What you should know

**Purpose**
The course provides an in-depth understanding of gear systems used in turbomachinery trains. It transfers knowledge on how to configure a reliable and efficient gear system for an almost trouble-free operation. It begins by delivering a fundamental understanding of gearboxes and their components during the training blocks of the basic training level. Then it proceeds giving guidelines for the selection of proper gear systems and how to optimize drive train configurations during the advanced training level.

**Audience Profile**
The training course is composed of modules that are built on each other. It starts at a fundamental level and ends up at a highly sophisticated level of gear knowledge. The course is suitable for engineers dealing with turbomachinery and for engineers involved in feasibility studies, engineers conducting detailed engineering, evaluating design concepts, manufacturing and designing of drive trains and operators dealing everyday with the equipment on site.

**Concept & Duration**
The modular conception of the BHS Gear Academy training course shows a high flexibility and can be tailored to the customer needs or conducted as a whole. The entire training course is structured in a basic and advanced training section, each of them consisting of 5 topical blocks that contain several modules of 30 - 60 minutes of duration. By booking the course for a company, flexibility is given to adapt the training to special demands. So trainings from 30 minutes up to 3.5 days are possible.

**Methodology**
The training is conducted in a diversified manner. This includes a combination of theoretical parts and many real life case studies, enhancing discussions and interactive exercises to create a long lasting learning success.

**Place**
The training can be held in the customers’ premises or at BHS’s headquarters in Sonthofen, Germany. The training is conducted in a diversified manner. This includes a combination of theoretical parts and many real life case studies, enhancing discussions and interactive exercises to create a long lasting learning success.

**Cost**
- All Blocks 1-5 ‘Basic’ (1.5 days): 3,000 Euros, 30 minutes of block 1-5: 150 Euro
- All Blocks 6-10 ‘Advanced’ (2 days): 4,500 Euros, 30 minutes of block 6-10: 200 Euro
  - Fees for single companies (up to 15 persons) individually negotiable.

**Participation / Registration**
The course can be booked as an independent course or for company groups from 5 - 15 persons in a ‘adapted’ course. ‘Basic’ course has from 10 -15 persons to have an intensive as possible. Way of booking is either directly or via Voith representative.

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**Attendee Profile**
- Engineers dealing with turbomachinery and for engineers involved in feasibility studies
- Engineers conducting detailed engineering, evaluating design concepts, manufacturing and designing of drive trains and operators dealing everyday with the equipment on site.

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**Why you should know**

The training presentation was pitched at the correct level for the group of Maintenance Engineers who attended, in terms of technical content. The focus appeared to be on the latest innovative developments and applications in gear design and gearbox construction rather than the basics of gear design, geometry and machinging which was appreciated. It never came across as a sales pitch, only as a lecture presentation by an engineer with significant in-depth knowledge of industrial gears and their applications.

Talisman, UK

“A superb training seminar delivered by gear specialist who understood exactly what gearbox operators need to know. Other OEM’s could learn a lot from Voith’s customer focussed service delivery.”

Total, UK

“Really useful: in depth discussion about gear technology. Much more going to ‘gear school’ than attending a sales pitch.”

BP, UK

“Easy to understand, very well presented and comprehensive.”

Total, UK

“The content was pitched at the correct level for the group of Engineers who attended. In general, it was a very good presentation, with in-depth knowledge of the subject matter.”

BP, UK

“Great presentation – informative without being dry.”

Total, UK

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**BHS Gear Academy**

A Look inside the Box

High-speed gear units in turbomachinery trains represent the Champions League for gearboxes. As they run in industries like oil & gas, petrochemical, chemical and power generation the huge daily production value demands utmost reliable, safe and energy-efficient machinery. Very often the gear units are neither in the focus of the original equipment manufacturer, the engineering company nor the plant operator but an high-speed gearbox is installed in turbine or electrical motor driven centrifugal compressor, pumps or generator drives they are crucial for the overall performance of such driving trains. So knowledge about the design, manufacturing, testing and servicing of turbo gears are decisive to serve the pros and cons, chances and risks of individually solutions and providers.

In special trainings this knowledge can be transferred from gear experts to experts in the necessary depth and all practical oriented as possible. tailor made to the individual requirements the seminars from Voith Turbo BHS Getriebe about high-speed gears offer the participant a real value in day-to-day routines.
Block: Gearbox Fundamentals - The ABC’s of Gear Systems

1. Gear Fundamentals
   - Understanding the basics of gearing - including the principles of gear tooth geometry, contact patterns, power transmission, and its design.
   - Introduction to High-Speed Gearboxes
   - Design, mechanical behavior, and performance of high-speed gearboxes.

2. Advanced Gear Fundamentals
   - Gear Components 1 - Designing Technology
     - Understanding the design processes of gear systems, including load gear design to increase train efficiency and operational life.
     - How to write a Specification for a reliable and efficient Gearbox
     - Tutorials on load gears and big integral gears.
     - Conducting a FEA and using the results in the design process. Case study on integral gear components.

3. Optimizing Drive Train by proper Gearbox Selection
   - Selection of gearboxes for compressor drives and turbine generators.
   - Optimizing reliability and efficiency of gear design.
   - Gear Components 2 - Selecting Technology
     - Understanding the selection processes of gear systems, including design variations and recommendations according to the different application fields.

4. Exploring Different High-Speed Gearbox Types
   - Design & Selection of application-specific gearbox, integral gearboxes and power distribution gearboxes.

5. Manufacturing Process & Quality Assurance
   - Manufacturing process steps, material selection depending on application.

6. Gearbox Design - Analytical Tools
   - Gear design process & tooling philosophies, durability, fatigue element evaluations, and analysis.

7. Block Learning goals
   - Learning goals and objectives for the block.

Module 1

1. Gear Fundamentals
   - Overview of gear technology - history, single helical and spur gearings, including principles of gear tooth geometry, contact patterns, power transmission, and its design.

2. Gear Components 1 - Designing Technology
   - Understanding the design processes of gear systems, including load gear design to increase train efficiency and operational life.
   - How to write a Specification for a reliable and efficient Gearbox
   - Tutorials on load gears and big integral gears.
   - Conducting a FEA and using the results in the design process. Case study on integral gear components.

Module 2

1. Advanced Gear Fundamentals
   - Gear Components 2 - Selecting Technology
     - Understanding the selection processes of gear systems, including design variations and recommendations according to the different application fields.

Module 3

1. Optimizing Drive Train by proper Gearbox Selection
   - Selection of gearboxes for compressor drives and turbine generators.
   - Optimizing reliability and efficiency of gear design.
   - Gear Components 3 - Selecting Technology
     - Understanding the selection processes of gear systems, including design variations and recommendations according to the different application fields.

Module 4

1. Exploring Different High-Speed Gearbox Types
   - Design & Selection of application-specific gearbox, integral gearboxes and power distribution gearboxes.

2. Manufacturing Process & Quality Assurance
   - Manufacturing process steps, material selection depending on application.

3. Gearbox Design - Analytical Tools
   - Gear design process & tooling philosophies, durability, fatigue element evaluations, and analysis.

4. Block Learning goals
   - Learning goals and objectives for the block.