

Application, Operation & Maintenance of

# Pumps & Pump Systems™

A comprehensive course designed to benefit: Mechanics, Operators, Consulting & Design Engineers & Multi-Craft Maintenance Technicians

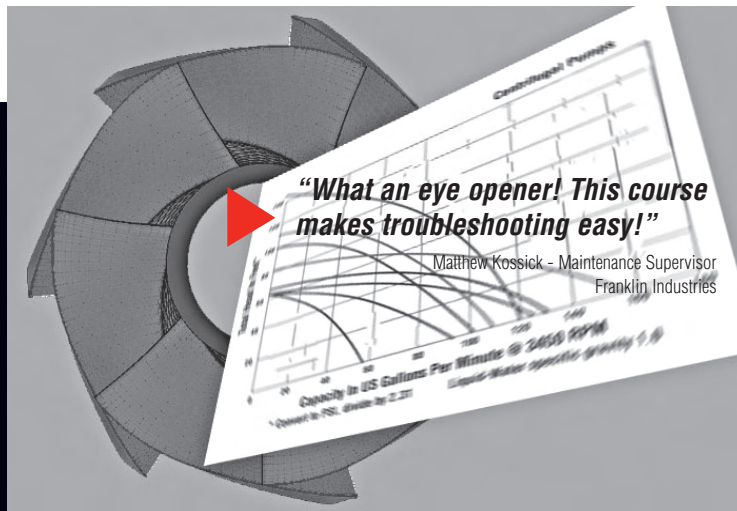
For a schedule of open enrollment classes or to bring this training to your plant or facility, contact us @

1-877-97-TRAIN

www.AmericanTrainco.com

### Top Reasons for Pump Failure

1. Operator Error
2. Wrong System Design
3. Wrong Application
4. Simple misunderstanding of how pumps work



Attend this seminar and learn to STOP replacing pumps!

**Free MTA  
Certification Testing!**

### IN THIS SEMINAR YOU WILL LEARN TO:

- Select the Right Pump & Motor for the Job
- Read and Interpret Pump Curves
- Understand what Your Gauges are Saying
- Determine Causes of Failure
- Avoid Cavitation & Vibration
- Prevent Seal & Bearing Failure
- Align Shafts and Motors.....and more!

- This seminar can also be presented at your facility for larger groups
- Reserve Your Space Now! Call 1-877-97-TRAIN
- Check us out online at [www.AmericanTrainco.com](http://www.AmericanTrainco.com) for a complete listing of all seminars coming to your area



**"I can't wait to get back to the plant to apply what I've learned."**

John Gadd - Maintenance Technician  
Grainger

## Application, Operation & Maintenance of

# Pumps and Pump Systems™

### PURPOSE OF TRAINING

Better than learning how to replace or repair a pump, wouldn't it be more efficient and a greater cost savings if you just knew how to prevent a pump from failing in the first place? That's exactly what this course is designed to do. From the pump and pump system, to the people who operate, maintain and design the pump system, this seminar will teach students how to identify the real problems causing pump failure, and how to avoid repeating those problems in the future. And because we know time is money, this seminar is designed to have immediate impact so that you can start saving maintenance dollars on costly repairs and downtime today! We approach our students as if they were our own employees. We give them real world, practical knowledge. And students attending this course are expected to go back to their workplace and immediately apply what they have learned. Now that's "Real World" training!

### TRAINING OUTCOMES

Upon completion of this course students will receive a training certificate and 1.4 Continuing Education Units indicating that the student has learned to:

- Understand basic pump principles
- Properly select the right pump & motor for the job
- Install, start-up and commission a pump
- Correctly align a pump and motor
- Properly maintain pumps and pump systems
- Properly operate a pump system
- Read and understand what pump gauges are saying
- Read and apply pump curve charts
- Identify and distinguish a "pump" problem from a "system" problem
- Identify, correct and avoid cavitation problems
- Prevent mechanical seal failure
- Conduct failure analysis so as not to repeat errors

### TEACHING PHILOSOPHY

"Real World Training...for Real World Needs", is not just our slogan, but also our mission statement. At American Trainco, we approach our students as if they were our own employees. We instruct and guide them in practical knowledge that allows them to immediately go back to their workplace and apply what they have learned. Our instructors are seasoned veterans with years of *real world* experience, and the students who attend our seminars often get more from a few days of training than an entire year of reading textbooks or watching videos. How do we know? They tell us.

Anyone can teach theory, but there simply is no substitution for experience. What sets American Trainco apart is our ability to communicate that experience to our students. As one attendee told us at the end of his two-day training course, "I think I can go back to work now and teach the veterans a thing or two."

Mission accomplished.

### ABOUT OUR INSTRUCTORS

All American Trainco instructors are required to have a formal education *and* real world work experience. They need to be leaders in their field. We don't hire field people without teaching experience, and we don't hire teachers without field experience. They must have both. And since attendees critique the instructor at the end of each class, a positive and enjoyable learning experience is virtually guaranteed.

### TRAINING CERTIFICATE

After completion of this seminar students will receive a personalized Certificate of Completion and 1.4 CEU's (Continuing Education Units) approved by the Maintenance Training Association of the Americas.

### UNAFFILIATED and NON-COMMERCIAL

Unlike some training experiences, you won't get a sales presentation at an American Trainco seminar - all

you get is an honest, commercially unbiased education. We do not engage in the practice of selling or promoting any other company's products or services, so you know that by attending one of our seminars, your time and money is well spent.

### HIGH QUALITY PRESENTATIONS

Black and white transparencies never made it in the door at American Trainco. From the start we demanded that all our presentations would be lively, attractive, crisp and clear. Our instructors use state-of-the-art computers, projection equipment and software to bring you a high quality visual experience. And our books are designed with the maintenance person in mind too. We know that they don't always have a lot of time to read volumes of literature so our manuals are quick and to the point, providing students the same charts, descriptions, pictures and bulleted items they'll see in the presentation.

### WHO SHOULD ATTEND

Attendees to this seminar come from a wide variety of industries, skill levels, company sizes and job titles, so if you're not sure you will fit in or will benefit from the class, don't worry - you will - as long as your job involves pumps. From the apprentice mechanic to the seasoned engineer, this course successfully addresses the questions and concerns of all those who need centrifugal pump knowledge, including: Maintenance Technicians, Mechanics, Machine Operators, Building Owners, Plant Engineers, Facility Managers, and Any Person involved in Cross-training or Multi-craft Skills programs.

### FREE - MTAA CERTIFICATION TEST (optional)

In addition to receiving MTAA approved CEU's for this class, you may also elect to take an MTAA Pumps Certification test. Instructions for taking the test will be provided at the end of the seminar.

# C O U R S E O V E R V I E W

## I. Pump Classification

- a. Positive Displacement
- b. Dynamic

## II. Basic Hydraulic Concepts & Definitions

- a. Defining Pressure
- b. Head
- c. Specific Gravity
- d. Why Head Instead of Pressure?

## III. How Centrifugal Pumps Work

- a. How Pumps Induce Flow

## IV. Net Positive Suction Head (NPSH)

- a. NPSHR vs. NPSHA
- b. Cavitation
- c. NPSH Margin

## V. Horsepower & Efficiency

- a. Losses
  - i. Hydraulic
  - ii. Mechanical
  - iii. Other
- b. Calculating Efficiency
- c. Affects of Viscosity

## VI. Reading Pump Curves

- a. Single Line Curves
- b. Multiple Trim Curves
- c. Multiple Speed Curves
- d. Affinity Laws

## VII. System Curves

- a. Calculating System Heads
- b. Where The Pump Will Operate
- c. Changes in the System Curve
- d. Determining a Pump's Operating Point in the Field

## VIII. Affect of Pump Operation on Mechanical Reliability

- a. Axial & Radial Loads
- b. Shaft Deflection
- c. Seal & Bearing Life
- d. Start Up and Commissioning Procedures
- e. Minimum Flow Restrictions

## IX. Specifying the Right Pump

- a. Tips on Getting the Right Pump for Your Application

## X. Bearings

- a. Lubrication Methods
- b. Failure Modes
- c. Proper Maintenance
- d. Proper Lubricant Care

## XI. Seals & Packing

- a. Packing
  - i. Types of Packing
  - ii. Proper Packing Installation
  - iii. Correctly Adjusting Packing
- b. Mechanical Seals
  - i. Pusher & Non Pusher Designs
  - ii. Single Seals
    1. Balanced and Unbalanced
  - iii. Double and Tandem Seals
  - iv. Dry Gas Seals
  - v. Other Sealing Methods

## XII. Good System Design and Installation Practices

- a. Building Reliability From the Foundation Up
- b. Alignment
  - i. Types of Misalignment
  - ii. Alignment Methods

## XIII. Optimizing Your Pump Operation

- a. Energy Efficiency
- b. Improved Reliability
- c. Better Process Control
- d. Pump Speed and Pump Life

## XIV. Pump Troubleshooting

- a. Common Pump Problems and Their Solutions
- b. Root Cause Analysis

## XV. Condition Monitoring of Pumps

- a. Vibration Analysis
- b. Lubricant Analysis
- c. Alternative Methods

## SEMINAR AGENDA

7:30 am	Registration
8:00 am	Class Begins
12:00 -1:00 pm	Lunch (on your own)
4:30 pm	Class Ends

## SEMINAR FEES \$985 Both Days

## NO RISK REGISTRATION & MONEY-BACK GUARANTEE

If you're not sure you'll be able to attend this seminar, you can still make a reservation to hold your space in class. While payment is due prior to the start of the seminar, you may choose a full refund or credit for cancellations made at least 24 hours in advance. Student substitutions can also be freely made at any time prior to the start of the seminar. Refunds will not be issued for registered attendees who fail to show up and have not given a notice of cancellation. In the rare event that you do not receive the expected value after attending our seminar, simply notify us in writing of your reasons and your money will be promptly refunded.

## IN-HOUSE TRAINING

You can bring this or any other maintenance training program directly to your facility. Simply give us a call, tell us what you're looking for, and we'll provide you a quote. We also provide custom training for courses not listed in this brochure.

Call **1-877-97-TRAIN** and ask for Dan or Adam, or email [AdamC@AmericanTrainco.com](mailto:AdamC@AmericanTrainco.com).

Visit us on the web at: [www.AmericanTrainco.com](http://www.AmericanTrainco.com)

## OTHER SEMINARS

American Trainco presents a variety of maintenance training seminars throughout the country on a regular basis. Contact us to find out more about the training courses coming to your area, including:

- **Basic Electricity for the Non-Electrician™**
- **Electrical Troubleshooting**
- **Air Conditioning & Refrigeration**
- **Boiler Operation, Maintenance & Safety™**
- **Arc Flash Protection & Electrical Safety™**
- **2008 National Electrical Code®**

And 20+ other courses in the following areas:

- **Electrical / Electrical Controls**
- **HVACR**
- **Mechanical**
- **Facility & Plant Management**
- **Fluid Power**
- **Pumps / Piping**
- **Codes / Standards / Safety**

Reserve Your Space Now!

**CALL 1-877-97-TRAIN**

Or Online at: [www.AmericanTrainco.com](http://www.AmericanTrainco.com)

**"Very down to earth and practical"**

Rick VanSeters - Product Engineer  
Parker Hannifin

Real World Training...for Real World Needs™



## Application, Operation & Maintenance of **PUMPS & Pump Systems™**

**SEMINAR FEE**  
\$985 Both Days

**FIVE EASY WAYS TO REGISTER:**

- 1) **Internet** www.AmericanTrainco.com
- 2) **Fax** (303) 531-4565
- 3) **Phone** Toll Free 1-877-97-TRAIN 1-877-978-7246 or (303) 531-4560
- 4) **Mail** this form to: American Trainco, Inc. P.O. Box 3397 Englewood, CO 80155
- 5) **E-mail** the information requested on this form to: Sales@AmericanTrainco.com

For a schedule of open enrollment classes or to bring this training to your plant or facility, contact us @

**1-877-97-TRAIN**

www.AmericanTrainco.com

**For Mechanics, Operators, Consulting & Design Engineers & Multi-Craft Maintenance Technicians**

**Authorizing Person/Supervisor:** Name \_\_\_\_\_

Title \_\_\_\_\_ Company Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_ Email \_\_\_\_\_

**"The most complete pump training course I have ever attended"**

Kevin Shelton - Process Specialist  
Midwest Generation

Seminar Attendees:	Name	Title	E-Mail	Seminar City

**Billing Information:** (Please fill out this section only if the "Bill To" name and address is different than the Authorizing Person's name and address above.)

Individual's Name	Title	Company Name
Address	City	State Zip
Phone	Fax	Email

**Payment Method:**

- Visa
  - MasterCard
  - Discover
  - American Express
  - Check Enclosed
  - Bill Purchase Order #:
- Card Number: \_\_\_\_\_  
 Expiration Date: \_\_\_\_\_  
 Name on Card: \_\_\_\_\_  
 Signature: \_\_\_\_\_  
 (Make payable to: American Trainco, Inc.)

### GOT A LARGE GROUP?

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Buy your training in bulk and save up to 25%! This program can be used to register any person for any seminar, at any location and for any date.

#### ON-SITE TRAINING

Bring any of our seminars directly to your site. The more people you have, the greater the savings!

*Call*

**1-877-97-TRAIN**



PO Box 3397  
Englewood, CO 80155



PROMOTION CODE

**X05**

