

CENTRIFUGAL PUMPS

CLASS FORMAT:

Lab + classroom

The participant is able to “learn-by-doing” in the course; this knowledge can be transferred to the workplace.

STANDARD SIZE CLASS:

NTT recommends a class of no more than 12 participants for the best results

NTT PROVIDES:

- 3-days (24 contact hours) of on-site instruction
- Textbooks “Centrifugal Pumps” (a fully illustrated workbook and reference)
- Classroom consumables
- Completion certificates
- Shipping and instructor travel logistics

CLIENT TO PROVIDE:

- Classroom, with easy access, of 750 square feet or greater
- LCD/laptop projector, overhead screen, white board and/or flip chart(s)
- Four separate (dedicated) 20 amp circuits are required for training equipment
- A dock facility or a forklift to unload the equipment
- A pallet jack to move the crates after they have been unloaded may also be needed
- The equipment should be placed in the training room for the NTT instructor to test and setup prior to the start of class

SHIPPING:

- 2 crates at 1500 lbs.
- 2 crates at 49” x 35” x 76” = 750 lbs. each



Increase your understanding and knowledge of centrifugal pumps including their design, selection, operation and maintenance. Moreover, the course will aid you in increasing productivity and reducing costly downtime.

It is important to understand what a pump is and how it works in order to solve problems. There are strong misconceptions about pumps. We will explain the basics so that you will be adequately prepared to understand certain design considerations, including sizing. In addition, this course provides the inside information on why and how centrifugal pumps are designed.

The hands-on exercises demonstrate and reinforce the practical techniques of maintenance and troubleshooting.

COURSE AGENDA

INTRODUCTION

- Pump operation
- Read pump curves
- Speed governing pump designs
- Suction specific speed
- Design differences between major pump types
- Importance of system curves
- Recirculation
- Shaft deflection
- Calculate pump energy costs
- Pump’s total discharge head requirement
- Closed and open pumping systems
- Pump terminology
- Pump installation
- Care for bearings
- Troubleshooting mechanical seal failures
- New pump start up
- Cause of wear
- Air entrainment

HYDRAULIC THEORY AND DESIGN

- Energy, work and brake horsepower
- Read a curve
- Affinity laws
- Specific speed
- Pump types and classifications

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COURSE AGENDA, continued

HYDRAULIC THEORY AND DESIGN, CONTINUED

- Suction-specific speed and NPSHR (HSV)
- Single versus double suction
- Steep versus flat pump curves
- Suction recirculation
- Shaft deflection and mechanical loads
- Split case versus end suction mechanical design considerations
- Twin volutes versus single volute designs
- Variable speed pumping
- Calculate energy loads

INSTALLATION, MAINTENANCE AND TROUBLESHOOTING

- Pump terminology
- TDH requirements
- Proper foundations
- Start-up procedures
- Troubleshooting
- Bearing failure
- Air entrainment
- Corrosion inside the pump
- Cavitation

LAB EXERCISES

- Pressure/head relationship
- Flow rate and head
- HP, WHP, efficiency
- Pump performance curves
- Pump affinity laws
- System curves
- Multiple pump operation
- Net positive suction head available



Using a strobe light on the NTT training equipment to demonstrate cavitation.



Parallel and series pump trainer.



Students learning to take flow and pressure readings..