



# Vibration Analysis ...

## ... Extended Engineering Services for Rotating Machinery

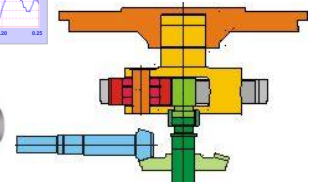
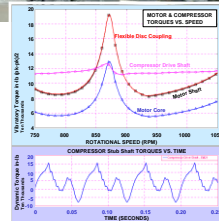
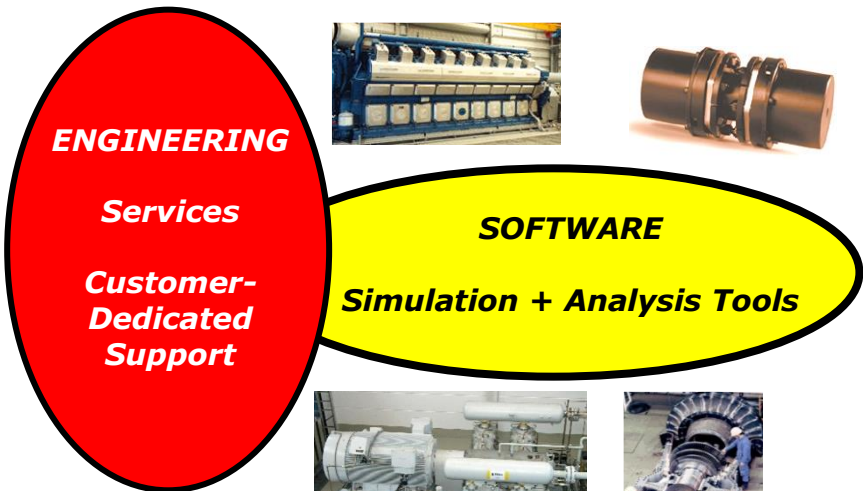
**Computer Simulation of Drive Systems (Drivelines) in Rotating Machinery Applications**

... dedicated to **Industry, Marine, Oil & Gas, Power Generation, etc.** – with the main focus on:

**DEVELOPMENT & DESIGN, SYSTEM RELIABILITY, CONDITION MONITORING, TROUBLESHOOTING, FAILURE ANALYSIS**

Laschet Consulting is specialist in computer simulation technology. Due to longterm experiences in the simulation of complete drive systems, we offer a professional customer **CAE Service for Engineers** worldwide including consultation, analysis, troubleshooting supported by computer simulation of **TORSIONAL & LATERAL VIBRATIONS IN ROTATING MACHINERY**:

- **Turbomachinery**
- **Compressors** (reciprocating, screw, turbo compressors)
- **Pumps, Fans/Blowers/Ventilators, Generator Drives**
- **Vehicle and Ship Drivelines** (with E-drives or all types of engines)
- **Drive Systems in Aviation & Aerospace Applications**
- **Drives with Couplings, Clutches, Gear Stages, Universal Shafts, E-Motors, Reciprocating Engines**
- **Test Rig Optimization** considering dynamic effects
- **Driveline Matching** crucial for design & troubleshooting (considering measurements, field testings, and machine diagnosis)



Our **CAE Service** provides the customer with a project-oriented analysis and interpretation of vibrations caused by external or internal excitation or parametrically excited disturbances. Nonlinear characteristics like backlash or torque-angle-hystereses can be taken into account, too. In order to meet all customers' requirements, **Laschet Consulting** uses and distributes high-sophisticated simulation software in close cooperation with software & engineering companies like RBTS, Inc., USA with the rotordynamic software **ARMD** ([www.rbts.com](http://www.rbts.com)).

We present "**Service for Engineers**" regularly at international conferences and exhibitions: ASME, POWER-GEN, SAE, IMechE, VDI, EFRC, TVS. Please also visit our **International Rotordynamic Seminars** in close cooperation with our partner RBTS, Inc., USA. Furthermore we offer online trainings, short courses, and brief FREE webinars.

**Measurements and field testings** are done via our cooperative partners worldwide. In all these cases we join the engineering results and provide a complete customer engineering solution including CAE and test results.

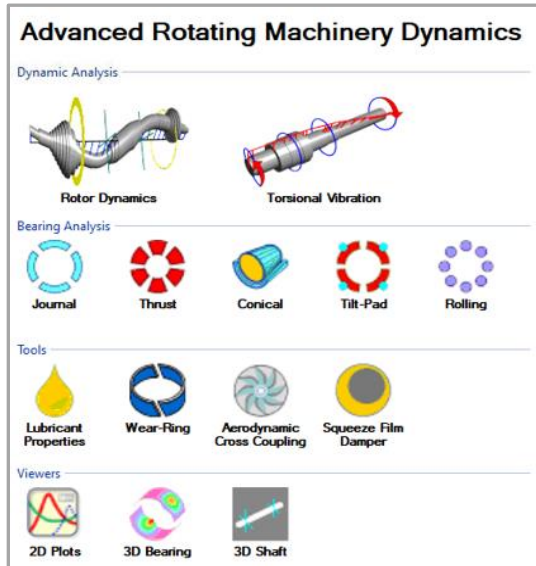


Online Trainings  
Online Short Courses



## The Professional Engineering Service ...

... supported by RBTS' simulation software **ARMD 6.1** – software & service available by **Laschet Consulting**

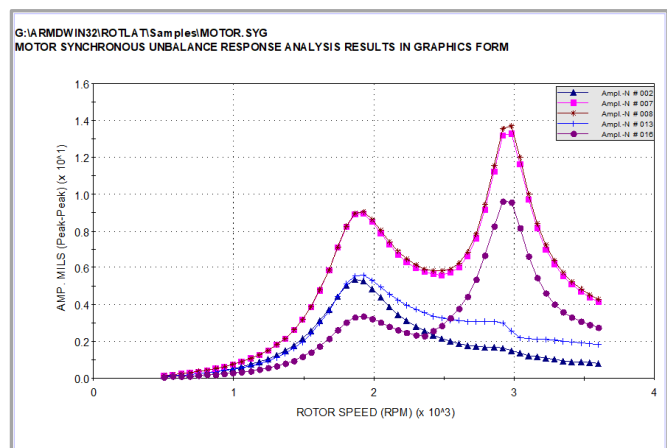
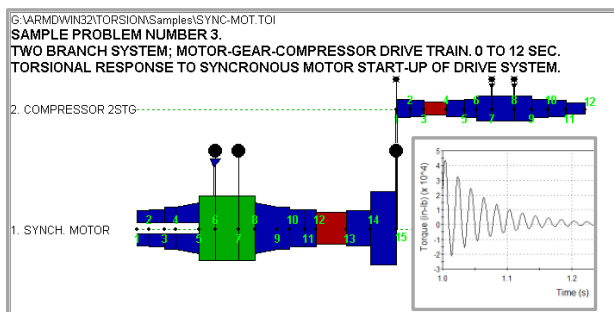
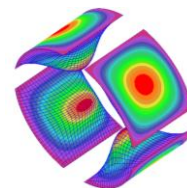
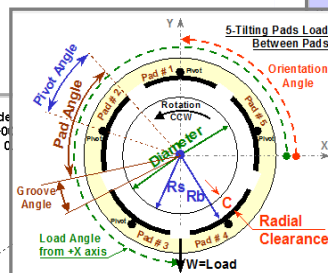
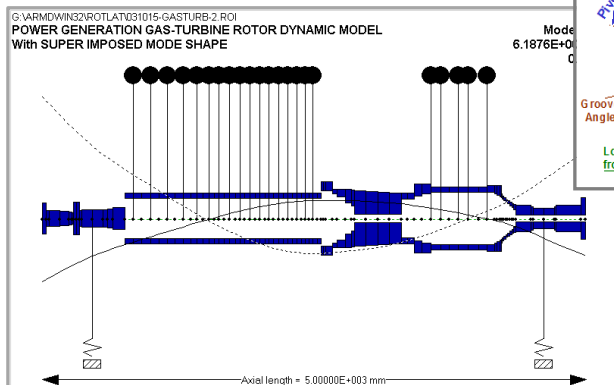
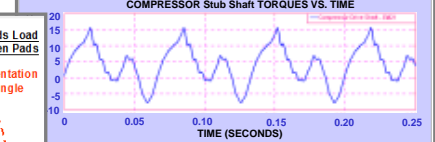
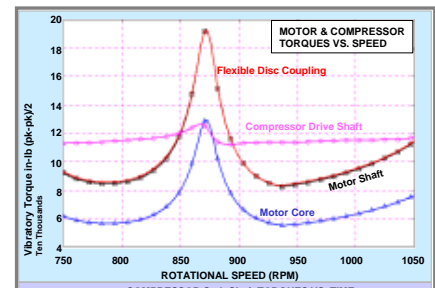
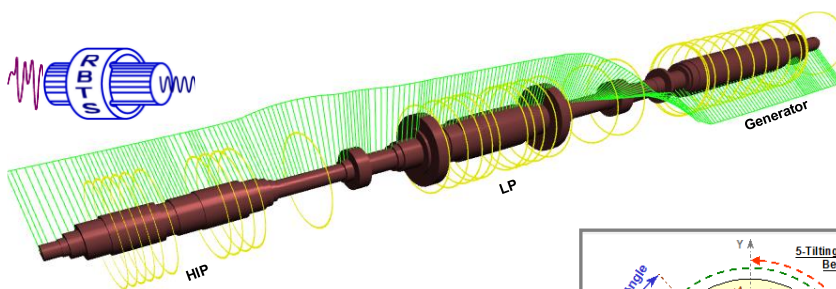


ARMD consists of 4 main modules:

- Rotor Dynamics
- Torsional Vibration
- Bearing Analysis
- Lubricant Performance

... with a variety of features, including:

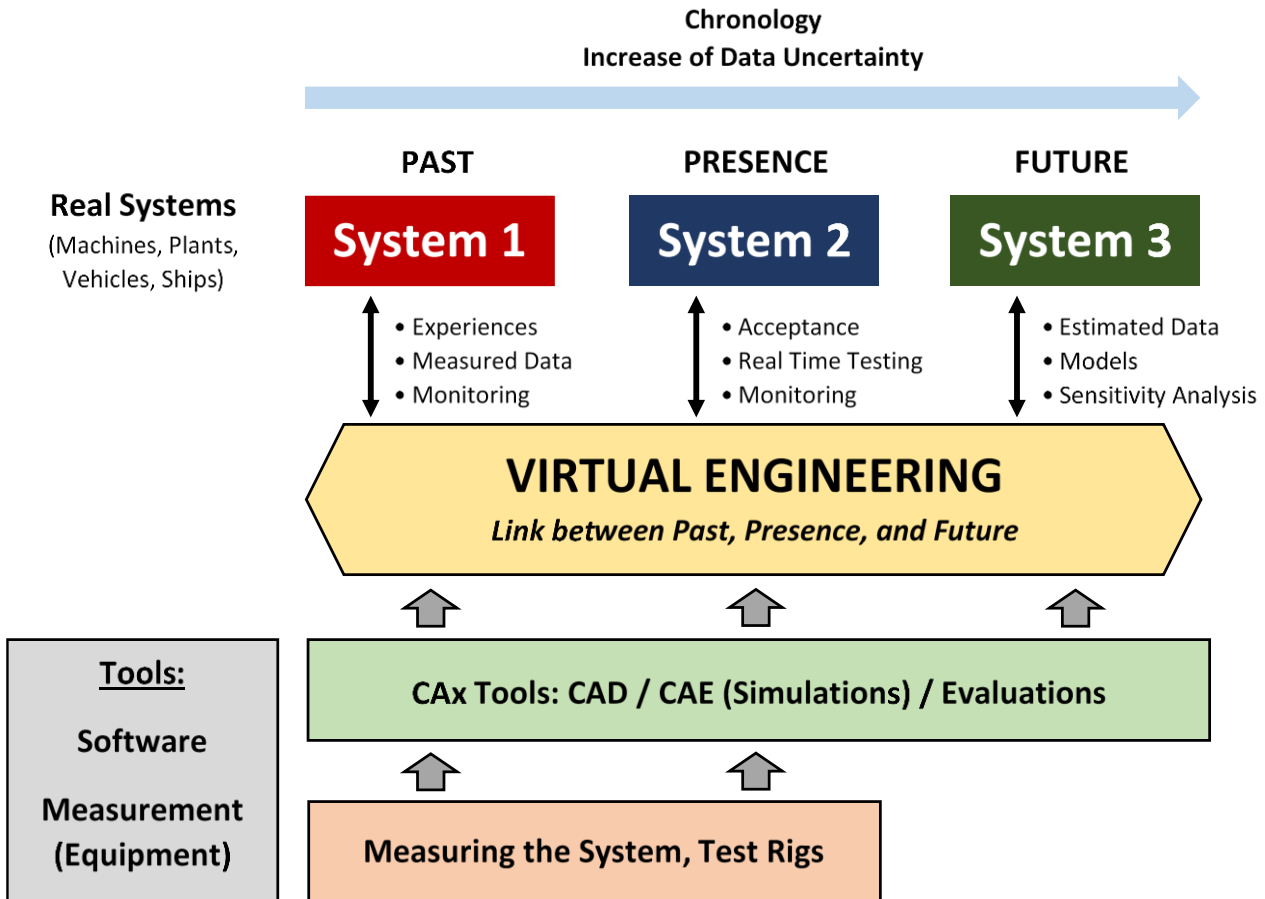
- user-friendly interface
- project and file management system
- 2D/3D graphics capabilities
- intermodule communication and data exchange
- powerful help tools & model templates





## The Strategy to Minimize Vibrations in Drivelines ...

... Supported by Powerful CAE Tools & Laschet's Engineering Services



### • Support of the R & D Process

- early detection of possible **critical speeds** and **resonance problems**
- evaluation of **different powertrain configurations** to determine the “**best**” set-up
- significant **quality improvement** with simultaneous **reduction of development time**

### • Support of Commissioning, Predictive Maintenance, Machine Diagnosis

- understanding **field testing** during **commissioning** using **vibration simulation tools**
- fine tuning of the CAE model, improved **machine diagnosis & conditioning monitoring**

### • Support of Troubleshooting, Failure Analysis, Root Cause Analysis

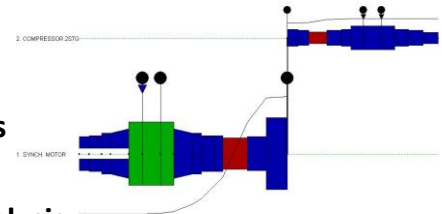
- improved **troubleshooting & root cause analysis** considering existing measurements
- **measurement and computer simulation “in dialogue”** for fast problem solving



## Typical Structure of our Engineering Services ...

... CAE Supported Vibration Analysis Based on Laschet's Extensive Know-How

- **TORSIONAL VIBRATION ANALYSIS (TVA) – Basic Analysis**  
*Natural Behavior, Resonance Analysis (Analysis of Excitability)*
- **TORSIONAL VIBRATION ANALYSIS (TVA) – Extended Analysis**  
*Nonlinear Effects (Load Dependent Coupling Behavior, Gear Backlash, etc.), Sensitivity Studies*
- **LATERAL VIBRATION ANALYSIS (LVA) – Basic Analysis**  
*Natural Behavior, Resonance Analysis (Analysis of Excitability), Sensitivity Studies*
- **Complete ROTORDYNAMIC ANALYSIS (RDA) – Extended Analysis**  
*Optionally with a Detailed Fluid-Film Bearing Analysis incl. Configuration & Sensitivity Studies*
- **Simulation Methods: STEADY-STATE or TIME-TRANSIENT Simulations**
- **Special Evaluation Approach Concerning NVH Effects in Vehicle Drivelines**



We usually provide you with a quotation splitted into the following parts:

1. **BASIC ANALYSIS (TVA / LVA)**  
*analysis of the natural behavior including analysis of excitability*
2. (optional) **EXTENDED ANALYSIS & DETAILED STUDIES (TVA / LVA / RDA)**  
*steady-state simulations and/or time-transient simulations for various load cases or time-dependent load scenarios – also in correlation with existing measurements if required; special RDA service in case of the analysis & configuration of fluid-film bearings*
3. (optional) **PARAMETER STUDIES (TVA / LVA / RDA)**  
*if the results concerning 1. or 2. do not meet customer expectations often combined with iterative analysis steps referring to a revised analysis of 1. + 2.*

All the services can be offered as a **fixed price package** provided that the job description is really clearly defined, or alternatively as a **customized consulting service** based on hourly or daily rates.

PLEASE SEND US YOUR INQUIRY AND CONTACT US TO DISCUSS FURTHER QUESTIONS  
IN A FIRST, NON-BINDING ONLINE MEETING.