

Centrifugal pump fundamentals with one-day hands-on MSD/HSB training



Understanding theories and mechanical workings of a centrifugal pump

Sulzer is a global partner with reliable and sustainable solutions for your key applications. We offer repair and maintenance services for your pumps, turbines, compressors, generators, and motors from one access point. Operating one of the largest service networks in the industry, Sulzer is close to you with more than 180 production and service centers and more than 15,000 employees around the world. We focus on lifetime extension and performance improvements of your rotating equipment.

Trained site and field maintenance staff are key to effectively maintaining pump assets and minimizing costs during the life of any pump installation. Most importantly, a thorough understanding of the pump and system in which it operates helps ensure safe working practices and operations. Sulzer puts safety at the heart of all aspects of our training programs.

Training from Sulzer specialists deliver more than the skills to dismantle, repair and rebuild a pump. With a foundation in the principles of pump operation and related systems, trained staff can quickly and accurately identify poor installations and take appropriate corrective action to avoid premature failures.

We can tailor courses to suit your business needs. Sessions are offered at select Sulzer Manufacturing Plants, Service Centers and at customer sites around the world, which often include hands-on practical sessions on actual pumps.

Training includes complete manuals to guide participants in their studies. At the end of the course, students are certified for completing the Sulzer Centrifugal Pump Fundamentals Training.



Centrifugal pump training session

The MSD/HSB pumps have the broadest hydraulic coverage of any BB3/BB1 type pumps in the market. There are over 10,000 MSD/HSB pumps installed in product pipelines, boiler feed, water injection and even nuclear safety-related services around the globe. One-day vertical pump training sessions are available upon request.

Training objective

This training discusses theories and mechanical workings of a centrifugal pump. Trained staff with excellent skills can improve safety and standardized work practices while reducing your maintenance costs over the lifetime of the equipment. Our trainings help to make your staff, processes and operations reliable and solid by teaching “best practices” of maintenance and operation.

Training schedule and location

This training can be delivered at select Sulzer Pumps Service Centers or customer sites. Please contact david.fasnacht@sulzer.com and Patrick.phillips@sulzer.com for training inquiries and the latest schedule and registration process.

Training participants

This training is intended for mechanical engineers, reliability engineers, maintenance staff, operators and any pertinent staff.

Syllabus

A standard MSD/HSB hands-on training will discuss centrifugal pumps, including the use of an actual MSD/HSB pump as well as the following topics:

- Pump Design
- Theory
- Alignment
- Balance
- Vibration
- NPSH
- Radial & axial loads
- Pump curves
- Seals
- Couplings
- Bearing assemblies
- Installation, operation, troubleshooting
- Maintenance

Training fees

Three-day Centrifugal hands-on training at a Sulzer facility	One to three-day customized Centrifugal hands-on training at a customer site
<p>\$1,700.00 USD per participant</p> <ul style="list-style-type: none">• Applicable taxes will be charged upon invoicing• Credit cards or purchase orders are required with registration (within 30 days or more prior to the date of the class) to reserve your place in the class• Credit cards and receipt of purchase orders will reserve spots in class on a first come, first serve basis• Please contact your Sulzer representative to check your nearest Sulzer facility	<p>A customized training quote will be issued for customer on-site training. Please contact the Customer Training Manager, david.fasnacht@sulzer.com, for inquiries. The quote will include:</p> <ul style="list-style-type: none">• Freight for training equipment• Instructor's air fare, transportation, meals, lodging and travel days charges• All training manuals

Training registration

To register for the training, please complete the registration form on page 8 and send all your inquiries and registration details to the Customer Training Manager, David Fasnacht at david.fasnacht@sulzer.com and Customer Training Administrator, Patrick Phillips at Patrick.phillips@sulzer.com

Training agenda

Day 1	
08:00 AM – 11:30 AM	<ul style="list-style-type: none"> • Course registration and introduction: Introduce students to the course and review the planned course objectives. • Safety introduction. • Impeller designs: Cover the various components and functions of an impeller and the different types of impellers. • Volute case designs: Cover the components of the case and how they convert the high velocity liquid generated by the impeller into pressure. • Axial forces: Cover how axial forces are generated inside a pump. Also discuss how we balance these forces and control the residuals left over, as well as the consequence if they get out of control. • Radial forces: Cover how radial forces are generated inside a pump and how we control them. Also discuss the consequence if they get out of control. • Component clearances; function of components of the rotating element, including clearances, fits and element build and torque values. • Basic pump metallurgy: Cover the basic metallurgy found in pumps, advantages and disadvantages.
11:30 AM – 12:30 PM	Lunch
12:30 PM – 3:30 PM	<p>Basic hydraulics: Concepts, terminology, definitions and standard units.</p> <ul style="list-style-type: none"> • Volume (capacity) • Density • Gauge pressure • Atmospheric pressure • Velocity • Specific gravity • Head pressure • Absolute pressure • Horsepower <p>Performance curves: Demonstrate how a performance curve is generated and the components that go into making up the curve.</p> <ul style="list-style-type: none"> • Head • Flow • Rpm • Temperature • Brake horsepower • Impeller trim speed change • Velocity/efficiency <p>Affinity laws: Understand how to apply the affinity laws to change pump performance.</p>
Day 2	
08:00 AM – 9:30 AM	<p>Bearing arrangements: Cover the three different bearing arrangements found in multistage pumps and the application and limitation range.</p> <ul style="list-style-type: none"> • Ball/ball • Ball/sleeve • Tilting pad/sleeve • Bearing oiling • Oil ring design and function • Sleeve bearing design and function • Mounting of bearings

09:30 AM – 11:30 AM	<p>Hands-on session: The rest of the day is spent in the shop. A full-sized MSD/HSB pump will be provided for the students to dismantle, inspect and reassemble under the instructor's tutelage. During this phase, the instructor will point out how each part works and how it interrelates with the other components.</p> <p>The instructor will also cover items and signs to watch for while dismantling the unit, which is indicative of possible operating problems. Logical problem analysis is stressed.</p>
11:30 AM – 12:30 PM	Lunch
12:30 PM – 4:30 PM	<p>Afternoon session: reassemble unit. High points covered:</p> <ul style="list-style-type: none"> • Bearing inspection • Case inspection • Impeller inspection • Dimensional inspection • Failure analysis • Shaft and element TIR • Impeller and element balance • Mechanical seals • Landing element • Centering bearing • Installation housing • Installation • Clearance inspection • Bearing clearance inspection • Bearing setting • Dialing in the bearing housings

Day 3

08:00 AM – 11:30 AM	<ul style="list-style-type: none"> • Exercises in pump operations. • Parallel operation. • Series operation. • NPSHa-NPSHr exercises in calculating NPSHa. • Temperature alarms and shutdowns. • Oil requirements. • TIR: Total indicated run-out specifications with demonstration of its importance. • Balance: Individual part assemblies. Also cover limits and tolerances. • Mechanical seals: Various seal flush systems and potential problems. • Vibration: Cover various points about basic vibration as related to centrifugal pumps and vibration measurement.
11:30 AM – 12:30 PM	Lunch
12:30 PM – 2:30 PM	<ul style="list-style-type: none"> • Installation and start up • Troubleshooting • Maintenance scheduling • Review

Fundamental Centrifugal Pump Training Locations

Please contact your local sales representative for tentative dates.

United States	Participant per session
Houston Service Center (Headquarters) 1910 Jasmine Dr. Pasadena, TX 77503	6-12
Baton Rouge Service Center 11521 Industriplex Blvd Baton Rouge, LA 70809	6
Chattanooga Service Center 4126 Caine Lane Chattanooga, TN 37421	6-12
Joliet Mid-West Service Center 2600 City's Edge Drive Joliet, IL 60436	6-12
Los Angeles Service Center 9856 Jordan Circle Santa Fe Springs, CA 90670	6-12
New Jersey Eastern Service Center 621 Heron Drive Bridgeport, NJ 08014	6-12
Odessa Service Center 340 S Meadow Odessa, TX 79761	6-8
Piedmont Southeast Service Center 108 Hurricane Creek Road Piedmont, SC 92673	6-12
Portland Manufacturing Plant 2800 NW Front Ave Portland, OR 97210	6-12
Rocky Mountain Service Center 21201 E 31 st Circle Aurora, CO 80011	6-12
Salt Lake City Service Center 3618 West 1820 South Salt Lake City, UT 84104	6-12
Canada	Participant per session
Burnaby BC Service Center 4129 Lozells Ave Burnaby, BC V5A 2Z5 Canada	6-12
Edmonton Service Center 5118 – 68 th Ave Edmonton, AB T6B 2X7	6-12
Toronto Service Centre 1851 Albion Road Toronto, ON M9W 5S8	6-12

Hotels near the service centers

Houston Service Center	Chattanooga Service Center
<ul style="list-style-type: none"> • Fairfield Inn & Suites 3640 E. Sam Houston Pkwy S Pasadena, TX 77505 Phone: 832-664-8870 • Holiday Inn Express 5450 Vista Rd. Pasadena, TX 77505 Phone: 281-487-8888 • La Quinta Inn & Suites 3490 E. Sam Houston Pkwy S Pasadena, TX 77505 Phone: 281-991-7771 	<ul style="list-style-type: none"> • Hilton Garden Inn 2343 Shallowford Dr Chattanooga, TN 37421 Phone: 423-308-4400 • Hampton Inn 7013 Shallowford Road Chattanooga, TN 37421 Phone: 423-855-0095
Joliet Mid-West Service Center	Los Angeles Service Center
<ul style="list-style-type: none"> • Hampton Inn 1521 Riverboat Center Dr Joliet, IL 60436 Phone: 815-725-2424 • Town Place Suites 1515 Riverboat Center Dr Joliet, IL Phone: 815-741-2400 	<ul style="list-style-type: none"> • Double Tree 13111 Sycamore Drive Norwalk, CA 90650 Phone: 562-863-5555 • Embassy Suites 8425 Firestone Blvd. Downey, CA 90241 Phone: 562-861-1900
New Jersey - Eastern Service Center	Piedmont Southeast Service Center
<ul style="list-style-type: none"> • Holiday Inn 1 Pureland Drive Swedesboro, NJ 08085 Phone: 856-467-3322 • Hampton Inn 2 Pureland Drive Swedesboro, NJ 08085 Phone: 856-467-6200 	<ul style="list-style-type: none"> • Embassy Suites Greenville 670 Verdai Blvd Greenville, SC 29607 Phone: 864-676-9090
Portland Manufacturing Plant	Rocky Mountain Service Center
<ul style="list-style-type: none"> • Holiday Inn Express 2333 NW Vaughn St Portland, OR 97210 Phone: 503-484-1100 	<ul style="list-style-type: none"> • Residence Inn 16490 East 40th Circle Aurora, CO 80011 Phone: 303-459-8000 • Hilton Garden Inn 16475 East 40th Circle Aurora, CO 80011 Phone: 303-371-9393 • Hampton Inn 4310 Airport Way Denver, CO 80239 Phone: 303-375-8118
Salt Lake City Service Center	Edmonton Service Center
<ul style="list-style-type: none"> • Springhill Suites 4955 Wiley Post Way Salt Lake City, UT 84116 Phone: 801-532-6633 • Hampton Inn 307 Admiral Byrd Road Salt Lake City, UT 84116 Phone: 801-530-0088 	<ul style="list-style-type: none"> • Sheraton Four Points 7230 Argyll Road Edmonton, AB T6C 4A6 Phone: 780-465-7931 • Radisson Hotel & Convention Center 4520 76th Ave NW Edmonton, AB T6B 0A5 Phone: 780-468-5400

Registration form - confirmation to Sulzer

Company Name:	Phone no:
Address:	Email address:
Participant name(s):	Participant title:
1.	
2.	
3.	
4.	
5.	
6.	
Class location:	Class Dates:

Payment method	
<ul style="list-style-type: none"> • Please include session location and dates on PO, and issue the PO to Sulzer Pump Services (US) Inc. • PO for trainings in Canada will need to be made out to the hosting Service Center or the Service Center supporting that region 	
<input type="checkbox"/>	Purchase Order (attach a copy of PO to form) PO no:
<input type="checkbox"/>	Credit card (please fill out the appropriate credit card transaction authorization form below and email to: david.fasnacht@sulzer.com (phone no: 720-688-8215) patrick.phillips@sulzer.com

MasterCard/Visa credit card transaction approval form (American Express not accepted)	
Date:	Requested by:
Customer name:	Service Center location:
Name as it appears on the card:	
Customer street address and zip code:	
Credit card number:	
Credit card expiration date: /	
Total amount charged:	
I authorize Sulzer Pump Services (US) Inc. To charge my credit card as referenced above and I acknowledge receipt of the product/services covered by this transaction plus applicable taxes. I agree to pay my credit card company for services charged.	
Signature:	Printed name:



Contact

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