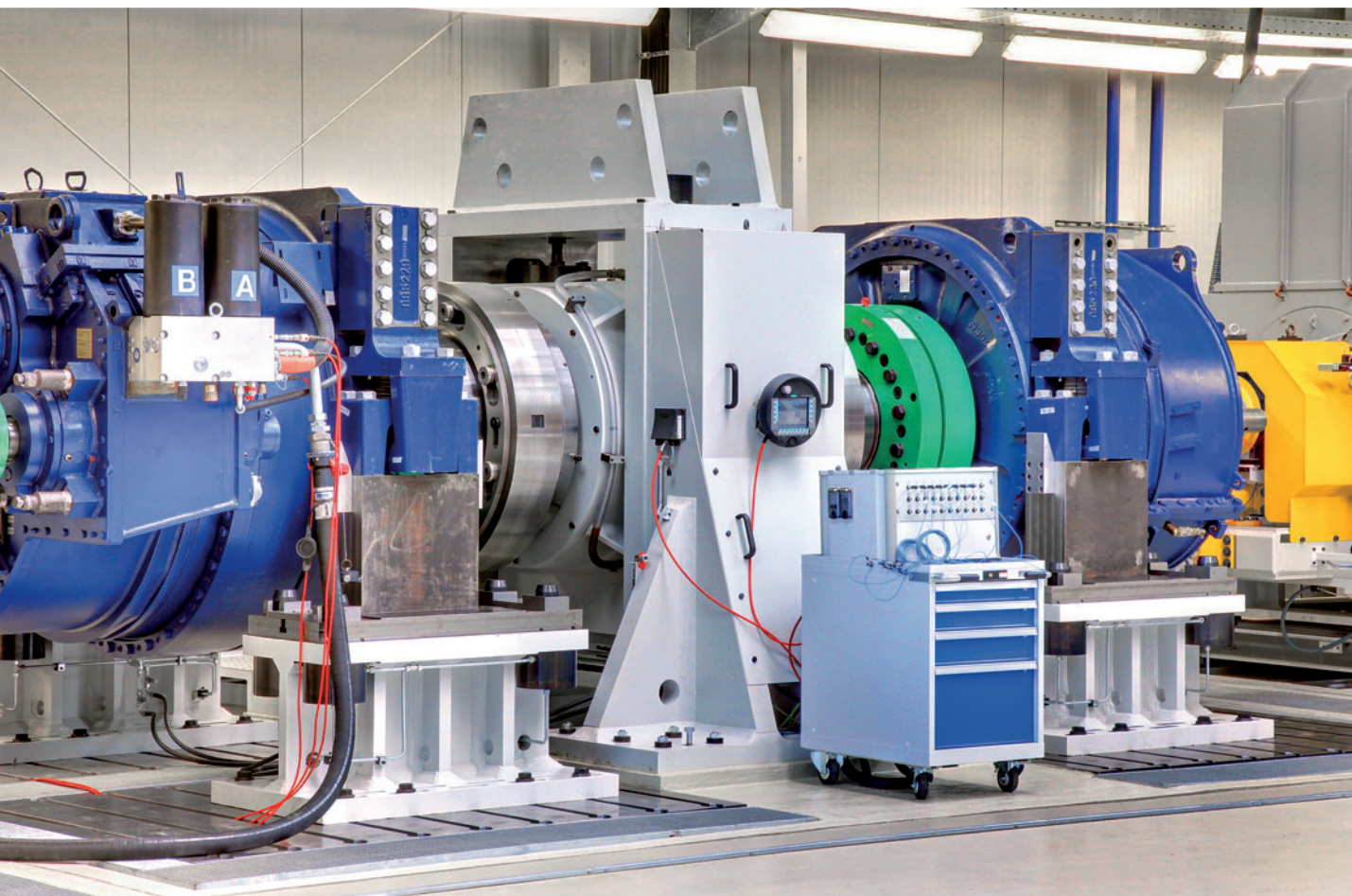
Acoustics

Acoustic measurements during speed run-ups with extensive evaluations, for example order analyses, produce comprehensive "acoustic finger prints".

Automatic mode

Automatic test sequences guarantee reproducible measuring results.

Test run in back to back arrangement



Drive technology

Great movements with little energy

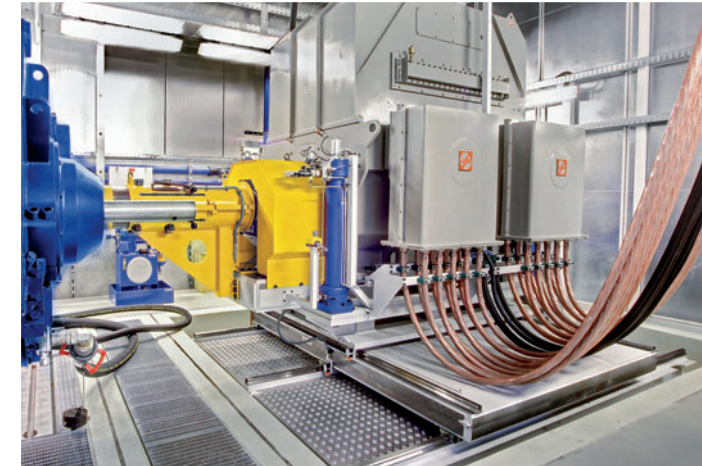
Depending on the test unit power, drive systems are designed in the low and medium voltage range.

The connection of the inverters on motor side via voltage intermediate circuit makes energy exchange of motor and generator possible, as a consequence allowing low power input.

Thanks to an active power supply unit a nearly sine-shaped current is taken from the mains and generator energy is supplied back into the mains.

Drive system

- Low and medium voltage design
- Energy compensation via voltage intermediate circuit
- Power connection by active power supply unit
- Use of standard and proven technologies and components



Measuring technology

Visible quality

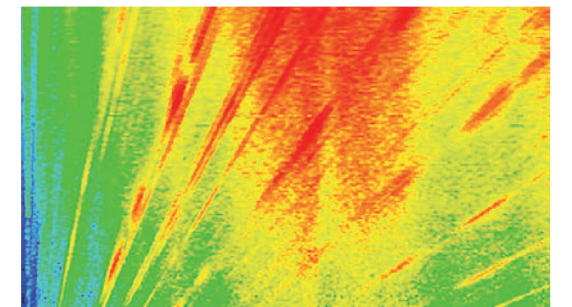
The applied testing methods meet the high quality standards applicable in the automotive sector.

Besides conventional measuring technology, oil pureness is measured, and acoustic measurements are made with extensive evaluations like FFT- and order analysis.

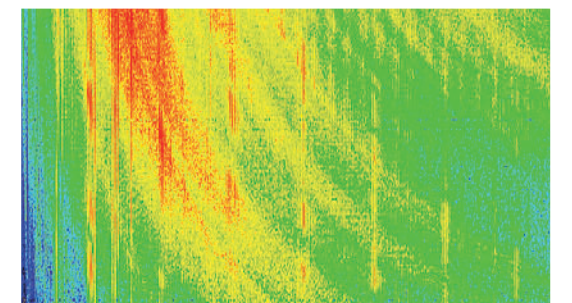
High-resolution, dynamic and modularly scalable signal conditioning permits versatile real-time analyses, from standardized tasks right through to highly complex ones, even for automatic test operation.

A consistent collection and archiving of all testing and test unit data ensures traceability of the test results for later analyses.

System supported calibrations and evidences of measuring capability ensure a return to the international normal.



FFT-evaluation of a body sound measurement



Order analysis of a body sound measurement

Automation technology

Complete control

The wind power transmission test rig is controlled, configured or maintained by the standardized self-explanatory visualization and operating system ZF-ATOS. Various control modes are available for these purposes.

Modular generation and flexible configuration of automatic test sequences is possible with the automation tool ZF-MODAS.

A safe and reliable future is achieved due to the use of mainstream and standardized components.

Data management

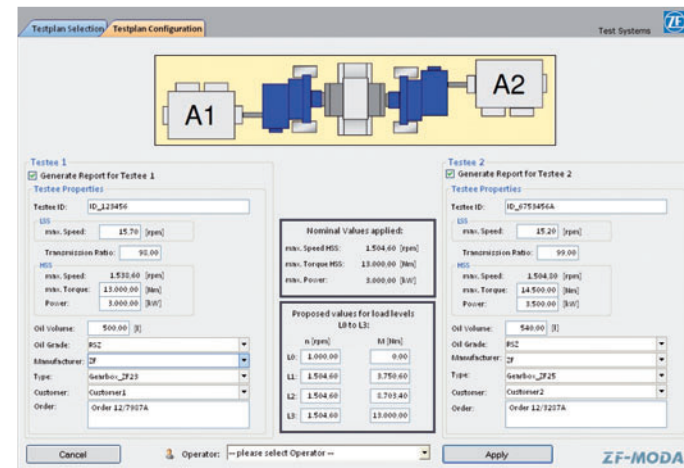
- Test rig configuration
- Test unit data
- Flexibly configurable test sequence
- Evaluation and test reports
- SQL data base
- Data exchange with customer network

Test rig control

- Control modes Service, Setting-up, Manual, Automatic
- Intuitive operation
- Real time system
- State-of-the-art control technology
- Main adjustments via servo axes



User interface ZF-ATOS



Test run parameterization ZF-MODAS

Lube oil supply

Detecting contamination

Availability of wind power transmissions stands and falls with the fluid technology. It is therefore extremely important to apply the right quantity of the right oil on the test unit.

The test units are flushed with lube oil both without load application and at various load levels, thereby generating the contamination class specified by the customer. The process is being continuously monitored by special sensors.

The lube oil, which is heated up due to loss of efficiency, is conditioned by suitably dimensioned oil-water heat exchangers, thus ensuring constant oil flow conditions.

Modularity

Unlimited scope

Extension options of the basic configuration

X-Y-adjustment of motor-generator units

- Individually selectable adjusting travels
- Programmable position

Z-adjustment of motor-generator units

- Adjustment by customer's crane
- As an alternative, automatic adjustment with programmable position and automatic clamping

Lifting device with bearing

- For test unit fixture at optimum tooling time
- Hydraulic clamping design
- Test unit fixed in the test rig close to the real installation situation

Extended tooling concept

- Separate tool-up and tool-down stations
- Parallel lube oil filling and discharge
- Dislocation of pretests
- Increase of output

Damping foundation

- Conceptual design and dimensioning tailored to customer's specifications
- FEM-analysis
- Project specific definition of media routing in the foundation

Cooling water

- Cooling water available on primary and secondary side

Mains connection

- Energy distribution with transformers and medium and low voltage distribution
- Customer and location specific version
- Clarifications with the corresponding electric power company

Sound intensity measurement

- Test unit assessment via airborne sound
- Particularly tuned pair of microphones
- Scanning of test unit

Noise protection

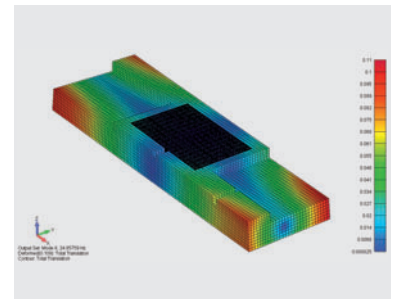
- Turnkey noise protection concept



X-Y-Z-adjustment of motor-generator units



Lifting unit with bearing



FEM-analysis on damping foundation



Noise protection cabin with sliding doors