



# Plant Operation Workshop

*Job Specific Training... Operators,  
Managers, QC, Safety Directors,  
Financial, Mechanics, Electricians*

**NAPA**  
Member  
**16 YEARS**

**On-Line** - any time, any where, all year long, even rain days and slow days.



- On-Line • On-Demand
- At Your Place • At Your Pace
- At Your Convenience
- Review • Test • Analyze

**Would you  
recommend this  
course?**

*Of all the participants surveyed,  
100% said "YES".*

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**Improve...**



• Safety



• Mix Quality



• Production



• Operating Costs

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Asphalt Plant  
Operation  
Workshop



Electro-Mechanical  
Maintenance and  
Troubleshooting Workshop

952-939-6000 • [carrie@clarencerichard.com](mailto:carrie@clarencerichard.com)

# Workshop by the Module

## Design Your Own Class • Check Off the Subjects You Want

### 1 Safety: Developing Confined Space-Lockout Written Procedure.

Safety is number 1. Accident prevention is key. This class defines the hazards around the plant and develops the written procedures required by OSHA . These procedures are designed for the plant operational people to easily write up the procedures for their particular application. Be Safe. Be Compliant.

Safety Director, Plants Manager, Plant Technician, Plant Mechanic, Operator, Trainee

### 2 Safety: Handling Asphalt Oil, Proving Safety Interlocks, Electrically Safe Maintenance Procedures, Damage Control.

Many people in the industry know of people burned by asphalt oil. There is no excuse for it. Burner and Material Handling Interlocks sometimes fail. Don't find out by accident your interlock does not work. Many Interlocks can be checked just by how equipment is operated. Just because you tripped a breaker, does not mean the circuit is safe to work on. Insure your people know that. The drum mixer stops rotating and 2,000 degree gases rush to your baghouse. Asphalt oil saturates the inside of your drum. What do you do first, second, third... ?

Safety Directors, Plants Manager, Plant Technician, Plant Mechanic, Operator, Trainee

### 3 Drum/Trunnion Maintenance

Balancing the sloped drum on tires is a technique that requires understanding the various load dynamics on trunnions and bearings. Troubleshooting problems and making adjustments ahead of the time bearings, tires, trunnions, drives, motors and switchgear fail reduces preventable downtime. Amp gauges, trunnion and tire wear tell a story—what's happening—what needs doing?

Equipment Buyers, Plants Manager, Plant Technician, Plant Mechanic, Operator, Trainee

### 4 Batch Plant Operation

Some Batch Plants are unnecessarily running slow while producing lower quality mix. What do you check if you're too rich or too lean? Adjusting the plant running procedure will tell the story. Some plants will produce a dryer batch every now and then. Why, and what can be done?

Equipment Buyers, Plants Manager, Plant Technician, Plant Mechanic, Operator, Trainee, QC

### 5 Aggregate Storage, handling and Feeder Systems      6 Asphalt Mix and Silo Operation

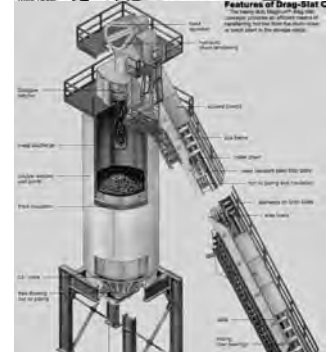
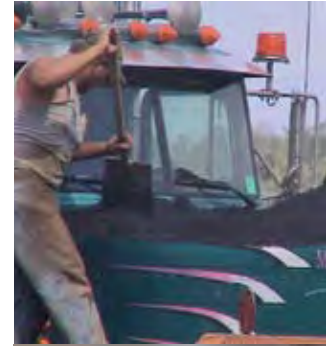
Cold feed Bins, Rap Bins are volumetric feeders and relatively easy to operate. Mineral filler and dust silos can be difficult if not equipped correctly. Now, with SMA and WMA, we are adding all sorts of material to our mix from wax beads to water, or fiber to powders, even liquid chemicals. Venting gets to be a problem with some weighing devices when blowing material in the silo and blowing material away from the silo discharge scale. The Exhaust Fan is a dust feeder. The more the damper is opened, the more dust is taken from the dryer. The dust makes a pit stop in the baghouse before being returned in spurts, partially returned or rejected. Some plants use a dust surge bin to even out the dust flow.

Equipment Buyer, Plants Manager, Plant Technician, Plant Mechanic, Operator, Trainee, QC

### 7 Scales and Meters

Continuous weigh scales are the most difficult to install, calibrate and maintain. Belt Scales, Flow Scales, Flow Meters etc may be made accurate for the rate the scale was calibrated at but may not be accurate at rates significantly different than that. Learn how to check for that and then correct it. Learn how to spot check problems as the plant is producing. Stop the process before making all that bad mix.

Equipment Buyer, Plants Manager, Plant Technician, Plant Mechanic, Operator, Trainee, QC



## 8 Control System Operation

Control systems are always changing. When something is wrong and they're not operating correctly, it can be hard to find the problem when you lack proper understanding of the dynamics. A step by step procedure from open loop control through the many closed loop control situations and theoretical plant control problems are introduced. Participants are asked for ideas of the symptoms of the control behavior. The role is reversed later when symptoms are presented and participants are asked what the problems may be. Control systems are made up of all types of electro-mechanical devices.

Understanding electrical helps one become a thorough troubleshooter.

Equipment Buyer, Plants Manager, Plant Technician, Plant Mechanic, Operator, Trainee, QC



## 9 Burner Operation      10 Hot Oil Heating

Combustion occurs when fuel, air and ignition unite. Complete combustion is achieved under the right conditions. Incomplete combustion reduces production, and increases energy and maintenance costs. Combustion efficiency can be monitored by the CFO when comparing energy bills and production. Learn what's acceptable and when a burner tune up is necessary. Plant Mechanics will learn how to tune the burner with or without a combustion analyzer, and to troubleshoot problems and learn how to fix them.

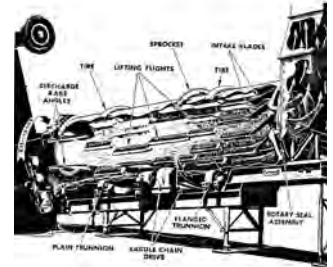
CFO, Equipment Buyer, Plants Manager, Plant Technician, Plant Mechanic, Operator, Trainee



## 11 Aggregate Drying

Learn how drying takes place under the many different conditions. Counter flow drying requires bigger and better pollution control equipment than parallel flow drying. Why? Learn about proper temperatures and pressures and compare them to what your plant is running at. Make adjustments or repairs to meet the proper criteria and raise your production. Learn how to measure effectiveness of the veiling flights. Some plants have the paint burned off one side of the stack. Why?

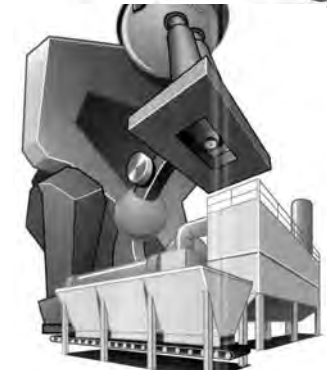
CFO, Equipment Buyer, Plants Manager, Plant Technician, Plant Mechanic, Operator, Trainee



## 12 Plant Production Troubleshooting

The plant behaves differently with various production rates and aggregates flowing through the dryer at different times of the year. Consequently, it becomes difficult to determine what's acceptable for the equipment and conditions. Learn to size up your situation for the production rate your plant *should* be able to attain, and for the energy consumption your plant *should* require. If you're not reaching these benchmarks, you're losing money. A lot of money is spent at the plant—don't make the operator the only one in charge of your purse strings. The plant is armed with many useful instruments. Teach your operator a profitable, safe way to manage it.

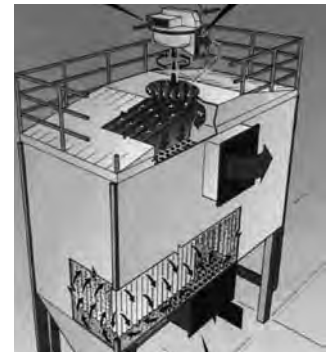
CFO, Equipment Buyer, Plants Manager, Plant Technician, Plant Mechanic, Operator, Trainee



## 13 Baghouse & Primary Collector Operation

The purpose of this pollution control equipment is to keep the air clean and as discussed in Module 4.0, to return material back to the mix. Reverse Air Bag systems clean large sections of the baghouse over a long period of time compared to the Pulse Jet systems. How do these very different systems affect combustion, production and mix quality. How should these be maintained, operated and protected?

CFO, Equipment Buyer, Plants Manager, Plant Technician, Plant Mechanic, Operator, Trainee



## 14 Plant Performance Evaluation

Look at the big picture and then focus on the small details. Set up a program to measure daily plant performance while documenting the many variables affecting the plant situation. Make some changes and measure to see if it was a positive or negative. Set up your operation so it uses the least amount of energy while allowing max production. Take snap shots of the plant behavior in different situations. Piece them together for the big picture over time. Plant operation is not an art, it is a science and a business. Run it by the numbers.

CFO, Equipment Buyer, Plants Manager, Plant Technician, Plant Mechanic, Operator, Trainee



## □ 1 Basic Electricity

'Understanding electricity has not been made so easy', is a common remark that has been made over the 15 years this Workshop has been performed. We approach this module as if the participant has no idea how electricity works. Many claim they only know enough to stay away from it. If you repeat these next six modules enough times, you will have a good foundation to work from. You will be able to pass along observations to plant controls people over the phone, trouble shoot and make some repairs yourself, working on equipment safely.

Plant Manager, Plant Technician, Plant Mechanic, Operator, Trainee

## □ 2 Circuit Analysis

What measurements should we measure in a good working circuit? Once we know that, a circuit not working is again measured then analyzed on the different measurements between a good working circuit and a bad circuit. Directions are determined where to measure next until we make the determination of the fault. This may seem easy. Participants normally need coaxing to measure the circuit under the condition it failed. Participants are tested at the end of each module and are encouraged to repeat the module as many times to make one most proficient.

Plants Manager, Plant Technician, Plant Mechanic, Operator, Trainee

## □ 3 Meter Usage

The meters measure resistance, voltage and amperage. Depending on the circumstances, one needs to set these up properly to safely read the value being measured. Some meters are auto ranging while other meters need to be ranged. Know when your meter is reading correctly and when it is not.

Plant Manager, Plant Technician, Plant Mechanic, Operator, Trainee

## □ 4 Troubleshoot – Beginner

Every plant has many high voltage motors and motor starters that require troubleshooting, maintenance and repair. It's important the job is done right and safely. OSHA requires circuits to be measured for no voltage when a disconnect is used to isolate the voltage from employees. If your people are in motor control cabinets and rewire motors, this alone is reason enough to be taking this module.

Plants Manager, Plant Technician, Plant Mechanic, Operator, Trainee

## □ 5 Troubleshoot – Advance

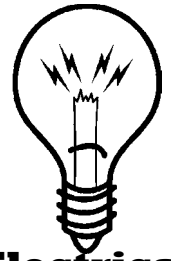
Electrical controls is more than supplying 480 vac or 120 vac to lights, motors and coils, etc. Equipment is also controlled from the varying AC and DC signals from load cells, VFDs, DC Motor controls, tachometers, potentiometers, etc. These circuits are explained and problems introduced into the circuits and then the Symptoms Game starts. This game is very effective in getting our point across and the challenge makes it fun for all.

Plants Manager, Plant Technician, Plant Mechanic, Operator, Trainee

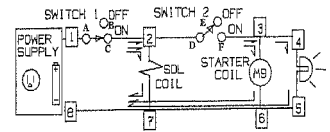
## □ 6 Troubleshoot – Expert

A closed loop control system is studied, then analyzed for the resulting symptoms once the system has been given a problem. This Module requires all the knowledge and skill gained from the previous Electrical Modules plus. The problem may not be an electrical one or a mechanical one but parameters programmed on a VFD or Blending control or a Continuous Weigh Scale. The problem may be intermittent or continuous. The problem may be in the control house or at the equipment location or in the motor control room or the cable in between.

Plants Manager, Plant Technician, Plant Mechanic, Operator, Trainee



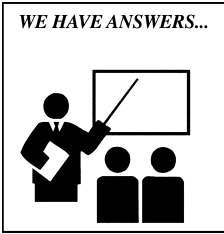
**Electrical**



SWITCH 1 AND 2 ON  
SOLENOID OFF  
STARTER OFF  
LIGHT OFF

FIND THE PROBLEM WITH YOUR TEST METER  
WHERE IS OUR FIRST GOOD CHECK





# Plant Operation Workshop Registration Form

## Clarence Richard Company

**952-939-6000**

[carrie@clarencerichard.com](mailto:carrie@clarencerichard.com) [www.clarencerichard.com](http://www.clarencerichard.com)



Company Information		(*) Required Field
*Company Name _____	Date: _____	
Address 1 _____	*Contact Name _____	
Address 2 _____	*Contact Phone _____	
*City _____	Contact Email _____	
*State _____ *ZIP _____	*Fax Number _____	

Payment Information	
Amount Due From Totals Below \$ _____	Payment is due prior to workshop by check or credit card. Make checks payable to Clarence Richard Co. Mail registration to: 3908 Tonkewood Rd, Minnetonka, MN 55345 or Fax to 952-939-1026 or email to <a href="mailto:carrie@clarencerichard.com">carrie@clarencerichard.com</a>
Payment Method	Check <input type="checkbox"/> Visa <input type="checkbox"/> Mastercard <input type="checkbox"/>
Credit Card Num. _____	Card Exp. Date _____ 3 Digit Security Code _____
Name on Card _____	
Billing Address _____	
<p><b>Information Disclaimer:</b> The information provided in workshops is considered by us as always being in a state of continuous improvement. This information is our opinion and the opinion of others gathered through knowledge, experience and research. The information here is true to the best of our knowledge. Your experiences and research may be different. This information is provided as a guide. Consult professional engineering for your application. CR Company liability for any costs incurred at anytime are limited to the course fee of a particular participant.</p>	

Participant Registration <i>(Place a checkmark by the course(s) and reference manual selection.)</i>			
*Participant Name _____	*Phone _____		
Title _____	*Email _____		
Course	Modules	On-Line	Optional Manual
-Plant Operation Workshop	(P1-P14)	\$995 <input type="checkbox"/>	\$195 <input type="checkbox"/>
-Plant Quality Assurance	(P4-P8)	\$595 <input type="checkbox"/>	\$95 <input type="checkbox"/>
-Plant Safety	(P1, P2, E2)	\$295 <input type="checkbox"/>	\$45 <input type="checkbox"/>
-Plant Financial	(P9, P12, P14)	\$195 <input type="checkbox"/>	\$35 <input type="checkbox"/>
- Plant Operation Workshop and Electrical Mechanical Systems and Troubleshooting	(P1-P14) (E1-E6)	\$1590 <input type="checkbox"/>	\$290 <input type="checkbox"/>
Attendance/achievement certification or CEU's available upon request.		<b>TOTAL</b>	<b>\$</b>

# Workshop Curriculum



**Plant Operation Workshop P1 - P14:** This course provides a comprehensive wide variety of topics aimed at broadening the students overall understanding on how asphalt plants work with an emphasis on safety. Plant Managers, Plant Technicians, Plant Mechanic, Operators, Trainees and Equipment Buyers will all benefit from this course.

**Plant Quality Assurance P4 - P8:** This course focuses on information that will benefit Quality Control Engineers, Bituminous Material Engineers and anyone focused on production and mix quality.

**Plant Safety P1, P2, E2:** This course concentrates specific safety related topics from the Plant Operation Workshop and Safe Meter Usage for Safety Directors and those wishing to focus on safety related material

**Plant Financials P9, P12, P14:** This course concentrates Plant Operation Workshop topics focused on financial concerns with purchasing, operating and maintaining a plant. This course is targeted towards CFOs, and Equipment Buyers.

**Electrical Trouble Shootin E1-E6:** Course focus is on developing safe electrical maintenance and troubleshooting skills for non-electricians working around plant production equipment. Plant Managers, Plant Technicians, Plant Mechanic, Operators and trainees would all benefit from this course.

## Plant Operation Workshop P1-14

### **P1 Safety: Handling Asphalt Oil, Proving Safety Interlocks, Electrically Safe Maintenance Procedures, Damage Control.**

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### **P2 Safety: Developing Confined Space Lockout Written Procedure.**

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### **P3 Drum/Trunnion Maintenance**

Balancing the sloped drum on tires is a technique that requires understanding varying load dynamics on trunnions and bearings. Troubleshooting problems and making adjustments ahead of bearing, tire, trunnion, drive, motor and switchgear failure reduces preventable downtime. Amp gauges, trunnion and tire wear tell a story—what's happening—what needs doing?

### **P4 Batch Plant Operation**

Some Batch Plants are unnecessarily running slow while producing lower quality mix. What do you check if you're too rich or too lean? Adjusting the plant running procedure will tell the story. Some plants will produce a dryer batch every now and then. Why, and what can be done?

### **P5 Feeders, Filler silos and Dust Bins**

Cold feed Bins, Rap Bins are volumetric feeders and relatively easy to operate. Mineral filler and dust silos can be difficult if not equipped correctly. Now, with SMA and WMA, we're adding all sorts of material to our mix from wax beads to water, or fiber to powders, and even liquid chemicals. Venting can be a problem with some weighing devices when blowing material in the silo and blowing material away from the silo discharge scale. The Exhaust Fan is a dust feeder. The more the damper is opened, the more dust is taken from the dryer. The dust makes a pit stop in the baghouse before being returned in spurts, partially returned or rejected. Some plants use a dust surge bin to even out the dust flow.

### **P6 Silo Operations**

Controlling silo level helps reduce wear and segregation. Batcher operation is most important. Some Batcher controls are significantly more effective than others. Prevent the Silo Batch Master from dropping tons of mix on truck hoods. Loading techniques can help reduce segregation. What causes significant temperature drops between the drum discharge and the silo discharge and what can be done about it?

### **P7 Scales and Meters**

Continuous weigh scales are the most difficult to install, calibrate and maintain. Belt scales, flow scales, flow meters, etc may be accurate for the rate a scale is calibrated for, but may not be accurate at significantly different rates. Learn how to check this and how to correct it. Learn how to spot check problems as the plant is producing. Stop the process before making all that bad mix.

## **P8 Control System Operation**

Control systems are always changing. When something is wrong and they're not operating correctly, it can be hard to find the problem when you lack proper understanding of the dynamics. A step by step procedure from open loop control through the many closed loop control situations and theoretical plant control problems are introduced. Participants are asked for ideas of the symptoms of the control behavior. The role is reversed later when symptoms are presented and participants are asked what the problems may be. Control systems are made up of all types of electro-mechanical devices. Understanding electrical helps one become a thorough troubleshooter.

## **P9 Burner Operation**

Combustion occurs when fuel, air and ignition unite. Complete combustion is achieved under the right conditions. Incomplete combustion reduces production, and increases energy and maintenance costs. Combustion efficiency can be monitored by the CFO when comparing energy bills and production. Learn what's acceptable and when a burner tune up is necessary. Plant Mechanics will learn how to tune the burner with or without a combustion analyzer, and to troubleshoot problems and learn how to fix them.

## **P10 Oil Heating**

Oil heaters operate 24 hours a day, 7 days a week, the entire construction season. Heat Transfer Fluid breaks down like motor oil. Consequently, heat is not being transferred, energy is being wasted and production may be affected. Pipe insulation is one of your best paybacks. Oil heaters have a spring startup procedure. Direct fired and electrically heated tanks can be dangerous. Tank level instruments have several benefits.

## **P11 Aggregate Drying**

Learn how drying takes place under the many different conditions. Counter flow drying requires bigger and better pollution control equipment than parallel flow drying. Why? Learn about proper temperatures and pressures and compare them to what your plant is running at. Make adjustments or repairs to meet the proper criteria and raise your production. Learn how to measure effectiveness of the veiling flights. Some plants have the paint burned off one side of the stack. Why?

## **P12 Plant Production Troubleshooting**

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## **P13 Baghouse & Primary Collector Operation**

The purpose of this pollution control equipment is to keep the air clean and as discussed in Module 4.0, to return material back to the mix. Reverse Air Bag systems clean large sections of the baghouse over a long period of time compared to the Pulse Jet systems. How do these very different systems affect combustion, production and mix quality. How should these be maintained, operated and protected?

## **P14 Plant Performance Evaluation**

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## **Sampling of e-Plant Operation Workshop**

<http://clarencerichard.adobeconnect.com/workshopdemo>

# Electrical Trouble Shooting E1-6

These courses focus on developing safe electrical maintenance and troubleshooting skills for non-electricians working around plant production equipment. Plant Managers, Plant Technicians, Plant Mechanic, Operators and trainees would all benefit from this course. Training topics and modules include:

## E1 Basic Electricity

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## E2 Meter Usage

The meters measure resistance, voltage and amperage. Depending on the circumstances, one needs to set these up properly to safely read the value being measured. Some meters are auto ranging while other meters need to be ranged. Know when your meter is reading correctly and when it is not. Safe meter usage is important when exposed to higher voltages and current capacities. This module directs the participant on proper safety procedures including the protective gear now being dictated by OSHA as directed by the New Arc Flash NFPA 70 E requirements.

## E3 Circuit Analysis

What measurements should we measure in a good working circuit? Once we know that, a circuit not working is again measured then analyzed on the different measurements between a good working circuit and a bad circuit. Directions are determined where to measure next until we make the determination of the fault. This may seem easy. Participants normally need coaxing to measure the circuit under the condition it failed. Participants are tested at the end of each module and are encouraged to repeat the module as many times to make one most proficient.

## E4 Troubleshoot – Beginner

Every plant has many high voltage motors and motor starters that require troubleshooting, maintenance and repair. It's important the job is done right and safely. OSHA requires circuits to be measured for no voltage when a disconnect is used to isolate the voltage from employees. If your people are in motor control cabinets and rewire motors, this alone is reason enough to be taking this module.

## E5 Troubleshoot – Advance

Electrical controls is more than supplying 480 vac or 120 vac to lights, motors and coils, etc. Equipment is also controlled from the varying AC and DC signals from load cells, VFDs, DC Motor controls, tachometers, potentiometers, etc. These circuits are explained and problems introduced into the circuits and then the Symptoms Game starts. This game is very effective in getting our point across and the challenge makes it fun for all.

## E6 Troubleshoot – Expert

A closed loop control system is studied, then analyzed for the resulting symptoms once the system has been given a problem. This Module requires all the knowledge and skill gained from the previous Electrical Modules plus. The problem may not be an electrical one or a mechanical one but parameters programmed on a VFD or Blending control or a Continuous Weigh Scale. The problem may be intermittent or continuous. The problem may be in the control house or at the equipment location or in the motor control room or the cable in between.

## Sampling of e-Electro-Mechanical Workshop

<http://clarencerichard.adobeconnect.com/p11825467/>