Advanced CAE tools and engineering expertise for Wind Turbine Transmissions

the people behind unique transmission design, development and manufacturing
for transmission design and analysis

Smart Manufacturing Technology (SMT) is a world-leading supplier of advanced CAE tools and process & engineering expertise for the design, analysis and development of complete driveline systems.

MASTA is the leading CAE environment for the complete and integrated design, simulation & optimisation of advanced wind turbine transmission systems from design concept to manufacture.

DESIGN
• Cylindrical gear design
• Complex planetary gear set design
• Gear macro geometry database
• Comprehensive database of bearings & bearing types
• Flexible bearing rings
• Bolts to VDI standards
• Detailed shaft modelling including stress concentration factors for fillet radii, cross hole grooves, etc.
• Import CAD for shaft profile design
• Splines & other couplings
• Planetary flexible pin design technology

COMPONENT ANALYSIS
• Durability analysis for gears, bearings, shafts & splines to international standards
• Detailed internal load distribution & stress results for individual bearing elements
• Shaft fatigue and stress analysis
• Detailed calculation of gear TE, root stress & contact patch
• Flexible pin & planetary load sharing analysis

SYSTEM ANALYSIS
• System NVH & system dynamics
• Efficiency & power loss analysis
• Import FE models of shafts and complex housings to increase the accuracy of gear & bearing misalignment predictions

OPTIMISATION
• Minimise system deflection including the effects of non symmetric components
• Minimisation of transmission error
• Automatic optimisation of:
  • Gear tooth macro-geometry for strength or NVH
  • Gear tooth root geometry for strength
  • Gear tooth micro-geometry for contact pattern & TE
• System optimisation for NVH
• iSight interface for multi-parameter global optimisation

CERTIFICATION
• Results output can be used to confirm ISO & GL certification requirements have been met for the design

MANUFACTURING ANALYSIS
• Optimise cylindrical gear cutter profile for maximum gear bending strength
• Cylindrical gear hobbing, shaping, shaving & grinding process simulation to predict gear quality
• Spiral bevel & hypoid gear tooth flank simulation & optimisation
• Spiral bevel & hypoid gear machine setting & cutter simulation
• Design for 6 Sigma
Engineering support services

SMT engineers are experienced in the design, optimisation and testing of gearboxes for wind turbines and have previously designed numerous gearboxes up to 7MW for a range of international gearbox manufacturers.

SERVICES INCLUDE:
- Concept design & feasibility
- Detailed transmission design & analysis
- Power density improvements
- Gearbox weight & cost reduction
- NVH troubleshooting
- Gear and transmission manufacturing process optimisation
- Test lab planning and test rig design
Key benefits of using MASTA include:

- User-friendly interface
- Powerful design tools & analysis capabilities in a fully integrated CAE environment for the accurate and rapid design of transmission systems
- Full-system simulation of any transmission system configuration to provide an accurate prediction of gear, bearing & shaft rating taking into account misalignment
- Comprehensive gear tooth contact pattern & root stress analysis & optimisation
- Accurate prediction & extensive reporting of loads, stresses & transmission errors
- Rapid prediction of key performance characteristics enabling the identification & correction of potential failure modes early in the product development cycle
- Customised reporting of design & analysis results
- Provides a virtual testing environment throughout the design process from concept to production
- Integrated gear manufacturing simulation to reduce process development time & cost

- NVH analysis
- System deflection analysis
- Planetary load sharing
- Component analysis
- Drive train simulation
- Complex transmission configurations
- Planetary micro geometry & tooth contact optimisation
- Root stress analysis
SMT locations - worldwide

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