

## Virtual Engineering ... ... Engineering Services for Drivetrains

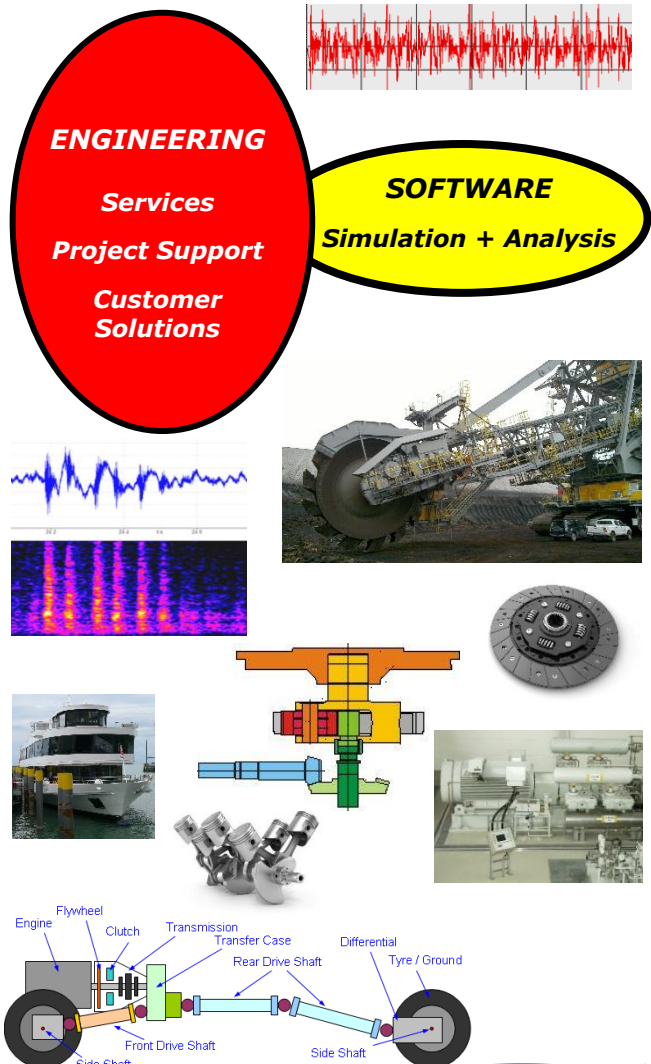
### Computer Simulation of Complete Drive Systems dedicated to Mechanical / Plant Engineering & Construction, Automotive Engineering, Shipbuilding

Customer-Dedicated Engineering Services to Analyze Torsional & Lateral Vibrations in Drivelines & Powertrains (Drive Systems)

Dr.-Ing. Andreas Laschet is specialist in computer simulation technology. Due to longterm experiences in the simulation of complete drive systems, he offers a professional customer-dedicated **CAE Service for Engineers** worldwide. I have personal wide expertise based on 40 years professional experiences. My customers are well-known OEMs and numerous suppliers from various sectors in the mechanical and plant engineering world. Furthermore there are excellent contacts and references in the domains of automotive, vehicle, aircraft engineering, and shipbuilding. In particular I have special experiences in the simulation of dynamic effects in test rigs and test stands including the comparison with test results and CAE models.

All my **engineering services and project works** contain a practice-oriented technical consulting at the time of research and development (R & D) which is part of the "**Virtual Engineering**" process. In addition to that I can help in case of real problems optionally with an appraisal of damages within a short time ("**Troubleshooting**"). This includes the elaboration of a suitable machine diagnosis concept which may be part of an effective "**Predictive Maintenance**" strategy – supported by external partners.

The engineering services I offer have been tried and tested in industry and in practice in order to identify solutions and optimize complete drive systems with regard to their dynamic behavior. One of the key targets of my engineering support is the minimization of **torsional vibrations** and also the study of further dynamic effects like **lateral vibrations** (or any other **rotordynamic effects in high-speed machinery**), or the special analysis and prevention of **NVH effects in automotive drivelines**. The analysis may also incorporate the tuning and matching of CAE models considering corresponding test results.



Customer Trainings  
Short Courses

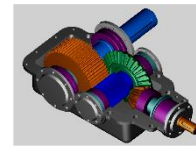


# Virtual Engineering for the Analysis of Drivetrains

To realize these ambitious jobs successfully I count on powerful **simulation tools** (like ITI-SIM, SimulationX, ARMD, own simulation software), but also on my own **long-term experiences**. What I can confirm as learnt from the past: **Engineer's brain is the most important "tool". Even powerful software cannot replace the engineer.**

## Applications of my CAE Engineering Services for "Drive Engineering" ...

- turbomachinery, extrusion machines, crushing machines, cement mills, machine tools
- compressors (turbo/centrifugal/radial, reciprocating, screw compressors) driven by E-motors, gas/diesel engines, turbines according to API standards (API 617, API 618, API 619)
- pumps, ventilators (fans, blowers) according to API standards (API 610, API 673)
- vehicle or ship drivelines with reciprocating engines, electric motors, hybrid drive technologies
- drive systems in the aircraft and aerospace industry
- complete drivelines with couplings, dampers, absorbers, clutches, gear stages, universal (cardan) shafts
- configuration of test stands (test rigs) incorporating measurement results
- fine tuning of prototypes to optimize the dynamic behavior



These are the typical subjects which I cover with CAE analyses:

- "**Torsional Vibration Analysis**" (TVA)
- "**Lateral Vibration Analysis**" (LVA) optionally with additional studies (in particular of fluid-film bearings) as part of a comprehensive "**Rotordynamic Analysis**" (RDA)
- simulation of NVH effects in vehicle drivelines (optionally with studies of sensitivity and target conflicts)
- application of different simulation methods (including CAE model matching):
  - a) **steady-state simulation** in the frequency domain for every operating speed
  - b) **non-steady-state (transient) simulation** in the time domain; study of nonlinear effects; startup

You may also request my list of publications (technical papers, books) and customer references.

Note: Measurements are offered and performed by external partners.

### Advanced Rotating Machinery Dynamics