

Miba Bearing Boosting Limits with Slide Bearing Technology

Bearing Show, September 7th, 2022
Falk Nickel, Head of Technology Competence Center



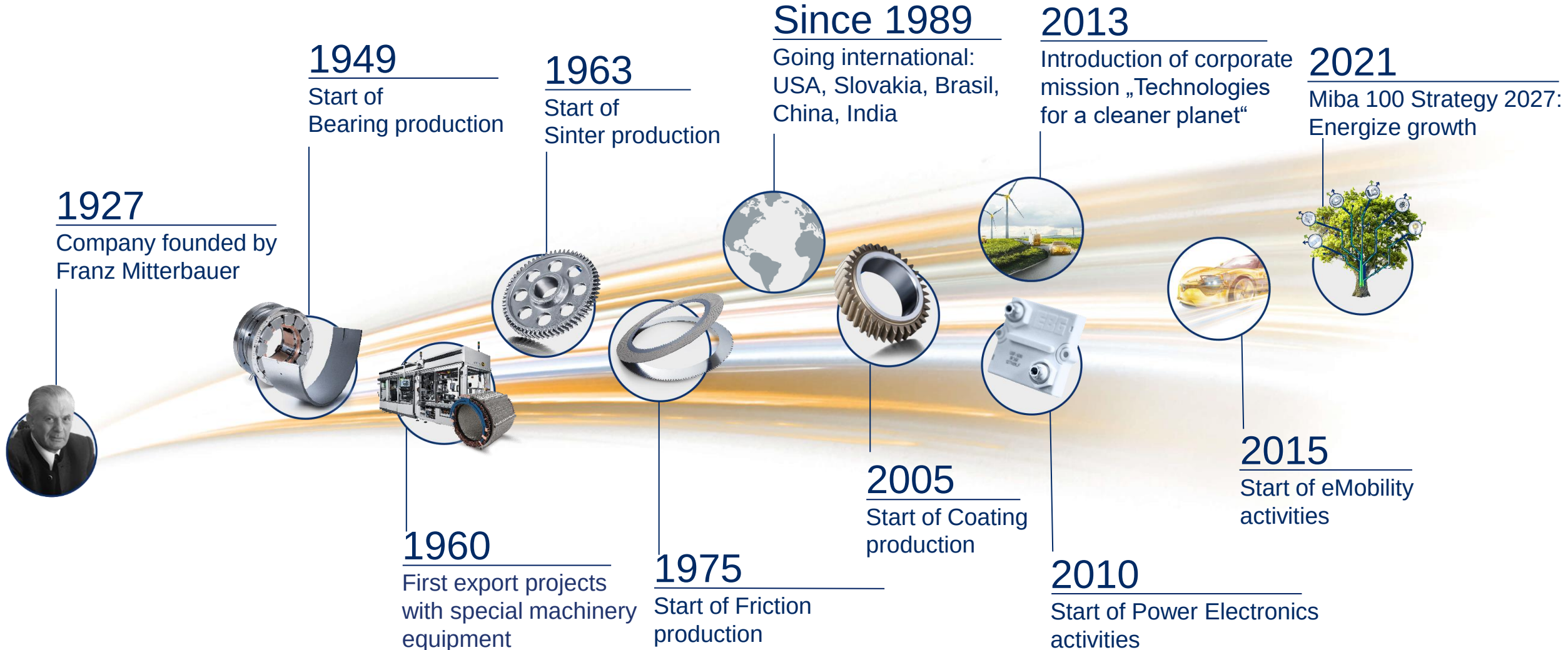
- Introduction of Miba
- Opportunity of Miba Slide Bearing Technology
- Miba Bearing Technology
- R&D Approach
- Application Highlight

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History of Miba

As a family-owned business, we stand for long-term orientation

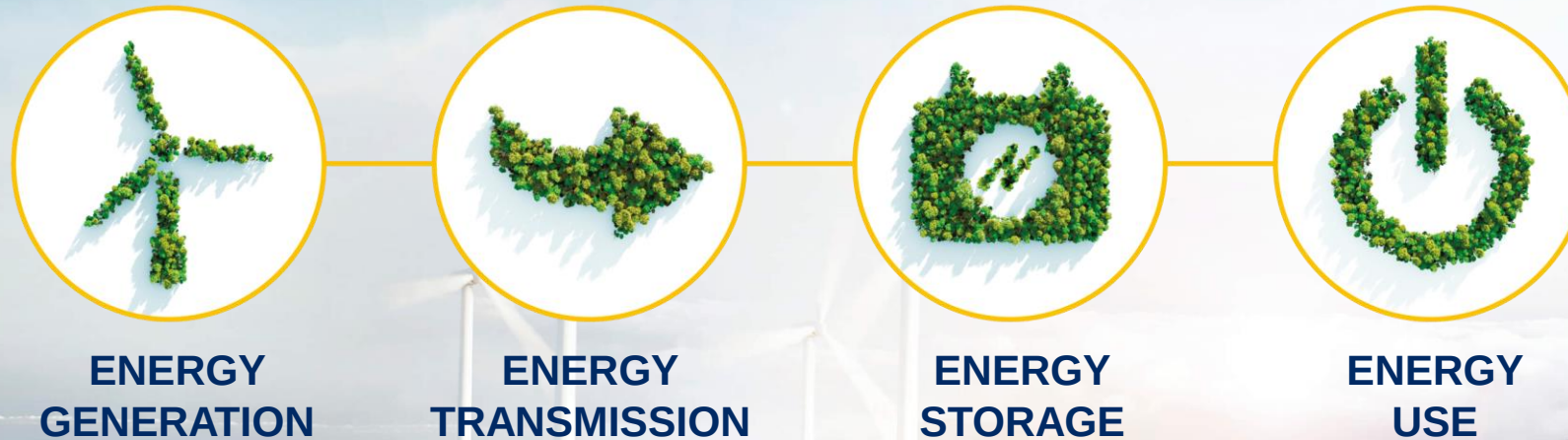


Our vision

Miba technologies along the entire energy value chain



NO POWER WITHOUT MIBA TECHNOLOGY



Our vision

Miba technologies along the entire energy value chain



ENERGY GENERATION

WIND POWER

SOLAR ENERGY

HYDRO POWER

GAS UND DIESEL GENSETS, TURBINES

FUEL CELLS



ENERGY TRANSMISSION

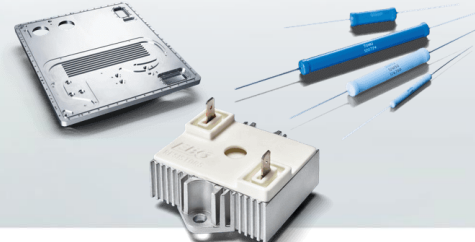
EFFICIENT ELECTRICITY
TRANSMISSION

(e.g., high-voltage direct current (HVDC)
transmission / medium voltage direct
current (MVDC) transmission)

SMART GRIDS
(intelligent network and control of
power grids)

COMPRESSORS AND PUMPS

COMPONENTS FOR CHARGING
INFRASTRUCTURE FOR ELECTRIC
VEHICLES



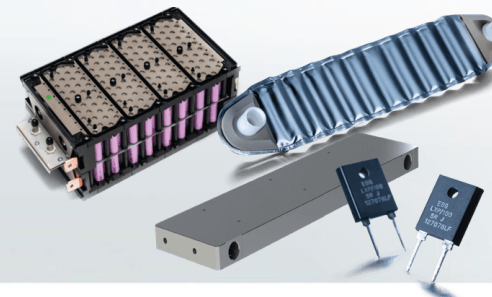
ENERGY STORAGE

BATTERY SYSTEMS AND
MODULES

BATTERY COOLING SOLUTIONS

POWER SAFETY DEVICES
FOR BATTERIES & FUELL CELLS

COATING SOLUTIONS
FOR BATTERIES



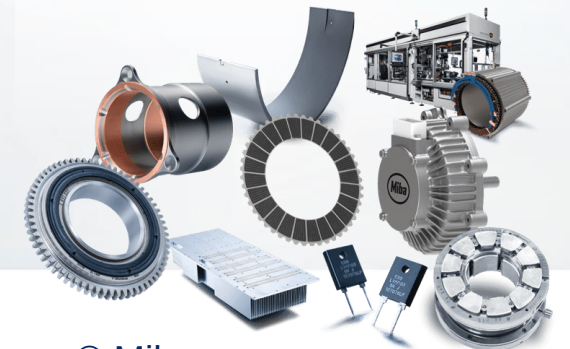
ENERGY USE

HIGHLY EFFICIENT POWERTRAIN
TECHNOLOGY:

- CONVENTIONAL DRIVES
- HYBRID DRIVES
- FULLY ELECTRIC DRIVES

VEHICLE APPLICATIONS OUTSIDE
THE POWERTRAIN
(e.g. auxiliary drives)

INDUSTRIAL APPLICATIONS



Financial strength and independence

to shape the future

971

Revenue*

(in EUR million)

7,366

Employees

(as at Jan 31, 2022)

30

Production sites

(as at Jan 31, 2022)

401

Valid patents

(as at Jan 31, 2022)

83

Investments*

in property, plant & equipment
and R&D (in EUR million)

50.5

Equity ratio*

(in percent)

4.2

Research ratio*

(in percent)

67

Patent applications**

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Miba Bearing Core and Future Products



Core Products

Engine Bearings

are used in connecting rods, crank- and camshafts in diesel and gas engines of heavy-duty commercial vehicles, locomotives, power plants and ships.

Industrial Bearings

are used in turbomachinery applications such as turbines, compressors, gearboxes, generators, and industrial pumps.



Future Products

Slide Bearings for

- Aerospace Turbofans
- Wind Turbine Rotor Main Bearings
- Wind Turbine Gear Boxes Planetary Stages
- Rail High Speed Train Bogies
- Challenging Low Friction Tribological Contacts
- ...MORE TO COME!



Slide versus Roller Bearing Technology

Application System Potential

Design to slide bearing opportunities instead to roller bearing limits

Opportunities

- **Increased Sliding speeds up to factor ~ 5**

Depending on load: up to 120 m/s for loads 5MPa; 50 m/s @ 20MPa loads

- **Load capability increase up to factor 3**

Depending on sliding speed: 100 MPa for 20-30 m/s

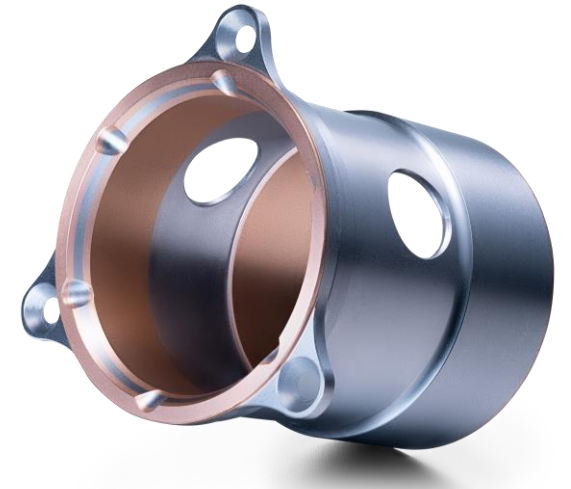
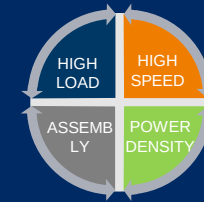
- **Power densities increase up to factor 10**

Resulting from combined load/speed scenario; see estimates above

- **Shock loading capability up to factor 6-8**

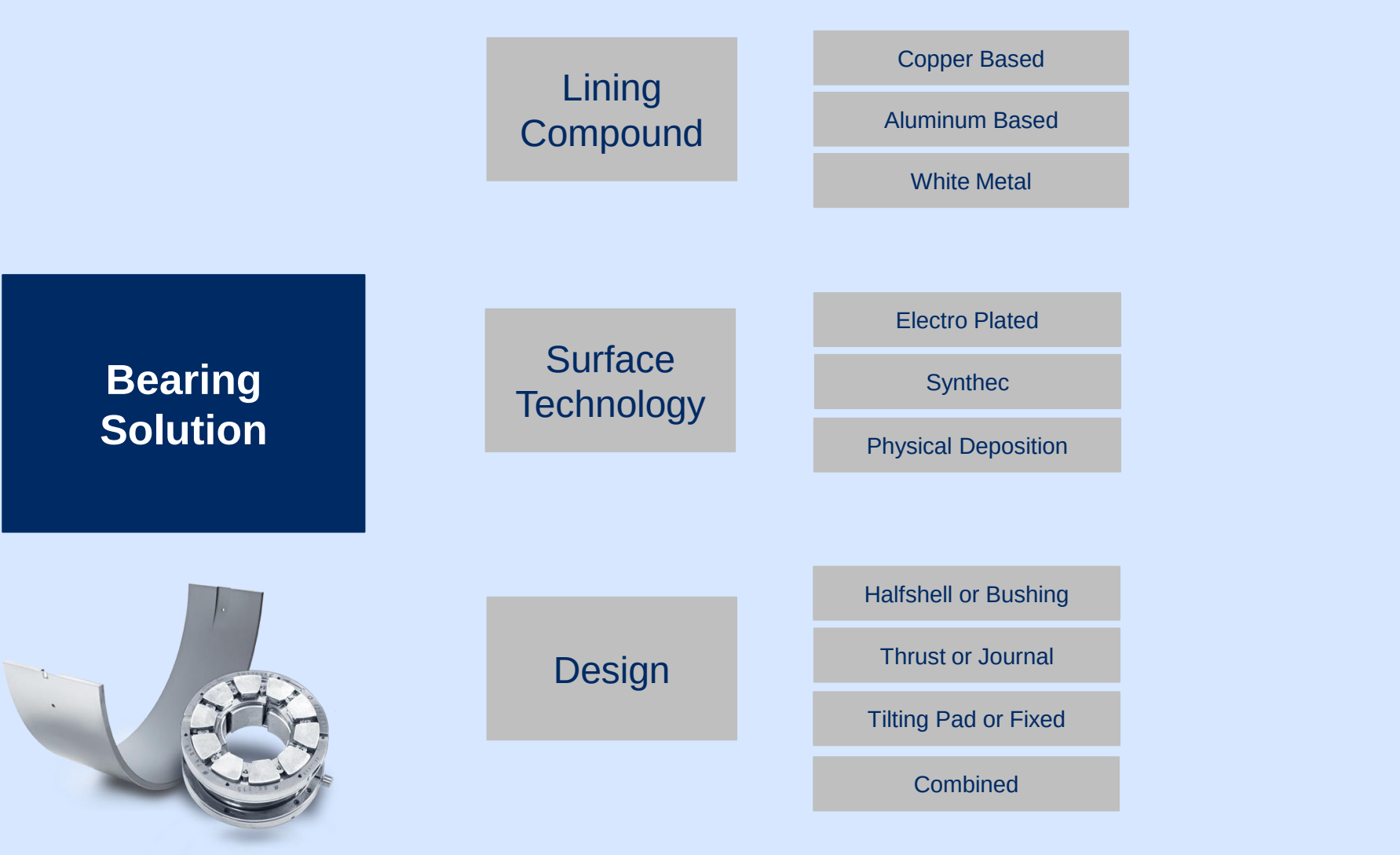
Dynamic loads up to 120MPa possible

- **Unlimited lifetime in hydrodynamic mode**
- **Easy assembly**
- **Noise reduction**



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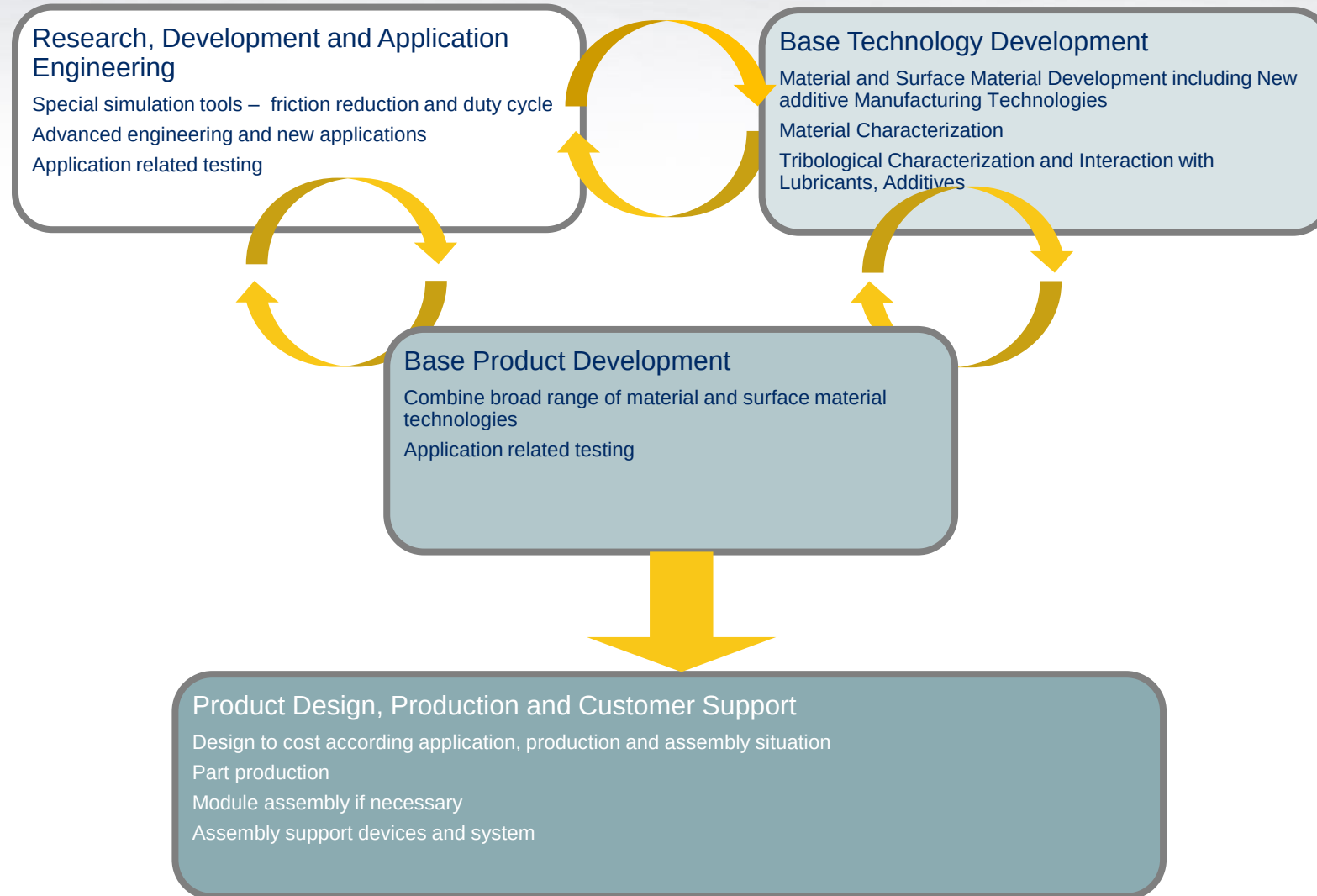
Broad Technology Capability for Tailored Solutions

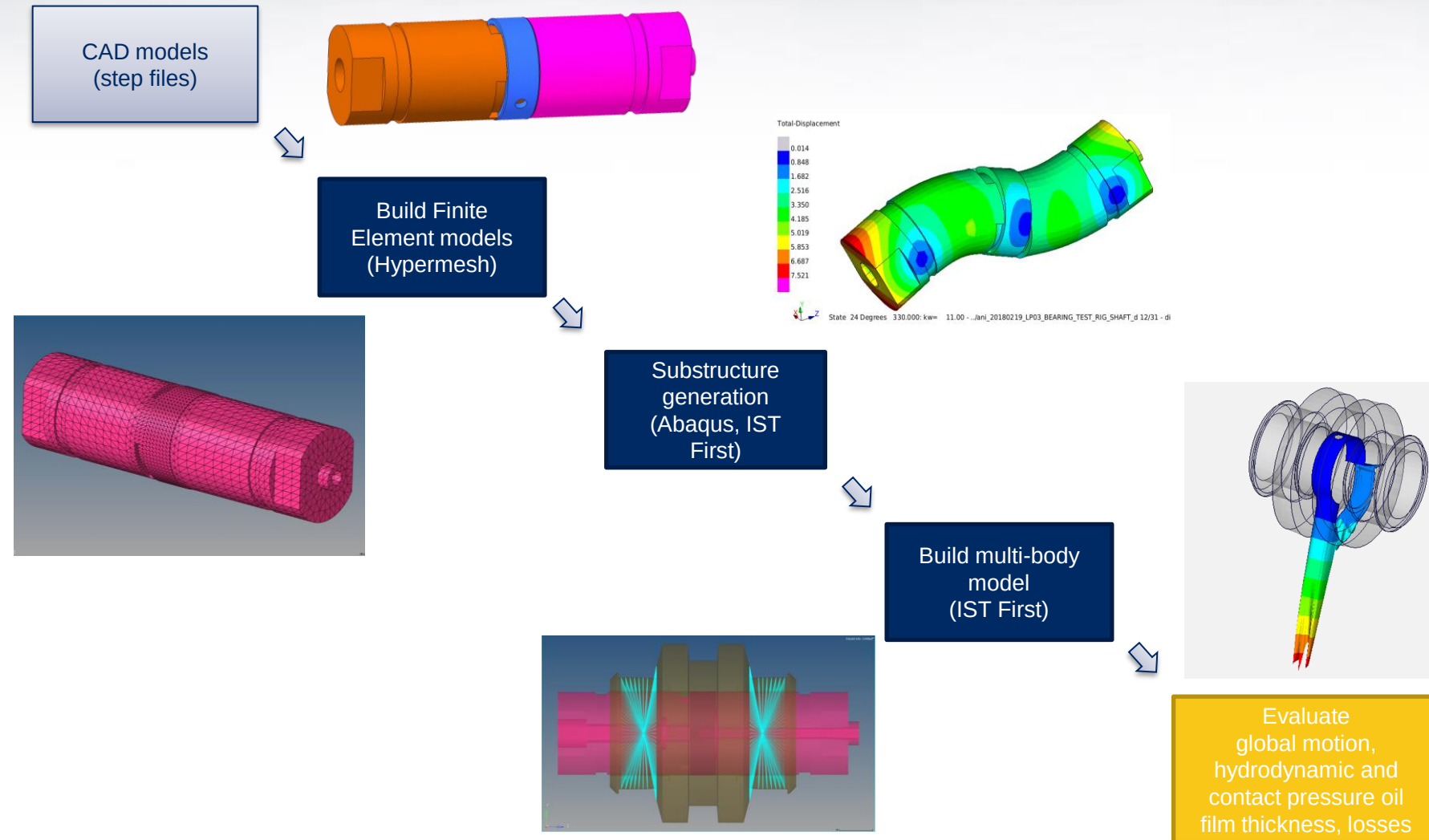


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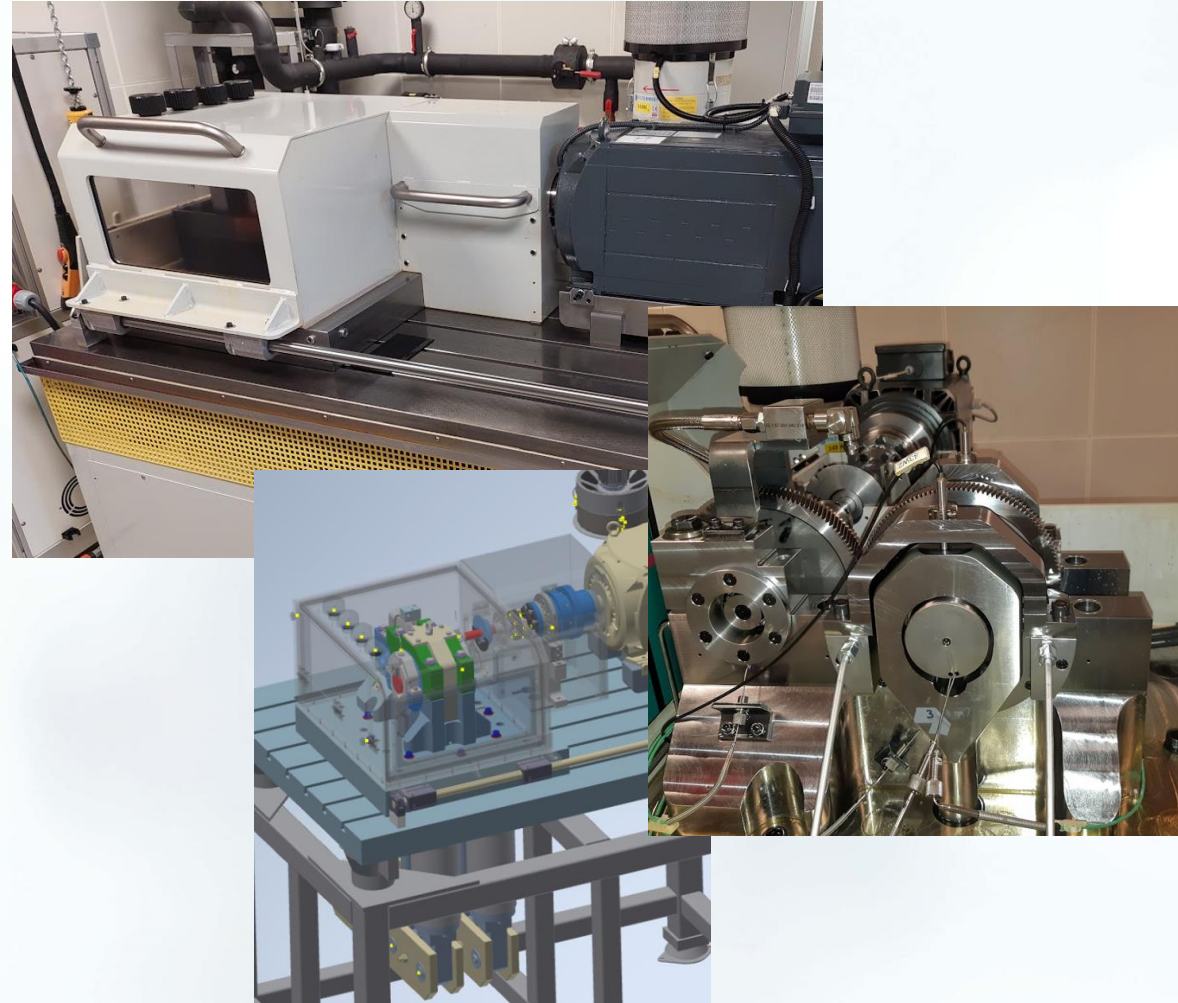
Comprehensive Engineering Approach by leading Experts and Toolchain





Test Center

- Wide range of high performance test machines to replicate the individual application load profiles
- Failure mode testing like dirt, misalignment, high temperature
- Simulation validation



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Wind Power Planetary Gearbox Slide Bearings

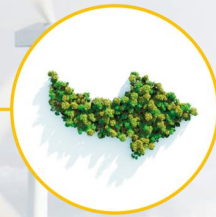


- Steel Aluminum bushing fixed to the planetary gear pin
- In serial stage with various customers in Europe and China

TECHNOLOGIES FOR A CLEANER PLANET



**ENERGY
GENERATION**



**ENERGY
TRANSMISSION**



**ENERGY
STORAGE**



**ENERGY
USE**

