COURSE OVERVIEW ME1118
Alignment for Vertical Pump

Course Title
Alignment for Vertical Pump

Course Date/Venue
Session 1: July 07-11, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: November 09-13, 2025/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE

Course Reference
ME1118

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course is designed to provide participants with a detailed and up-to-date overview of Alignment for Vertical Pump. It covers the types and components of vertical pumps including its applications in industry and the importance of alignment in vertical pump operation; the fundamentals of pump alignment, causes and effects of misalignment, alignment terminology and concepts and pump installation considerations; the safety and preparatory work for alignment covering lockout/tagout (LOTO) procedures, personal protective equipment (PPE), risk assessment and safety protocols and tools checklist and pre-alignment inspection; the dial indicator alignment method, laser alignment systems, optical and straightedge methods; and the plumbness and shaft centerline measurement.

Further, the course will also discuss the thermal expansion, materials and thermal behavior, predicting thermal growth and setting alignment targets accordingly; the types of soft foot, detection techniques, correction process and verification and preventing recurrence; the vertical pump shaft alignment process, vertical driver-to-pump alignment, motor base and column alignment; the multi-stage pump alignment considerations; and the vibration analysis and alignment correlation.

During this interactive course, participants will learn the troubleshooting of misalignment issues and coupling types and alignment impact including bearing and seal considerations; the proper alignment in harsh environments, alignment documentation and reporting and industry standards and best practices; and the pre-alignment inspection and baseline readings and final alignment validation

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain an in-depth knowledge on alignment for vertical pump
- Identify the types and components of vertical pumps including its applications in industry and the importance of alignment in vertical pump operation
- Discuss the fundamentals of pump alignment, causes and effects of misalignment, alignment terminology and concepts and pump installation considerations
- Apply safety and preparatory work for alignment covering lockout/tagout (LOTO) procedures, personal protective equipment (PPE), risk assessment and safety protocols and tools checklist and pre-alignment inspection
- Carryout dial indicator alignment method, laser alignment systems, optical and straightedge methods and plumbness and shaft centerline measurement
- Discuss thermal expansion, materials and thermal behavior, predicting thermal growth and setting alignment targets accordingly
- Identify the types of soft foot and apply detection techniques, correction process and verification and preventing recurrence
- Illustrate vertical pump shaft alignment process, vertical driver-to-pump alignment, motor base and column alignment
- Describe multi-stage pump alignment considerations and apply vibration analysis and alignment correlation
- Troubleshoot misalignment issues and recognize coupling types and alignment impact including bearing and seal considerations
- Apply proper alignment in harsh environments, alignment documentation and reporting and industry standards and best practices
- Carryout pre-alignment inspection and baseline readings and final alignment validation

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of alignment for vertical pump for maintenance technicians and engineers, mechanical engineers, reliability engineers, millwrights and fitters, plant operators and supervisors, condition monitoring specialists, technical and maintenance managers and other technical staff.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Dr. Tony Dimitry, PhD, MSc, BSc, is a **Senior Mechanical & Maintenance Engineer** with over **35 years** of industrial experience within the **Petroleum**, **Oil & Gas**, **Petrochemical**, **Nuclear & Power** industries. His expertise covers Revising **Engineering Drawings**, **Engineering Drawings & Diagrams**, **AutoCAD & GIS Support**, Retailed **Engineering Drawings**, Codes & Standards, **Mechanical Diagrams** Interpretation, Reading **Engineering Drawings**, **Process & Project Drawings**, **Engineering Drawings** Interpretation, **Piping Layouts & Isometrics**, **P&ID** Reading & Interpretation, Glass Reinforced Epoxy (**GRE**), Glass Reinforced Pipes (**GRP**), Glass Reinforced Vent (**GRV**), **Mechanical Pipe Fittings**, **Flange Joint Assembly**, Adhesive Bond Lamination, **Butt Jointing**, **Joint & Spool Production**, **Isometric Drawings**, **Flange Assembly** Method, **Fabrication & Jointing**, Jointing & Spool Fabrication, **Pipe Cuttings**, **Flange Bolt Tightening** Sequence, **Hydro Testing**, **Failure Analysis Methodologies**, Machinery Root Cause Failure Analysis (**RCFA**), **Preventive Maintenance** & **Condition Monitoring**, Reliability Centred Maintenance (**RCM**), Risk Based Inspection (**RBI**), Root Cause Analysis (**RCA**), **Planning & Managing Plant Turnaround**, **Scheduling Maintenance**, **Data Archive Maintenance**, **Master Milestone Schedule** (**MMS**), Piping & Mechanical **Vibration Analysis**, Preventive & Predictive Maintenance (**PPM**) **Maintenance**, Condition Based Monitoring (**CBM**), Risk Based Assessment (**RBA**), Planning & Preventive Maintenance, **Maintenance** Management (**Preventive**, **Predictive**, **Breakdown**), **Reliability** Management, Rotating Equipment, Scheduling & Cost Control, **Maximo** Foundation, **Maximo** Managing Work, **Asset Management Best Practices**, **Resource Management**, **Inventory Set-up & Management**, **Work Management**, Automatic & Work Flows & Escalations, **Vibration Analysis**, **Heat Exchanger**, **Siemens**, **Gas & Steam Turbine Maintenance**, **Pumps & Compressors**, **Turbo-Expanders**, **Fractional Columns**, **Boilers**, **Cryogenic Pumps** for **LNG**, **Electromechanical Maintenance**, **Machinery Alignment**, **Lubrication Technology**, **Bearing & Rotary Machine**, **Blower & Fan**, **Shaft Repair**, **Safety Relief Valves**, **Pipelines**, **Piping**, **Pressure Vessels**, **Process Equipment**, **Diesel Engine & Crane Maintenance**, **Tanks & Tank Farms**, **Pneumatic System**, **Static Equipment**, **FMEA**, **Corrosion**, **Metallurgy**, **Thermal** and **Electrical Modelling** of **Battery Problems**. He is also well-versed in various simulators such as i**-Learn Vibration**, **AutoCAD**, **Word Access**, **Aspen One**, **Fortran**, **VB**, **C ANSYS**, **ABAQUS**, **DYNA3D**, **Ceasar**, **Caepipe**, **MS Project**, **Primavera**, **MS Excel**, **Maximo**, **Automation Studio** and **SAP**. Currently, he is the **Maintenance Manager** of the PPC Incorporation wherein he is responsible for the maintenance and upgrading of all **Power Station** components.

During his career life, Dr. Dimitry held a significant positions such as the **Operations Engineers**, **Technical Trainer**, **HSE Contracts Engineer**, **Boilers Section Engineer**, **Senior Engineer**, **Trainee Mechanical Engineer**, **Engineer**, **Turbines Section Head**, **Professor**, **Lecturer/Instructor** and **Teaching Assistant** from various multinational companies like **Chloride Silent Power Ltd.**, **Technical University of Crete**, **National Nuclear Corporation**, **UMIST Aliveri Power Station** and **HFO Fired Power Station**.

Dr. Dimitry has **PhD**, **Master** and **Bachelor** degrees in **Mechanical Engineering** from the **Victory University of Manchester** and the **University of Newcastle**, **UK** respectively. Further, he is a **Certified Instructor/Trainer,** a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**) and an associate member of the American Society of Mechanical Engineers (**ASME**) and Institution of Mechanical Engineers (**IMechE**). He has further delivered various trainings, seminars, courses, workshops and conferences internationally.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Fee

US$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the workshop for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Vertical Pumps*** *Types and Classifications of Vertical Pumps • Applications in Industry (e.g., Water, Petrochemical, Power) • Main Components of a Vertical Pump • Importance of Alignment in Vertical Pump Operation*
0930 – 0945	*Break*
0945 – 1030	***Pump Alignment Fundamentals*** *Definition and Purpose of Pump Alignment • Consequences of Misalignment • Types of Misalignment (Angular, Parallel, Combined) • Horizontal versus Vertical Alignment*
1030 – 1130	***Causes & Effects of Misalignment*** *Thermal Growth and Dynamic Movement • Improper Installation or Foundation • Pipe Strain and Structural Issues • Vibration and Premature Failure*
1130 – 1215	***Alignment Terminology & Concepts*** *Coupling Types and Alignment Tolerances • Reference Planes and Axes • Offset versus Angular Misalignment • Alignment Targets and Specifications*
1215 – 1230	*Break*

1230 – 1330	***Pump Installation Considerations*** *Foundation and Baseplate Requirements • Anchor Bolt Tensioning and Grouting • Verticality Checks and Leveling • Piping Stress Evaluation*
1330 – 1420	***Safety & Preparatory Work for Alignment*** *Lockout/Tagout (LOTO) Procedures • Personal Protective Equipment (PPE) • Risk Assessment and Safety Protocols • Tools Checklist and Pre-Alignment Inspection*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2

0730 – 0830	***Dial Indicator Alignment Method*** *Principles and Setup • Rim and Face Readings • Reverse dial Method • Calculation and Correction Techniques*
0830 – 0930	***Laser Alignment Systems*** *Overview of Laser Alignment Technology • System Setup and Calibration • Measurement Process and Data Interpretation • Advantages and Limitations*
0930 – 0945	*Break*
0945 – 1100	***Optical & Straightedge Methods*** *Optical Alignment Tools Overview • Practical Use of Straightedge and Feeler Gauge • Use Cases and Accuracy Considerations • Troubleshooting Common Errors*
1100 – 1215	***Plumbness & Shaft Centerline Measurement*** *Measuring Plumbness of Pump Shaft • Importance of Vertical Shaft Alignment • Use of Plumb Bob and Laser Plumb Tools • Interpreting Results and Adjustments*
1215 – 1230	*Break*
1230 – 1330	***Thermal Growth Compensation*** *Understanding Thermal Expansion • Materials and Thermal Behavior • Predicting Thermal Growth • Setting Alignment Targets Accordingly*
1330 – 1420	***Soft Foot Detection & Correction*** *Definition and Types of Soft Foot • Detection Techniques (Indicator, Shim, Feeler) • Correction Process and Verification • Preventing Recurrence*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3

0730 – 0830	***Vertical Pump Shaft Alignment Process*** *Step-by-Step Procedure • Setting up the Dial or Laser • Aligning Motor to Pump • Recording and Adjusting Readings*
0830 – 0930	***Vertical Driver-to-Pump Alignment*** *Understanding Driver Configuration (Electric Motor, Diesel Engine) • Shim Placement for Height Adjustment • Angular Correction in Vertical Configuration • Use of Brackets and Special Fixtures*
0930 – 0945	*Break*

0945 – 1100	***Motor Base & Column Alignment*** *Checking Flatness and Level of Base • Column Alignment and Centering • Squareness of Mounting Surfaces • Effect on Shaft and Coupling Alignment*
1100 – 1215	***Multi-Stage Pump Alignment Considerations*** *Unique Challenges with Long Shaft Lines • Spacer Coupling Handling • Thermal Considerations Across Stages • Intermediate Bearing Alignment*
1215 – 1230	*Break*
1230 – 1330	***Vibration Analysis & Alignment Correlation*** *Identifying Alignment-Related Vibration Patterns • Frequency Spectrum Interpretation • Tools for Vibration data Collection • Using Vibration data to Confirm Alignment*
1330 – 1420	***Case Study & Hands-on Alignment Practice*** *Real-World Misalignment Case • Setup of Pump and Driver • Alignment Execution Using Laser Tool • Analysis and Discussion of Results*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4

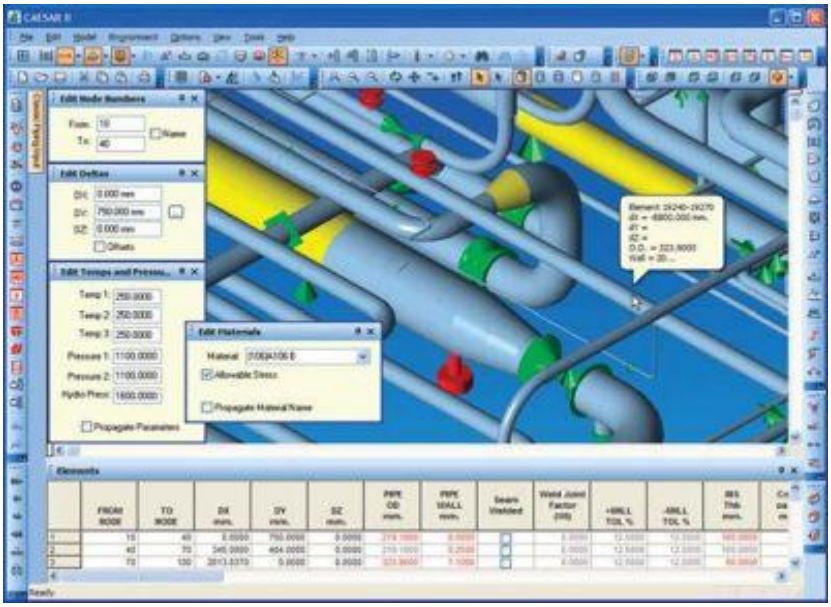
0730 – 0830	***Troubleshooting Misalignment Issues*** *Recognizing Symptoms (Noise, Heat, Wear) • Root Cause Analysis Techniques • Using Historical Data for Diagnostics • Field Examples and Solutions*
0830 – 0930	***Coupling Types and Alignment Impact*** *Flexible versus Rigid Couplings • Spacer and Non-Spacer Couplings • Alignment Procedure Variation by Type • Torque Transmission and Angular Errors*
0930 – 0945	*Break*
0945 – 1100	***Bearing & Seal Considerations*** *How Misalignment Affects Bearings • Seal Performance under Misalignment • Detecting Early Bearing Failure Signs • Shaft Run-out and Concentricity Check*
1100 – 1215	***Alignment in Harsh Environments*** *Marine, Petrochemical and High-Humidity Applications • Dealing with Corrosion and Wear • Use of Protective Coatings and Materials • Equipment Adaptation for Environment*
1215 – 1230	*Break*
1230 – 1330	***Alignment Documentation & Reporting*** *Creating Alignment Reports • Recording Measurements and Adjustments • Maintenance Records and Data Logging • Alignment Certificates and Standards*
1330 – 1420	***Industry Standards & Best Practices*** *API, ANSI, ISO Standards for Alignment • OEM Recommendations • Condition-Based Maintenance (CBM) • Digital Transformation in Pump Alignment*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

Day 5

0730 – 0830	***Pre-Alignment Inspection & Baseline Readings*** *Checking Shaft Runout and Concentricity • Inspecting Coupling Wear and Damage • Initial Reading Documentation • Visual Checks and Tolerances*
0830 – 0930	***Hands-on Workshop: Alignment with Laser System*** *Setup and Safety • Real Pump System Alignment • Troubleshooting during Process • Interpretation and Adjustment*
0930 – 0945	*Break*
0945 – 1100	***Hands-on Workshop: Dial Indicator Technique*** *Setting up Dial Indicators • Performing Measurements • Correction Techniques • Comparing Results with Laser Tool*
1100 – 1215	***Final Alignment Validation*** *Rechecking Soft Foot and Shims • Running Test and Vibration Check • Thermal Check Post-Run • Final Reading Recording and Acceptance*
1215 – 1230	*Break*
1230 – 1345	***Group Case Study Presentation*** *Teams Work on Alignment Scenarios • Identify Misalignment Root Causes • Propose Corrective Actions • Present Findings and Learning Outcomes*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about t Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulators (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art Simulator "CAESAR II Software".



CAESAR II

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org