

Shovel Mechanical eLearning Course Catalog

Maintaining a skilled, knowledgeable workforce is a challenge everyone faces. With changing technologies and fluctuations within the mining industry, it can be especially daunting. Whether you need training for a new hire or a veteran, it can be difficult to find training that is engaging, technologically relevant and easy to fit into busy schedules. Product Training and Publications, the technical communication and training group within P&H Mining Equipment, strives to provide you with the knowledge, skills and competencies needed for your employees to achieve their highest performance potential.

Product Training and Publications has identified eLearning as the primary delivery method for the knowledge components of Fundamental and Product Specific Training. eLearning provides several advantages over traditional training methods:

- eLearning content can be accessed on any computer that has Internet access by any individual who has the appropriate login and password credentials.
- Immediate availability of training content. Students receive the training they require right now, when the training is required most. This provides a quicker, more productive workforce.
- Reduces the cost of training by eliminating travel, living, and other expenses associated with Instructor Led Training.
- Provides students with the ability to learn at their own pace and in their own comfortable environment.
- Improved retention of technical and operational content.
- The training content can be delivered to a large contingent of people in varying locations and be technically consistent across the board.
- Training content can be tailored to an individual's personal strengths and weaknesses. This provides a targeted more effective training solution for today's workforce.
- When used as a prerequisite to Instructor Led Training, eLearning can level the playing field between novice and senior personal. This makes the Instructor Led Training more effective by allowing the Instructor to spend more time developing skills rather than knowledge-based components.

This Course Catalog contains descriptions of the eLearning Lessons available to you through Product Training and Publications.

Lesson Duration:

Each eLearning Lesson is designed to be 45 minutes in duration. However, because eLearning is self-paced training, actual duration may vary per student.

Target Audience:

Shovel Operators, Technicians, and Engineers who will operate and/or perform maintenance on P&H Mining Shovels.

Prerequisites:

Students should have a basic working knowledge of computers, and fundamental understanding of electronics, mechanics, pneumatics, hydraulics, operation, etc., as it applies to the systems of a P&H Shovel.

Lesson Location:

eLearning content can be accessed on any computer that has Internet access by any individual who has the appropriate login and password credentials.



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Computer Requirements:

It is recommended that all computers accessing eLearning content have the basic minimum requirements:

- Internet Explorer version 7 or better.
- Flash Player version 8 or better.
- Java version 1.5 or better.
- Latest version of Windows Media Player.
- Adobe Reader version 8 or better.

Shovel Mechanical eLearning

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Shovel Mechanical eLearning (continued)

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Lesson 13.1 | Wire Rope and Strand Cable

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Module 20 Cable Reel (In Development)

Shovel Mechanical Lesson Descriptions

Module 4 General Assembly Procedures

Lesson 4.1 Pre-Assembly Cleaning

Lesson Description:

The purpose of this Lesson is to establish methods for Pre-Assembly General Cleaning and Protection Covering (after cleaning but prior to assembly). This standard applies to assembly activities of P&H Mining Equipment. It is the responsibility of each mechanic to comply with the requirements of this standard to properly maintain P&H Mining machinery.

Objectives:

Upon completion of this Lesson the student will:

- Discuss methods used for general cleaning of components prior to assembly.
- Identify protective coverings applied by P&H to preserve components that will be stored for a period of time before being assembled.

Lesson Outline:

- Topic 1 General Cleaning
- Topic 2 Protective Covering

Lesson 4.2 Fasteners and Torqueing

Lesson Description:

The purpose of this Lesson is to establish methods used to obtain proper fastener torque. This standard applies to assembly activities of P&H Mining Equipment. It is the responsibility of each mechanic to comply with the requirements of this standard to properly maintain P&H Mining machinery.

This Lesson applies to all fasteners for final assemblies that have torque requirements. Only calibrated torque wrenches with capacity to achieve the specified torque values should be used.

Objectives:

Upon completion of this Lesson the student will:

- Analyze the theory and factors that affect bolted joint pre-load principles.
- Examine fastener coatings and lubrication and their effect on bolt torque.
- Review P&H Mining recommended torque values for various grade fasteners.
- Relate fastener torque procedures to be used on P&H Mining equipment.
- Describe the basic design, operation and maintenance of hydraulic torque wrenches.
- Explore the concept and methods of bolt tensioning used to assemble P&H Mining equipment.
- Review the design and application of the SuperNut™ bolt fastener tensioning system.
- Differentiate the design and application of the TorqueRite™ clamping system.

Lesson Outline:

- Topic 1 Bolted Joint Preload Principles
- Topic 2 Types of Fasteners
- Topic 3 Fastener Coatings
- Topic 4 Hydraulic Torque Wrenches
- Topic 5 Pneumatic Torque Wrenches
- Topic 6 Hydraulic Bolt Tensioner
- Topic 7 Applying Torque to Fasteners
- Topic 8 SuperNuts™
- Topic 9 TorqueRite™ Clamps

Lesson 4.3 Interference Fit and Installation

Lesson Description:

Bearings, bushings, couplings, dowel pins, gears, keys, pins, and splines are frequently installed using interference fits. Procedures defined in this Lesson apply to assembly activities of P&H Mining Equipment and are recommended for all users.

Objectives:

Upon completion of this Lesson the student will:

- Review procedures on interference fit and installation of various types of component assemblies, such as bushings, couplings, dowel pins, gears, keys, splines and coupling bolts.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Bushings
- Topic 3 Couplings
- Topic 4 Dowels
- Topic 5 Gears
- Topic 6 Keys
- Topic 7 Pins
- Topic 8 Splines
- Topic 9 Coupling (Body Fit) Bolts

Lesson 4.4 Bearings

Lesson Description:

Bearings are precision parts. To retain their accuracy and reliability they must be handled with care. They should be protected against corrosion, kept clean from contamination from foreign materials, and should not be subjected to sharp and heavy impacts. This Lesson provides information on how this is accomplished.

Objectives:

Upon completion of this Lesson the student will:

- Outline the proper method of handling and storing bearings.
- Describe the preparation and methods to be followed when installing interference fit bearing assemblies.
- Compare the concept of press fit versus sliding fit.

Lesson Outline:

- Topic 1 Bearing Handling
- Topic 2 Types of Bearing Assemblies

Lesson 4.5 Shrink Fit Clearances Required for Assembly

Lesson Description:

This Lesson covers the clearances required for assembly based on Running or Sliding Fits Class RC4. Clearances required for Close Fit or Shrink Fit Assemblies using Liquid Nitrogen or Dry Ice will also be defined.

Objectives:

Upon completion of this Lesson the student will:

- Determine how to compute shrink fit clearance required for assembly.
- Solve examples illustrating calculation procedure to determine shrink fit clearance required for assembly.
- Discuss procedure used to shim bearing retainer caps that clamp bearing outer races in housing bores.
- Review procedure used to shim bearing retainer caps that provide clearance to bearing outer races in housing bores.
- Define procedure used to shim shaft end plates that clamp bearing inner races on shaft shoulders.
- Identify procedure used to shim to seat an inner bearing race or member with clearance against a shaft shoulder.

Lesson Outline:

- Topic 1 Determination of Shrink Fit Clearances
- Topic 2 Clearance Examples

Lesson 4.6 Lubrication During Assembly

Lesson Description:

This Lesson addresses lubrication recommendations for assembly operations. This standard applies to assembly activities of P&H Mining Equipment, and is recommended procedure for all users. It is the responsibility of each mechanic to comply with the requirements of this standard to properly maintain P&H Mining machinery.

Objectives:

Upon completion of this Lesson the student will:

- Relate lubrication recommendations for assembling components.

Lesson Outline:

- Topic 1 Assembly Lubrication Recommendations

Lesson 4.7 Shimming Shaft and Bearing Assemblies

Lesson Description:

This Lesson applies to assembly activities on P&H Mining Equipment. These procedures are meant to define the proper method for shimming shaft and bearing assemblies for clamping or end-play allowance. The Lesson discusses the types of shims and their uses as well as the procedures to properly shim various assemblies.

Objectives:

Upon completion of this Lesson the student will:

- Examine the proper method of shimming shaft and bearing assemblies to clamp and/or set the proper end play allowance.
- Describe the various types and application of shims used on P&H Mining Equipment.

Lesson Outline:

- Topic 1 General Principles and Practices
- Topic 2 Types of Shims and Use
- Topic 3 Shimming Bearing Retainer Caps (Clamping)
- Topic 4 Shimming Bearing Retainer Caps (Clearance)
- Topic 5 Shimming End Plates (Clamping)
- Topic 6 Shimming End Plates (Clearance)

Lesson 4.8 Sealing

Lesson Description:

This Lesson applies to the P&H Mining Equipment assembly activity to establish methods of proper application, installation, and assembly of seals and sealants.

Objectives:

Upon completion of this Lesson the student will:

- Relate the procedure and precautions to be observed when working with metal-to-metal joints.
- Describe the procedure used for the proper installation and assembly of O-rings.
- State the installation guidelines required to assure proper installation and function of a labyrinth seal assembly.
- Discuss the proper procedures to be used when assembling the two types of lip seals used on P&H Mining equipment.
- Identify the proper method of assembling threaded pipe joints.

Lesson Outline:

- Topic 1 Metal-to-Metal Joints
- Topic 2 Installation and Assembly of O-Rings
- Topic 3 Assembly of Labyrinth Seals
- Topic 4 Installation and Assembly of Lip Seals
- Topic 5 Threaded Pipe Joints

Lesson 4.9 Bushings

Lesson Description:

This Lesson describes the purpose, installation issues, and lubrication requirements for P&H manufactured Bushings.

Objectives:

Upon completion of this Lesson the student will:

- Explain the purpose and handling of P&H bushings.

Lesson Outline:

- Topic 1 Purpose
- Topic 2 Handling
- Topic 3 Lubrication

Lesson 4.10 Gearcase Manufacturing

Lesson Description:

This Lesson provides information about typical gearcases, or transmissions, on a P&H Electric Mining Shovel. This lesson will also provide information on the manufacturing process used to create P&H Gearcases, Gears, and Pinions, the purpose and requirement for sealing Gearcases, and the purpose and requirements for Lubrication of Gearcases.

Objectives:

Upon completion of this Lesson the student will:

- Identify and locate the transmission assemblies used for each of the primary shovel motions.
- Discuss the various types of gearing used on P&H shovels.
- Describe how P&H Gears, Pinions, and Gearcases are manufactured.
- Examine the various types of sealing used on P&H Transmission assemblies and their purpose.
- Describe how the gearing, bearings, and bushings are lubricated in P&H transmissions.
- Review the external Lubrication Systems available for the Hoist, Swing, and Crowd Transmissions.

Lesson Outline:

- Topic 1 Gearcase Locations and Descriptions
- Topic 2 Gearing
- Topic 3 Gearcase Specifications
- Topic 4 Gear Manufacturing
- Topic 5 Pinion Manufacturing
- Topic 6 Gearcase Sealing
- Topic 7 Gearcase Lubrication

Lesson 4.11 Motor Alignment

Lesson Description:

This Lesson provides information about motor coupling alignment as it applies to P&H Mining Equipment.

Objectives:

Upon completion of this Lesson the student will:

- Have a thorough understanding of the two components of shaft misalignment, angular and offset.
- Have a thorough understanding of the two planes of potential misalignment, horizontal and vertical.
- Understand the dangers of motor/shaft misalignment.
- Have a basic understanding of the steps required to align a typical P&H motor shaft.

Lesson Outline:

- Topic 1 Shaft Alignment
- Topic 2 Typical Alignment Procedure

Module 5 General Inspection

Lesson 5.1 Predictive Diagnostics

Lesson Description:

This Lesson provides information about Predictive Diagnostics based on a brief orientation of the subject, predictive technique applications through examples obtained from P&H shovels, P&H Drills and LT loaders, and finally, the actual format of the predictive report will be explained.

Objectives:

Upon completion of this Lesson the student will:

- Understand the basics of vibration analysis as it applies to P&H equipment.
- Understand the basics of oil analysis as it applies to P&H equipment.
- Understand the basics of thermography analysis as it applies to P&H equipment.
- Be able to apply the information through the predictive reports.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Thermography
- Topic 3 Vibration Analysis
- Topic 4 Oil Analysis
- Topic 5 Final Report

Lesson 5.2 Transmission Inspections

Lesson Description:

This Lesson provides detailed information on how to inspect the gears associated with P&H Electric Mining Shovel Transmissions and gear sets.

Objectives:

Upon completion of this Lesson the student will:

- Understand the importance and periodicity requirements of transmission inspections on P&H Mining Equipment.
- Have a thorough understanding of what is involved and required in a visual inspection of P&H transmissions and gearcases.
- Understand the conditions associated with gear wear.
- Understand the conditions associated with plastic flow.
- Understand the conditions associated with surface fatigue.
- Understand the conditions associated with breakage.
- Understand the different gear failure conditions associated with the process.
- Have a thorough understanding of the process required to make a contact pattern check.
- Understand how to make a basic diagnosis based on a contact pattern check.

Lesson Outline:

- Introduction
- Topic 1 Visual Inspection
- Topic 2 Wear
- Topic 3 Plastic Flow
- Topic 4 Surface Fatigue
- Topic 5 Breakage
- Topic 6 Failures Associated with the Process
- Topic 7 Contact Patterns

Lesson 5.3 Oil Analysis

Lesson Description:

This Lesson provides detailed information on how to take an oil sample when performing an inspection on the gears associated with P&H Electric Mining Shovel Transmissions and gear sets.

Objectives:

Upon completion of this Lesson the student will:

- Identify typical oil sampling points for P&H Transmissions.

Lesson Outline:

- Topic 1 Oil Analysis
- Topic 2 General Procedure

Module 6 Disc Brakes

Lesson 6.1 Introduction to Disc Brakes

Lesson Description:

This Lesson describes the component functions and system operation of the disc brakes on P&H electric mining shovels and crawler draglines.

Objectives:

Upon completion of this Lesson the student will:

- Understand the terms set and release, and how they apply to disc brakes.
- Identify the location of the disc brakes on the mining shovel.
- Understand the difference between static and dynamic braking.
- Identify brake components that must be correctly oriented when the disc brake is assembled.
- Recognize how disc brake assemblies must be rotated correctly for orientation when installed.
- Identify and locate the various components of the disc brake system.
- Have a working knowledge of how disc brake components fit together to create a disc brake assembly.
- Identify correct reference sources to find brake assembly part numbers and become familiar with how P&H brake assembly part numbers are found.
- Describe the concept of stored mechanical energy and some of the hazards caused by it.
- Describe how to remove stored mechanical energy from a mechanical drive train before maintenance will be performed on it.

Lesson Outline:

- Topic 1 Disc Brake Overview
- Topic 2 Disc Brake Components
- Topic 3 Brake Orientation
- Topic 4 Stored Energy in Brake Safety
- Topic 5 Identification of Brakes

Lesson 6.2 Brake System Operation

Lesson Description:

This Lesson provides information on the brake systems associated with the P&H Electric Mining Shovel and how they operate.

Objectives:

Upon completion of this Lesson the student will:

- Identify the operator's controls and displays used for the brake system.
- Describe how the operator's controls are used to release and set the brakes and what the indicators display.
- Describe how the operator's controls are used to transfer between dig mode and propel mode and what the indicators display.
- Identify the situations that cause a brake hold mode.
- Identify the effects of each situation that causes a brake hold mode.
- Identify the action that must be taken to bring the shovel out of each brake hold mode.
- Identify the number and location of the brake system transducers.

- Describe the function of the transducers in the brake system.
- Identify the programmed set points for the air pressure for brakes in the shovel's logic control system.
- Identify the limit switches.
- Understand the function of the limit switches.
- Describe the sequence of events that occurs as the brake releases and sets.
- Describe what makes a brake that is set provide friction for braking.
- Identify the brake system alarms.
- Recognize the logic that is generating the alarms.
- Identify the input devices, transducers and limit switches that provide the signals that generate the alarms.

Lesson Outline:

- Topic 1 Operator Controls
- Topic 2 Brake Hold Mode
- Topic 3 Brake System Transducers
- Topic 4 Brake Limit Switches
- Topic 5 Brake System Alarms
- Topic 6 How Disc Brakes Work

Lesson 6.3 Disc Brake Maintenance

Lesson Description:

This Lesson provides information on the inspection and maintenance issues related with the disc brakes on P&H equipment.

Objectives:

Upon completion of this Lesson the student will:

- Reference the maintenance manual for detailed information to accompany this Lesson.
- Identify which inspections are visual inspections, mechanical inspections, and operational inspections.
- Understand which inspections are performed on disc brakes.
- Identify the 3 field maintenance tasks routinely performed on disc brakes.
- Describe how each of the 3 maintenance tasks are performed.

Lesson Outline:

- Topic 1 Disc Brake Inspection
- Topic 2 Disc Brake Field Maintenance

Lesson 6.4 Disc Brake Burnish-In Procedure

Lesson Description:

This Lesson provides information for the hoist, crowd, swing, and propel motion burnish-in procedure for disc brakes.

Objectives:

Upon completion of this Lesson the student will:

- Understand the burnish-in procedure for the disc brakes on P&H equipment.
- Understand how to verify static holding torque for the disc brakes on P&H equipment.
- Understand how to verify dynamic braking torque for the disc brakes on P&H equipment.

Lesson Outline:

- Topic 1 Procedure
- Topic 2 Static Holding Torque Test
- Topic 3 Dynamic Braking Torque Test

Module 7 Propel System

Lesson 7.1 Propel System Description

Lesson Description:

This Lesson provides a brief overview of the propel system components associated with P&H Electric Mining Shovels.

Objectives:

Upon completion of this Lesson the student will:

- Be able to identify the major assemblies and components of the Propel System.
- Be able to describe the function of the major assemblies and components of the Propel System.
- Explain the basic theory of operation of the Propel System on P&H Electric Mining Shovels.
- Describe the differences between older Propel Drive System and the newer Delta Drive System.

Lesson Outline:

- Topic 1 Propel System Components
- Topic 2 Propel System Component Detail

Lesson 7.2 Propel System Inspections

Lesson Description:

This Lesson provides the information required to inspect the propel and crawler systems of the electric mining shovel.

Objectives:

Upon completion of this Lesson the student will:

- Be able to identify the major assemblies and components of the propel and crawler systems.
- Be able to describe the function of the major assemblies and components for the propel and crawler systems.
- Have a thorough understanding of the inspection requirements for the components of the propel system.
- Have a thorough understanding of the inspection requirements for the components of the crawler system.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Propel System Components
- Topic 3 Crawler System Components

Lesson 7.3 Crawler Adjustments

Lesson Description:

This lesson provides the technician information on adjusting and maintaining the components of the crawler track.

Objectives:

Upon completion of this Lesson the student will:

- Understand the importance of crawler track tension and how to determine if track tension is ideal, too tight, or too loose.
- Have a thorough understanding of how to adjust crawler track tension.
- Have a thorough understanding of how to adjust the front idler shaft retainer collars.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Adjusting Crawler Track Tension
- Topic 3 Adjusting Front Idler Shaft Retainer Collars

Module 8 Machinery House

Lesson 8.1 Machinery House

Lesson Description:

This lesson describes the components of the machinery house and their functions.

Objectives:

Upon completion of this Lesson the student will:

- Be able to identify and describe the components of the machinery house.
- Have a thorough understanding of the components associated with the walkways, handrails, and ladders.
- Understand the steps required to remove and install the roof panels for performing maintenance on components within the machinery house.

Lesson Outline:

- Topic 1 Machinery House Components
- Topic 2 Walkways, Handrails, and Ladders
- Topic 3 Roof Panels

Module 9 House Filtration

Lesson 9.1 AirScrubPro

Lesson Description:

This lesson provides the technician with information they need to understand the components of the AirScrubPro system, how they operate, and how they should be maintained.

Objectives:

Upon completion of this Lesson the student will:

- Be able to identify the components of the AirScrubPro system and describe their function/purpose in the system.
- Have a thorough understanding of the theory of operation as it related to the AirScrubPro system
- Have a thorough understanding of how to inspect the components of the AirScrubPro system
- Understand the steps required to adjust the air pressure regulator, replace the cartridge filters, and clearing objects within the screw conveyor.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Theory of Operation
- Topic 3 System Inspection
- Topic 4 System Adjustments

Lesson 9.2 Dynavane

Lesson Description:

This lesson provides the technician with information they need to understand the components of the Dynavane machinery house pressurization and filtration system, how it operates, and how it should be maintained.

Objectives:

Upon completion of this Lesson the student will:

- Be able to identify the components of the Dynavane system and describe their function/purpose in the system.
- Have a thorough understanding of the theory of operation as it relates to the Dynavane system.
- Have a thorough understanding of how to inspect the components of the Dynavane system.
- Understand the steps required to adjust the machinery house blower fan blades and cleaning the Dynavane filter blades.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Theory of Operation
- Topic 3 System Inspection
- Topic 4 System Adjustments

Module 10 Mine Air

Lesson 10.1 Mine Air

Lesson Description:

This lesson provides a general overview of the Mine Air System, its controllers, and maintenance required to keep the system operating efficiently.

Objectives:

Upon completion of this Lesson the student will:

- Be able to identify the major components of the Mine Air System.
- Have a basic understanding of the operation of the Mine Air System.
- Be able to identify the SEC and MLC controllers, and their functions, associated with the Mine Air System.
- Have a general understanding of the maintenance required to keep the Mine Air System operating efficiently.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Mine Air Controllers
- Topic 3 Maintenance

Module 11 Swing System

Lesson 11.1 Swing System Description

Lesson Description:

This Lesson provides technicians with an introduction to the Swing System components.

Objectives:

Upon completion of this Lesson the student will:

- Be able to identify and locate all major components of the swing system.
- Have a thorough understanding of the purpose of the components used in the swing system.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Component Identification

Lesson 11.2 Swing Roller Circle

Lesson Description:

This lesson provides the technician information on inspecting and maintaining the components of the swing roller circle.

Objectives:

Upon completion of this Lesson the student will:

- Have a thorough understanding of how to inspect the components and assemblies of the swing roller circle.
- Have a thorough understanding of the procedures required to repair the upper roller path.
- Have a thorough understanding of the procedures required to repair the lower roller path.
- Have a thorough understanding of the procedures required to repair gaps between the swing ring gear and carbody.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Inspecting the Roller Paths
- Topic 3 Inspecting the Ring Gear
- Topic 4 Inspecting all other Roller Circle Components
- Topic 5 Repairing the Upper Roller Path
- Topic 6 Repairing the Lower Roller Path
- Topic 7 Repair Gaps between the Ring Gear and Carbody

Lesson 11.3 Center of Rotation

Lesson Description:

This Lesson provides the technician information on inspecting and maintaining the components of the center gudgeon.

Objectives:

Upon completion of this Lesson the student will:

- Have a thorough understanding of how to inspect the components associated with the center gudgeon and be instructed on when the center gudgeon adjusting nut needs to be adjusted.
- Have a thorough understanding of the procedures required to adjust the center gudgeon adjusting nut.
- Understand when the spherical washer and thrust washer on the center gudgeon needs to be replaced.
- Have a thorough understanding of the steps required to replace the spherical washer and thrust washer on the center gudgeon.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Inspecting the Center Gudgeon
- Topic 3 Adjusting the Center Gudgeon Adjusting Nut
- Topic 4 Spherical and the Thrust Washer Replacement

Module 12 Hoist System

Lesson 12.1 Hoist System Description

Lesson Description:

This lesson provides technicians with an introduction to the Hoist System components.

Objectives:

Upon completion of this Lesson the student will:

- Be able to identify and locate all major components of the hoist system.
- Have a thorough understanding of the purpose of the components used in the hoist system.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Component Identification

Lesson 12.2 Hoist Gear Case

Lesson Description:

This lesson provides the technician information on inspecting and maintaining the components of the hoist gear case.

Objectives:

Upon completion of this Lesson the student will:

- Be able to identify all the components of the hoist gear case and describe their function/purpose in the system.
- Have a thorough understanding of how to inspect the components and assemblies of the hoist gear case.
- Have a thorough understanding of the procedure required to adjust the hoist gear case supports.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Hoist Gear Case Inspection
- Topic 3 Adjusting the Hoist Gear Case Supports

Lesson 12.3 Hoist Drum

Lesson Description:

This lesson provides the technician information on inspecting and maintain the components of the hoist drum.

Objectives:

Upon completion of this Lesson the student will:

- Be able to identify all the components of the hoist drum and describe their function/purpose in the system.
- Have a thorough understanding of how to inspect the components and assemblies of the hoist drum.
- Have a thorough understanding of the procedure required to engage/disengage the hoist drum locking bar.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Inspecting the Hoist Drum
- Topic 3 Hoist Drum Locking System

Lesson 12.4 Hoist Ancillary System

Lesson Description:

This lesson provides the information a technician requires to utilize and maintain the remote hoist controller and cable tuggers.

Objectives:

Upon completion of this Lesson the student will:

- Have a thorough understanding of how to utilize and maintain the remote hoist controller
- Have a thorough understanding of how to utilize and maintain the cable tuggers.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Remote Hoist Controller
- Topic 3 Cable Tugger Operation

Module 13 Wire Rope

Lesson 13.1 Wire Rope and Strand Cable

Lesson Description:

This lesson provides operators and maintainers the information they require to inspect and maintain the wire rope on the equipment.

Objectives:

Upon completion of this Lesson the student will:

- Have a thorough understanding of the components of a wire rope including wires, strands, core, grades, lay direction, lay length, classification, and how to seize strands before cutting.
- Have a thorough understanding of why, how, and what to inspect on wire rope and the criteria required for its replacement.
- Understand how to handle wire rope from receipt to installation.
- Have a thorough understanding how to inspect sheave and drum grooves.
- Be able to describe the type of wire rope used on the hoist system and understand what is required for their inspection.
- Be able to describe the type of wire rope used for the boom suspension cables and understand what is required for their inspection.
- Be able to describe the type of wire rope used on the dipper trip system and understand what is required for its inspection.

Lesson Outline:

- Topic 1 Wire Rope Basics
- Topic 2 Wire Rope Inspection
- Topic 3 Handling Wire Rope
- Topic 4 Inspecting Sheave and Drum Grooves
- Topic 5 Hoist Ropes
- Topic 6 Boom Suspension Cables
- Topic 7 Dipper Trip Cable

Module 14 Attachments

Lesson 14.1 Attachments

Lesson Description:

This less provides maintenance personnel the information they require to inspect and maintain the attachments associated with the boom assembly.

Objectives:

Upon completion of this Lesson the student will:

- Be able to identify and describe the attachment components associated with the boom assembly.
- Have a thorough understanding of the inspection process required for the boom.
- Have a thorough understanding of the inspection process required for the gantry.
- Have a thorough understanding of the inspection process required for the boom point assembly.
- Have a thorough understanding of the inspection process required for the boom limit resolver.
- Have a thorough understanding of the inspection process required for the hoist rope guides.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Boom Assembly
- Topic 3 Gantry
- Topic 4 Boom Point Assembly
- Topic 5 Boom Limit Resolver
- Topic 6 Hoist Rope Guides

Module 16 Crowd System

Lesson 16.1 Crowd System Description

Lesson Description:

This lesson provides technicians with an introduction to the Crowd System components on P&H Electric Mining Shovels.

Objectives:

Upon completion of this Lesson the student will:

- Be able to identify and locate all major components of the crowd system.
- Have a thorough understanding of the purpose of the components used in the crowd system.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Component Identification

Lesson 16.2 Crowd Belt Assembly

Lesson Description:

This lesson provides the technician information on inspecting and maintaining the components of the crowd belt assembly on P&H Electric Mining Shovels.

Objectives:

Upon completion of this Lesson the student will:

- Be able to identify all the components of the crowd belt assembly and describe their function/purpose in the system.
- Have a thorough understanding of how to inspect the components of the crowd belt assembly.
- Have a thorough understanding of the procedure required to adjust the crowd belt assembly.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Inspecting the Crowd Belt Assembly
- Topic 3 Hydraulic Hand Pump
- Topic 4 Retensioning the Crowd Belt

Lesson 16.3 Shipper Shaft and Saddle Block

Lesson Description:

This lesson will teach you how to perform the shipper shaft axial clearance and saddle block upper and lower wear plate adjustments.

Objectives:

Upon completion of this Lesson the student will:

- Be able to identify the components of the shipper shaft assembly.
- Be able to identify the components of the saddle block assembly.
- Understand what inspection criteria is required when performing the prescribed inspections.
- Understand the steps required to adjust the shipper shaft axial clearance to within specified parameters.
- Understand the steps required to adjust the saddle block upper wear plate to within specified parameters.
- Understand the steps required to adjust the saddle block lower wear plate to within specified parameters.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Shipper Shaft and Saddle Block Inspection
- Topic 3 Shipper Shaft Axial Clearance Adjustment
- Topic 4 Saddle Block Upper Wear Plate Adjustment
- Topic 5 Saddle Block Lower Wear Plate Adjustment

Module 17 Air Compressors

Lesson 17.1 Sullair with Supervisor II Control

Lesson Description:

This lesson provides the technician information on using and maintaining the Sullair air compressor with Supervisor II Controller.

Objectives:

Upon completion of this Lesson the student will:

- Be able to identify the components of the Sullair air compressor.
- Have a thorough understanding of the operation of the Sullair air compressor.
- Understand the buttons, lamps, and display features of the Supervisor II Controller associated with the Sullair Air Compressor.
- Understand the procedures required for the fluid filter replacement, the air/fluid separator replacement, and inlet control valve maintenance.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Theory of Operation
- Topic 3 Supervisor II Controller
- Topic 4 Maintenance

Lesson 17.2 Sullair with Q1 Control

Lesson Description:

This lesson provides the technician information on using and maintaining the Sullair air compressor with Q1 Controller.

Objectives:

Upon completion of this Lesson the student will:

- Be able to identify the components of the Sullair air compressor.
- Have a thorough understanding of the operation of the Sullair air compressor.
- Understand the buttons, lamps, and display features of the Q1 Controller associated with the Sullair air compressor.
- Understand the procedures required for the fluid filter replacement, the air/fluid separator replacement, and inlet control valve maintenance.

Lesson Outline:

- Topic 1 Introduction
- Topic 2 Theory of Operation
- Topic 3 Q1 Controller
- Topic 4 Maintenance

Module 18 Air System

Lesson 18.1 Air System Description

Lesson Description:

This Lesson provides information on the major components and theory of operation of the Air System Description.

Objectives:

Upon completion of this Lesson the student will:

- Describe the major components of the Air System
- Describe the operation of the major components of the Air System
- Discuss the theory of operation of the Air System

Lesson Outline:

- Topic 1 Components of the Air System
- Topic 2 Air System Operation