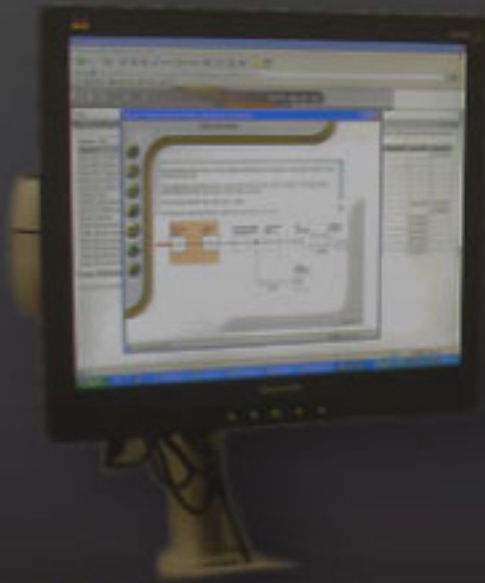


**Drill Maintenance
eLearning Course
Catalog**

P&H



Peak Services

eLearning – 120A



P&H Knowledge and Development Department is proud to announce the availability of Online eLearning content. eLearning is the delivery of self paced learning, training, or educational content, by electronic means. P&H Peak Services eLearning can be accessed by P&H employees through our MineNet website by clicking on Learning Center or by end customers through a website link provided by P&H Peak Services.

Lesson Duration:

Each Lesson within a module is designed with a 45-minute duration in mind. However, eLearning is self-paced instruction; actual lesson duration will vary per student.

Target Audience:

Electricians, Technicians, and Engineers who will service and maintain all aspects of a P&H Mining Drill.

Description:

eLearning is the delivery of self paced learning, training, or educational content, by electronic means. It's also a means of providing follow-up training to our online Needs Analysis Assessment. eLearning provides several advantages over traditional training methods:

- Ideal for situations where people are in various locations, and a large amount of people need to be trained on consistent information.
- Improved retention of materials.
- Correct equipment usage.
- Available anywhere to vital information.
- Quicker Productivity
- Reduced Overall Costs
- Consistent content delivery
- Self paced

Prerequisites:

Students should have a basic working knowledge of computers, and fundamental understanding of Electrical and Mechanical Systems.

Lesson Location:

eLearning can be accessed on any computer that has internet access.

Main Concepts:

- 120A Drill Maintenance

Technological Requirements:

- Internet Explorer 6.0 or better
- Java 1.5 or better
- Flash Player 7 or better
- Windows Media Player



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Lesson 6A.1 120A Propel System

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Lesson 10A.1 120A Rotary Carriage

Lesson 11A.1 120A Pipe Handling System

Lesson 12A.1 120A Leveling System

Lesson13A.1 120A Auto Lubrication System

Lesson 14A.1 120A Electrical System



Lesson 3A.1 Blasthole Drill Overview

Course Description

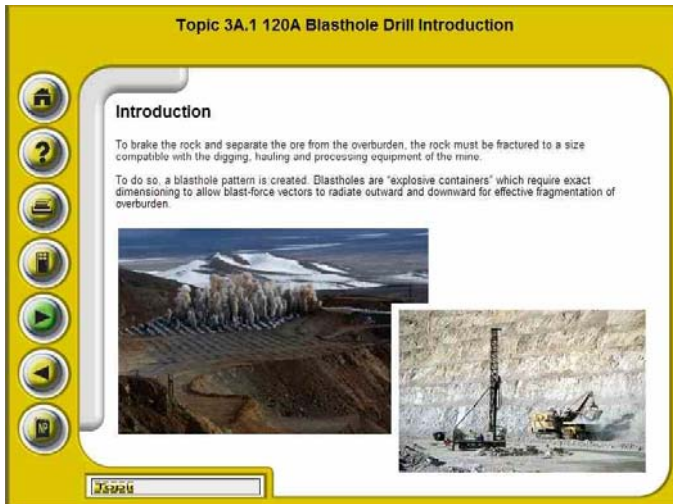
This introduction will provide a base knowledge of the 120A drill. Descriptions and locations of the various components will be provided to give a better understanding of the drills functions and layout.

Objectives

- Discuss major historical developments and facts of P&H Blasthole drills.
- Identify the importance of the P&H blasthole drills in mine operations.
- Describe the purpose and capabilities of the 120A Blasthole Drill.
- Identify the main systems of the 120A Blasthole Drill.

Lesson Outline

- Topic 3A.1.1 120A Blasthole Drill Introduction
- Topic 3A.1.2 120A Main Systems
- Review Topics 3A.1.1 - 3A.1.2



Lesson 4A.1 120A Power Unit

Course Description

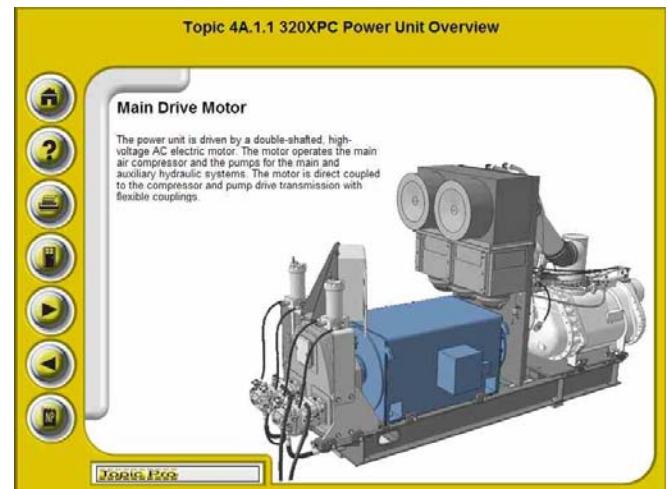
This Lesson will provide a base knowledge of the 120A drills Power Unit. Descriptions and locations of the various components will be provided to give a better understanding of the drills new system.

Objectives

- Identify and locate the Power Unit and its components
- Understand the Power Unit and its functions

Lesson Outline

- Lesson 4A.1.1 Power Unit
- Lesson 4A.1.2 Main Motor
- Lesson 4A.1.3 Pump Drive Transmission
- Review Lesson 4A.1.1 - 4A.1.3



Lesson 6A.1 120A Propel System

Course Description

This lesson provides information on the purpose, operation and components of the propel system used on the 120A Drills

Objectives

- Describe the purpose of the Propel System.
- Identify the main components of the Propel System.
- Describe the purpose of the Propel Motor.
- Identify the main components of the Propel Motor.
- Describe the purpose of the Propel Transmission.
- Identify the main components of the Propel Transmission.

Lesson Outline

- Topic 6A.1.1 Propel System Overview
- Topic 6A.1.2 Propel System Components
- Review Topic 6A.1.1 and 6A.1.2
- Topic 6A.1.3 Propel Motor
- Topic 6A.1.4 Propel Transmission
- Review Topics 6A.1.3 and 6A.1.4

Lesson 8A.1 120A Water Injection System

Course Description

This lesson provides information on the purpose, operation and components of the Water Injection System.

Objectives

- Describe the purpose of the Water Injection System.
- Identify the main components of the Water Injection System.
- Describe the purpose of the Water Tank
- Identify the main components of the Water Tank.
- Describe the purpose of the Water Pump.
- Identify the main components of the Water Pump.
- Describe the purpose of the Water Control Assemblies.
- Identify the main components of the Water Control Assemblies.

Lesson Outline

- Topic 8A.1.1 Water Injection Overview
- Topic 8A.1.2 Water Tank
- Review Topics 8A.1.1 and 8.1.2
- Topic 8A.1.3 Water Pump
- Topic 8A.1.4 Control Components
- Review Topics 8A.1.3 and 8A.1.4

Lesson 9A.1 120A Mast Assembly

Course Description

This lesson provides information on the purpose, operation and components of the Mast Assembly on the 120A drill.

Objectives

Upon completion of this Lesson the student will:

- Describe the purpose of the Mast Assembly.
- Identify the main components of the Mast Assembly.
- Describe the purpose of the Back Braces.
- Identify the components of the Back Braces.
- Describe the purpose of the Anchor Pins
- Identify the main components of the Anchor Pins
- Describe the purpose of the Mast Cylinders
- Identify the components of the Mast Cylinders
- Describe the purpose of the Auxiliary Winch.
- Identify the components of the Auxiliary Winch.

Lesson Outline

- Topic 9A.1.1 Mast Overview
- Topic 9A.1.2 Back Braces
- Topic 9A.1.3 Anchor Pins
- Review Topic 9A.1.1 - 9A.1.3
- Topic 9A.1.4 Mast Cylinders
- Topic 9A.1.5 Auxiliary Winch
- Review Topic 9A.1.4 and 9A.1.5

Lesson 10A.1 120A Rotary Carriage

Course Description

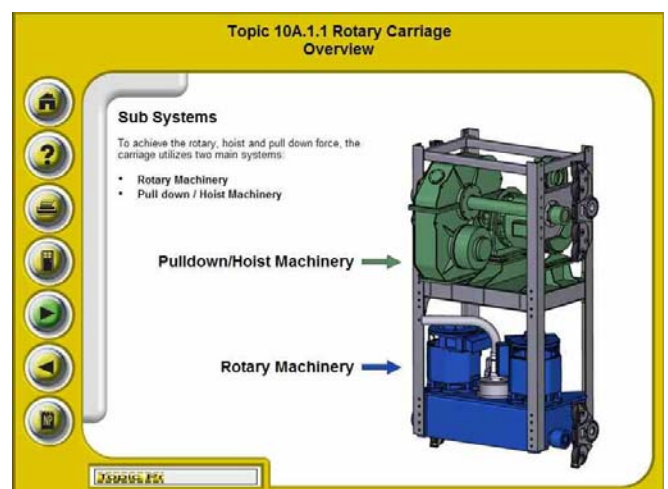
This lesson provides information on the purpose, operation and components of the Rotary Carriage Equipment.

Objectives

- Describe the purpose of the Rotary Carriage Assemblies.
- Identify the main components of the Rotary Carriage Assemblies.
- Describe the purpose of the Pulldown Machinery.
- Identify the main components of the Pulldown Machinery.
- Describe the purpose of the Rotary Machinery.
- Identify the main components of the Rotary Machinery.

Lesson Outline

- Lesson 10A.1.1 Rotary Carriage Overview
- Lesson 10A.1.2 Pulldown / Hoist Machinery
- Review Topics 10A.1.1 and 10A.1.2
- Lesson 10A.1.3 Rotary Machinery
- Review Topic 10A.1.3



Lesson 11A.1 120A Pipe Handling System

Course Description

This lesson provides information on the purpose, operation and components of the Pipe Handling Equipment used on both 120A Drill Models

Objectives

Upon completion of this Lesson the student will:

- Describe the purpose of the Pipe Handling System.
- Identify the main sub systems and components of the Pipe Handling System.
- Identify the location of the sub systems and components of the Pipe Handling System.
- Describe the purpose of the Pipe Rack.
- Identify the main components of the Pipe Rack.
- Identify the location of the sub systems and components of the Pipe Rack.
- Describe the purpose of the Breakout Wrench.
- Identify the main components of the Breakout Wrench.
- Identify the location of the sub systems and components of the Breakout Wrench.
- Describe the purpose of the Deck Wrench.
- Identify the main components of the Deck Wrench.
- Lesson 11A.1.1 Pipe Handling Equipment Overview
- Lesson 11A.1.2 Pipe Rack
- Review Lessons 11A.1.1 and 11A.1.2
- Lesson 11A.1.3 Breakout Wrench
- Lesson 11A.1.4 Deck Wrench

Lesson 11A.1 120A Pipe Handling System (cont.)

Lesson Outline (cont.)

- Review Lessons 11A.1.3 and 11A.1.4



Lesson 12A.1 120A Leveling System

Course Description

This lesson provides information on the purpose, operation and components of the Leveling system. This lesson will show how the leveling system works and all the components involved in its operation.

Objectives

Upon completion of this Lesson the student will:

- Describe the purpose of the Leveling System Assembly.
- Identify the main components of the Leveling System Assembly.
- Identify locations of the components
- Describe the purpose of the Jacks.
- Identify the main components of the Jacks.
- Describe the theory of operation of the leveling system.

Lesson Outline

- Topic 12A.1.1 Leveling System Overview
- Topic 12A.1.2 System Components
- Topic 12A.1.3 Leveling system operation
- Review Topics 12A.1.1 - 12A.1.3

Topic 12A.1.1 Leveling System Overview

Theory of Operation

The PLC Monitors the condition of the leveling system and reports the information back to the operator via the GUI screen. The PLC utilizes leveling switches, Limit switches and pressure switches to identify the location and condition of the leveling jacks.

Pressure Switch



Level Switch



Tools, Equipment, Dies

Topic 12A.1.2 120A Leveling System Components

System Components / Rear Jacks

The operator controls each jack independently by separate switches on the operator's console. Hydraulic pressure is applied to the cylinder piston through internal passages in the rod, causing the spud and shoe to extend or retract.



120A12A

eLearning – 320XPC



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- Correct equipment usage.
- Available anywhere to vital information.
- Quicker productivity.
- Reduced overall costs.
- Consistent content delivery.
- Self paced.

Prerequisites:

Students should have a basic working knowledge of computers, and fundamental understanding of Electrical and Mechanical Systems.

Lesson Location:

eLearning can be accessed on any computer that has internet access.

Main Concepts:

- 320XPC Drill Maintenance

Technological Requirements:

- Internet Explorer 6.0 or better
- Java 1.5 or better
- Flash Player 7 or better
- Windows Media Player



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Lesson 3B.1 320XPC Product Overview

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Lesson 5B.1 320XPC Hydraulic System

Lesson 6B.1 320XPC Propel System

Lesson 8B.1 320XPC Water Injection System

Lesson 9B.1 320XPC Mast Assembly

Lesson 10B.1 320XPC Rotary Carriage

Lesson 11B.1 320XPC Pipe Handling System

Lesson 12B.1 320XPC Leveling

Lesson 13B.1 320XPC Auto Lubrication System



Lesson 3B.1 320XPC Product Overview

Course Description

This introduction will provide a base knowledge of the new 320XPC drill. Descriptions and locations of the various components will be provided to give a better understanding of the drills new layout.

Objectives

- Discuss major historical developments and facts of P&H Blasthole drills.
- Identify the importance of the P&H blasthole drills in mine operations.
- Describe the purpose and capabilities of the 320XPC Blasthole Drill.
- Identify the main systems of the 320XPC Blasthole Drill.

Lesson Outline

- Topic 3B.1.1 320XPC Blasthole Drill Introduction
- Topic 3B.1.2 320XPC Main Systems
- Review Topics 3B.1.1 - 3B.1.2

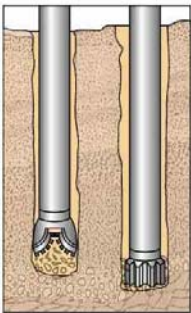

Topic 3B.1.1 320XPC Blasthole Drill Introduction

Rock Breakage Mechanisms

Rotary and percussion drilling are the most common mechanical breakage systems used in the mining industry today.

There are a number of rock breakage mechanisms including:

- Drilling and Blasting
- Erosional (Hydraulic Mining)
- Jet Piercing
- Other (chemical expansion, freezing)



Rotary Drilling (Left Side)
Percussion Drilling (Right Side)

Lesson 4B.1 320XPC Power Unit

Course Description

This Lesson will provide a base knowledge of the new 320XPC drills Power Unit. Descriptions and locations of the various components will be provided to give a better understanding of the drills new system.

Objectives

- Identify and locate the Power Unit and its components
- Understand the Power Unit and its functions

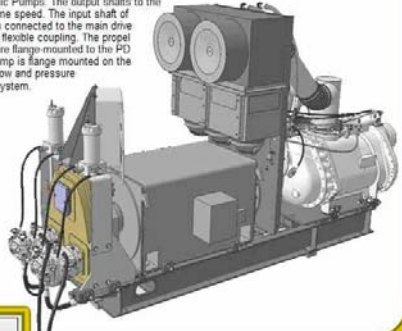
Lesson Outline

- Lesson 4B.1.1 Power Unit
- Lesson 4B.1.2 Main Motor
- Lesson 4B.1.3 Pump Drive Transmission
- Review Lesson 4B.1.1 - 4B.1.3

Topic 4B.1.1 320XPC Power Unit Overview

Pump Drive Transmission

The Pump Drive Transmission, or PDT, is a multi-shafted gear reducer that distributes torque from the electric Main Drive Motor to the three attached Hydraulic Pumps. The output shafts to the pumps all rotate at the same speed. The input shaft of the hydraulic pump drive is connected to the main drive motor shaft by means of a flexible coupling. The propel system hydraulic pumps are flange-mounted to the PDT housing. A double vane pump is flange mounted on the front of the PDT provides flow and pressure to the auxiliary hydraulic system.



Lesson 5B.1 320XPC Hydraulic System

Course Description

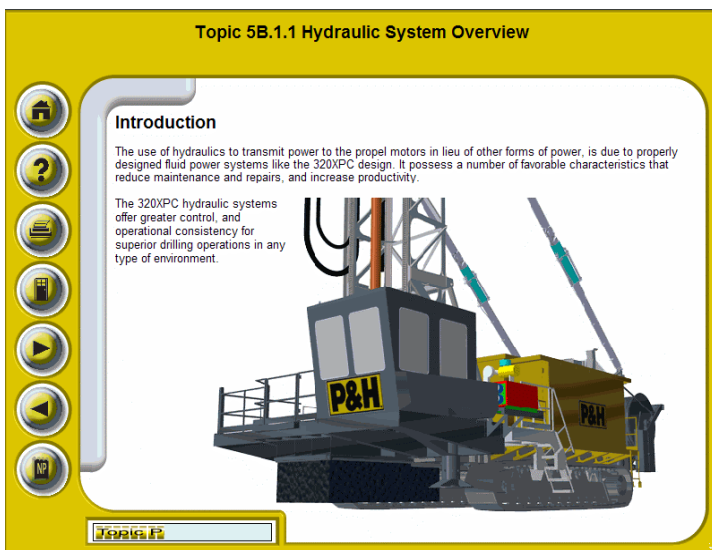
This lesson will take you through the hydraulic system for the 320XPC blasthole drill. The lesson breaks the hydraulic system down to help you understand each section of the system including, Propel Hydraulics and Auxiliary Hydraulics.

Objectives

- Understand the main hydraulic system and its components.
- Understand the auxiliary hydraulic system and its components.
- Know where all components are location on the drill.
- Have a complete understanding of how this system works in a whole.

Lesson Outline

- Topic 5B.1.1 Hydraulic System Overview
- Topic 5B.1.2 Hydraulic System Components
- Review Topics 5B.1.1 and 5B.1.2
- Topic 5B.1.3 Main Hydraulic Operation
- Topic 5B.1.4 Auxiliary Hydraulic Operation
- Review Topics 5B.1.3 and 5B.1.4



Lesson 6B.1 320XPC Propel System

Course Description

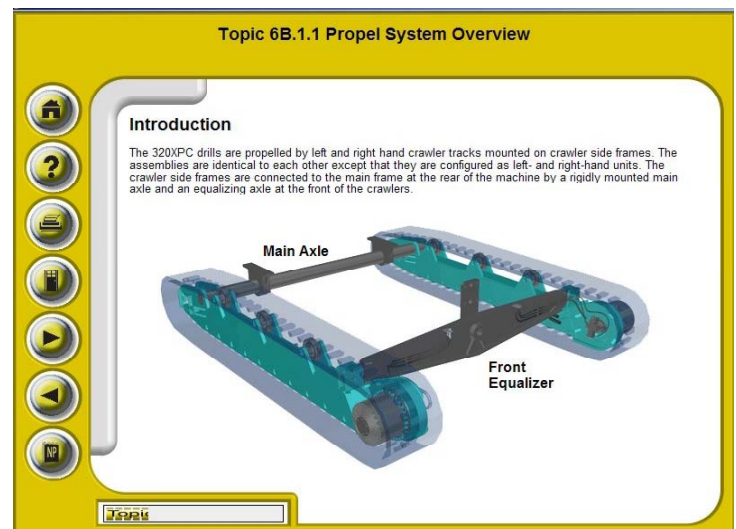
This lesson provides information on the purpose, operation and components of the propel system used on the 320XPC Drills.

Objectives

- Describe the purpose of the Propel System.
- Identify the main components of the Propel System.
- Describe the purpose of the Propel Motor.
- Identify the main components of the Propel Motor.
- Describe the purpose of the Propel Transmission.
- Identify the main components of the Propel Transmission.

Lesson Outline

- Topic 6B.1.1 Propel System Overview
- Topic 6B.1.2 Propel System Components
- Review Topic 6B.1.1 and 6B.1.2
- Topic 6B.1.3 Propel Motor
- Topic 6B.1.4 Propel Transmission
- Review Topics 6B.1.3 and 6B.1.4



Lesson 8B.1 320XPC Water Injection System

Course Description

This lesson provides information on the purpose, operation and components of the Water Injection System.

Objectives

- Describe the purpose of the Water Injection System.
- Identify the main components of the Water Injection System.
- Describe the purpose of the Water Tank.
- Identify the main components of the Water Tank.
- Describe the purpose of the Water Pump.
- Identify the main components of the Water Pump.
- Describe the purpose of the Water Control Assemblies.
- Identify the main components of the Water Control Assemblies.

Lesson Outline

- Topic 8B.1.1 Water Injection Overview
- Topic 8B.1.2 Water Tank
- Review Topics 8B.1.1 and 8B.1.2
- Topic 8B.1.3 Water Pump
- Topic 8B.1.4 Control Components
- Review Topics 8B.1.3 and 8B.1.4

Lesson 9B.1 320XPC Mast Assembly

Course Description

This lesson provides information on the purpose, operation and components of the Mast Assembly.

Objectives

- Describe the purpose of the Mast Assembly.
- Identify the main components of the Mast Assembly.
- Describe the purpose of the Back Braces.
- Identify the components of the Back Braces.
- Describe the purpose of the Anchor Pins
- Identify the main components of the Anchor Pins
- Describe the purpose of the Mast Cylinders
- Identify the components of the Mast Cylinders
- Describe the purpose of the Auxiliary Winch.
- Identify the components of the Auxiliary Winch

Lesson Outline

- Topic 9B.1.1 Mast Overview
- Topic 9B.1.21 Back Braces
- Topic 9B.1.3 Anchor Pins
- Review Topic 9B.1.1 - 9B.1.3
- Topic 9B.1.4 Mast Cylinders
- Topic 9B.1.5 Auxiliary Winch
- Review Topic 9B.1.4 and 9B.1.5



Lesson 10B.1 320XPC Rotary Carriage

Course Description

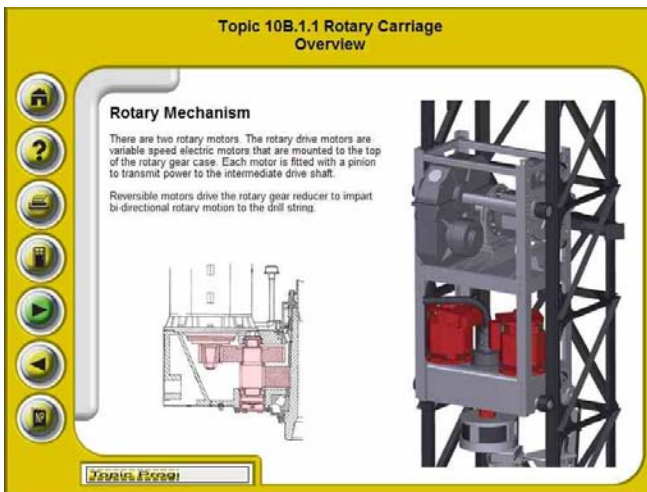
This lesson provides information on the purpose, operation and components of the Rotary Carriage Equipment for 320XPC blasthole drills.

Objectives

- Describe the purpose of the Rotary Carriage Assemblies.
- Identify the main components of the Rotary Carriage Assemblies.
- Describe the purpose of the Pulldown Machinery.
- Identify the main components of the Pulldown Machinery.
- Describe the purpose of the Rotary Machinery.
- Identify the main components of the Rotary Machinery.

Lesson Outline

- Lesson 10B.1.1 Rotary Carriage Overview
- Lesson 10B.1.2 Pulldown / Hoist Machinery
- Review Topics 10B.1.1 and 10B.1.2
- Lesson 10B.1.3 Rotary Machinery
- Review Topic 10B.1.3



Lesson 11B.1 320XPC Pipe Handling System

Course Description

This lesson provides information on the purpose, operation and components of the Pipe Handling Equipment used on the 320XPC Drill Models.

Objectives

- Describe the purpose of the Pipe Handling System.
- Identify the main sub systems and components of the Pipe Handling System.
- Identify the location of the sub systems and components of the Pipe Handling System.
- Describe the purpose of the Pipe Rack.
- Identify the main components of the Pipe Rack.
- Identify the location of the sub systems and components of the Pipe Rack.
- Describe the purpose of the Breakout Wrench.
- Identify the main components of the Breakout Wrench.
- Identify the location of the sub systems and components of the Breakout Wrench.
- Describe the purpose of the Deck Wrench.
- Identify the main components of the Deck Wrench.
- Identify the location of the sub systems and components of the Deck Wrench.

Lesson Outline

- Lesson 11B.1.1 Pipe Handling Equipment Overview
- Lesson 11B.1.2 Pipe Rack
- Review Lessons 11B.1.1 and 11B.1.2
- 11B.1.3 Breakout Wrench
- Lesson 11B.1.4 Deck Wrench
- Review Lessons 11B.1.3 and 11B.1.4

Lesson 12B.1 320XPC Leveling System

Course Description

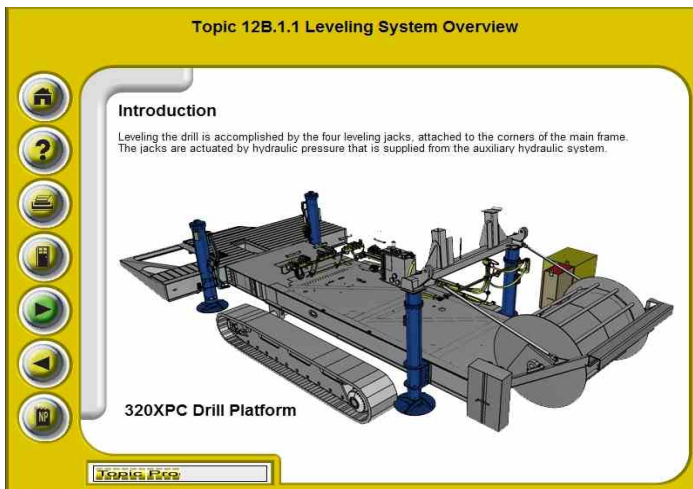
This lesson provides information on the purpose, operation and components of the Leveling system. This lesson will show how the leveling system works and all the components involved in its operation.

Objectives

- Describe the purpose of the Leveling System Assembly.
- Identify the main components of the Leveling System Assembly.
- Identify locations of the components
- Describe the purpose of the Jacks.
- Identify the main components of the Jacks.
- Describe the theory of operation of the leveling system.

Lesson Outline

- Topic 12B.1.1 Leveling System Overview
- Topic 12B.1.2 System Components
- Topic 12B.1.3 Leveling system operation
- Review Topics 12B.1.1 – 12B. 1.3



Lesson 13 B.1 320XPC Lubrication

Course Description

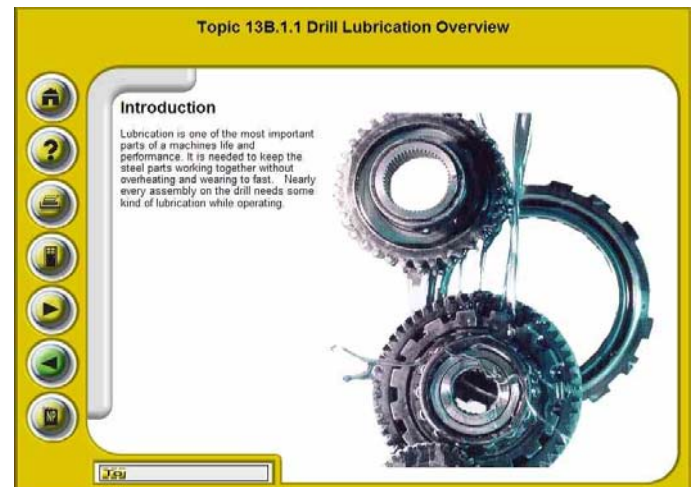
In this lesson the lubrication of the drills assemblies are explained. The auto lubrication system is one of the key systems on the drill and ensures the operator that the machine will keep working well when lubricated correctly.

Objectives

- Understand the different types of lubrication used on the 320XPC drill.
- Know the components used lubrication different assemblies of the drill.
- Understand the Automatic Lubrication Systems operation and its components.

Lesson Outline

- Topic 13B.1.1 Drill Lubrication Overview
- Topic 13B.1.2 Auto Lubrication System Components
- Review Topics 13B.1.1 and 13B.1.2
- Topic 13B.1.3 Auto Lubrication System Operation
- Review Topic 13B.1.3



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- All lessons will be provided via the Internet from the P&H Learning Center.
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- Peak Services highly recommends pre and post-assessments.

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Post-Assessments:

Are used to determine the effectiveness of the training.

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