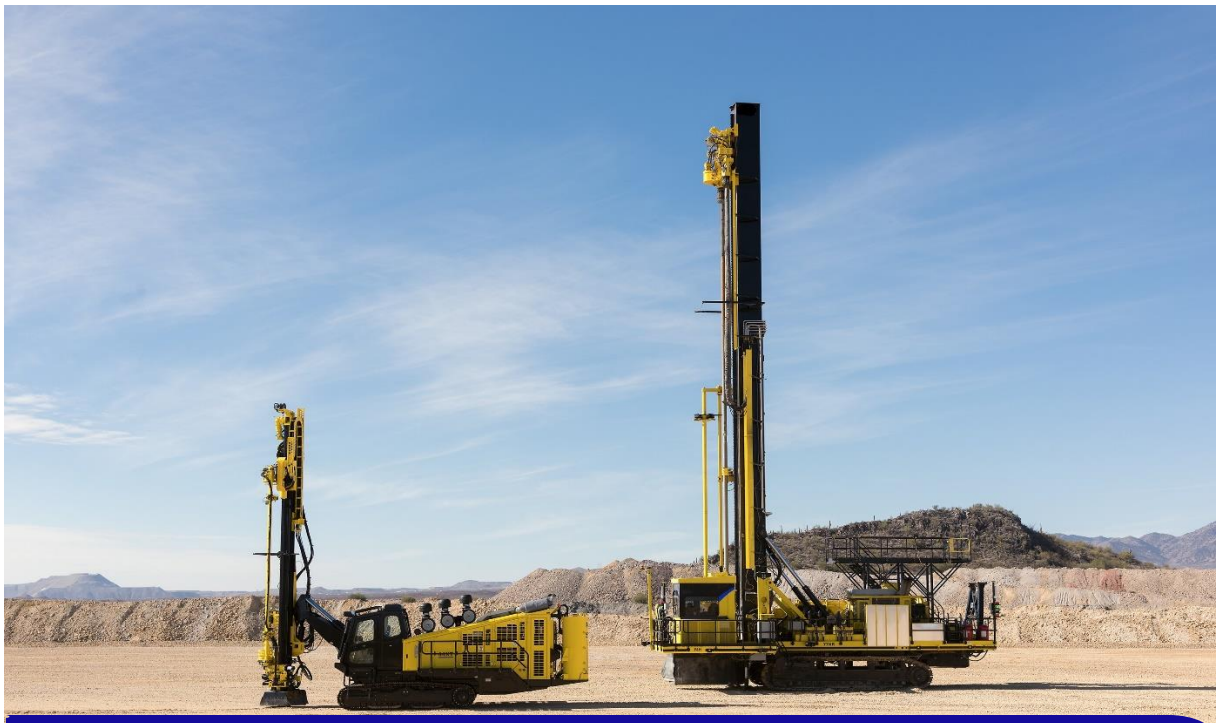

Blasthole Drill Technical Training Catalog

KOMATSU

Product Training and Publications

Contents

Global Mining Solutions eLearning

Product Training and Publications has identified eLearning as a delivery option for fundamental knowledge and product specific training. eLearning provides several advantages over traditional training methods:

- eLearning content can be accessed through the Internet by any individual who has the appropriate login and password credentials.
- Immediate availability of training content which provides a quicker, more productive workforce.
- Online training reduces the cost of training by eliminating travel, living, and other expenses associated with Instructor-Led Training.
- eLearning provides students with the ability to learn at their own pace and in their own comfortable environment.
- The training content can be delivered to a large contingent of people in varying locations and be technically consistent across the board.
- When used as a prerequisite to Instructor-Led Training, eLearning can level the playing field between novice and senior personnel. 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 less than 60 minutes in duration. However, because eLearning is self-paced training, actual duration may vary per student.

Target audience:
Blasthole Drill Operators, Technicians, and Engineers who will operate and/or perform maintenance on P&H/Komatsu Blasthole Drills.

Prerequisites:
Students should have a basic working knowledge of computers as well as a fundamental understanding of electronics, mechanics, pneumatics, and hydraulics as it applies to the systems of P&H/Komatsu Blasthole Drills.

Lesson location:
eLearning content can be accessed through the Internet by any individual who has the appropriate login and password credentials.

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

- Adobe Reader version 8 or better

Note:
Our eLearning content is periodically revised and updated.

Terms and Conditions:
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Drill Operator eLearning Lesson Descriptions

General Drill Operator

Drill Orientation

Lesson description:
This lesson provides the Operator or Maintenance Technician with a complete overview of the Drill Exterior, Interior, and Cab Components of past and current production model XPC Blasthole Drills.

Objectives:
Upon completion of this lesson the student will:

- Understand the purpose and function of the exterior, and interior components associated with XPC Blasthole Drills
- Understand the purpose and function of the major components and controls associated with the Operator Cab on XPC Blasthole Drills

Lesson outline:

- Topic 1: Exterior Component Overview
- Topic 2: Interior Component Overview
- Topic 3: Operator Cab Overview

Qualifications and Conducts of a Drill Operator

Lesson description:
This lesson provides recommendations for the purpose and reducing the possibility of personal injury, either to the Operators, or to those who work on or in the area adjacent to the Drill. This lesson is general in nature, and your drill may not be equipped with all devices mentioned.

However, it is impossible to foresee all such conditions and it must remain the responsibility of the Mining Company and Drill Operator to anticipate and avoid any unsafe conditions not described in detail in this lesson. It is understood that safety rules within individual Mining Companies vary, and that if a conflict exists, the rules of the Mining Company take precedence over the suggestions contained in the lesson.

Objectives:
Upon completion of this lesson the student will:

- Understand the basic qualifications as recommended for a Blasthole Drill Operator
- Have a basic understanding of the proper conduct for an Operator of a Blasthole Drill
- Have a basic understanding of the Functional Checks required of the Operator before starting and operating a Blasthole Drill
- Have a basic understanding of the responsibilities of crew members performing a job on or near a Blasthole Drill
- Have a basic understanding of the important of planning a job

Lesson outline:

- Topic 1: Operator Qualifications
- Topic 2: Operator Conduct
- Topic 3: Operator Functional Checks
- Topic 4: Crew Member Responsibilities
- Topic 5: Planning a Job

Operator Functional Checks

Lesson description:
This lesson provides information for the Operator to make Pre-Start, Startup, and Shutdown checks of the Blasthole Drill.

Objectives:
Upon completion of this lesson the student will:

- Have a thorough understanding of the inspection points surround the drill that are required prior to starting the drill
- Have a thorough understanding of the steps required to properly startup a drill
- Have a thorough understanding of the steps required to properly shutdown a drill under normal conditions and under emergency conditions

Lesson outline:

- Topic 1: Pre-Start Functional Checks
- Topic 2: Startup Functional Checks
- Topic 3: Shutdown Functional Checks

Drill Operation (XPC Models)

Lesson description:
The purpose of the lesson is to describe the operation of the individual motion controls and include some recommended operating procedures and practices that will aid the Operator in the safe, smooth, and efficient operation of Blasthole Drills.

It is important to understand that this lesson is not complete without follow-up hands on skills-based training. This lesson can provide the knowledge of the controls and functions of the drill. It is this knowledge portion, combined with the skills training from a Factory Authorized Operator Trainer that will increase the competence of the Drill Operator Trainee.

Objectives:
Upon completion of this lesson the student will:

- Have a thorough understanding of the operation of the Propel Joystick Controller
- Have a thorough understanding of the concepts and procedures required to propel the drill forward, backways, turn left, and turn right
- Understand the controls and indicators associated with the Drill Remote Control Unit
- Understand the procedure required to prepare the drill for towing
- Understand the procedure required to level the drill automatically and manually
- Understand the concepts and procedures required to raise and lower the Drill Mast
- Understand the concepts and procedures required to prepare the drill for the different drill functions

Lesson outline:

- Introduction
- Topic 1: Propel Operation
- Topic 2: Remote Control Operation
- Topic 3: Towing the Drill
- Topic 4: Leveling Operations
- Topic 5: Raising and Lowering the Mast
- Topic 6: Drill Setup
- Topic 7: Drilling

ZR77 Quick Start Guides

Air System

Lesson description:
This quick start guide provides a brief overview of the pre-operational inspection for the air filters and different components of the air system.

Objectives:
Upon completion of this lesson the student will:

- Locate the air filters
- Be able to identify and locate the filter bag and filter gauge
- Know how to complete the necessary steps in checking the air filters

Lesson outline:
- Topic 1: Overview

Deck Wrench Operation

Lesson description:
This quick start guide provides an overview of the Deck Wrench and the functionality of the operator's joysticks.

Objectives:
Upon completion of this lesson the student will:

- Understand the Deck Wrench operation and the functionality of the joysticks

Lesson outline:
- Topic 1: Overview

Mast Raise and Lower

Lesson description:
This quick start guide provides the learner with safety tips before raising or lowers the drill mast. The learner will also see a brief overview of raising and lowering the mast using the one touch mast raise and lower button.

Objectives:
Upon completion of this lesson the student will:

- Understand safety aspects of raising and lowering the mast
- Have a basic understanding of raising and lowering the drill mast using the one touch button

Lesson outline:
- Topic 1: Overview

Drill eLearning Curriculums

Track Drill Standard Curriculum (ZT Class Drills)

Product Overview

Lesson description:
This lesson provides a brief overview of each of the major systems that shape the track drill as well as a few of the defining features.

Objectives:
Upon completion of this lesson the student will:

- Have a brief understanding of the track style drill
- Be able to identify the Major Systems
- Have a brief understanding of the systems that make up the drill

Lesson outline:

- Topic 1: Overview

Operator Walkaround Overview

Lesson description:
This lesson provides a brief description of the necessary areas the operator should inspect around the drill before operation.

Objectives:
Upon completion of this lesson the student will:

- Understand the key areas to inspect around the drill before operating a track drill

Lesson outline:

- Topic 1: Overview

Operator Cab and Controls

Lesson description:
This lesson provides the learner with a basic overview of the operator's cab layout as well as the controls and monitors used when operating the machine.

Objectives:
Upon completion of this lesson the student will:

- Be comfortable with the cab and controls layout
- Have a basic understanding of the controls used when operating a track drill

Lesson outline:

- Topic 1: Operator Cab Layout
- Topic 2: Operator Modes and Controls
- Topic 3: Operator's Main Screen
- Topic 4: Remote Control System
- Topic 5: Inclinometer Display
- Topic 6: Alarm Annunciator

Maintenance Overview

Lesson description:
This lesson provides an overview of the maintenance schedule and key areas of the machine that should be checked and maintained.

Objectives:
Upon completion of this lesson the student will:

- Understand the key areas to consider when maintaining a track drill

Lesson outline:
- Topic 1: Maintenance Overview

Rotary Drill Standard Maintenance Curriculum (ZR Class Drills)

Product Overview

Lesson description:
In this lesson you will see a brief overview of each of the major systems that shape the 77 class of Blasthole Drills as well as a few of the defining features. At the end of this lesson, you will understand each system and the main functionality of each system. While this lesson is a brief overview, knowing and understanding the main functionality of the major systems will increase your knowledge as well as give you a baseline to advance your awareness throughout the remaining lessons.

Objectives:
Upon completion of this lesson the student will:

- Have a brief understanding of the 77 class of drills
- Be able to identify the Major Systems
- Have a brief understanding of the systems that make up the drill

Lesson outline:
- Topic 1: Drill Introduction
- Topic 2: Major Systems
- Topic 3: Major Systems Descriptions

Power Module

Lesson description:
In this lesson you will be given a basic understanding of the Power Module. Descriptions and locations of the various components will be provided to give a better understanding of how this system operates. While reviewing this lesson, it is important to be aware of the various components of the Power Module and to familiarize yourself with the locations of the components.

Objectives:
Upon completion of this lesson the student will:

- Identify and locate the Power Module and its components
- Understand the Power Module and how it functions

Lesson outline:
- Topic 1: Power Module Overview
- Topic 2: System Components

Hydraulic System

Lesson description:
This lesson will provide you with the information necessary to gain an understanding of the purpose, operation, and components of the Hydraulic System. The Hydraulic System lesson is important to review to understand what the main components of the system are and how the components operate. The Hydraulic System is a very important part of the drills operation so understanding the operation and the components of the hydraulics will be helpful in maintaining the drill and in proper operation.

Objectives:
Upon completion of this lesson the student will:

- Describe the purpose of the Hydraulic System
- Identify the shared components
- Describe the functionality of the Main & Auxiliary Hydraulic System
- Describe the functionality of the Fan Drive Hydraulics
- Describe the functionality of the Recirculation Hydraulics

Lesson outline:

- Topic 1: Introduction
- Topic 2: Shared Components
- Topic 3: Main Hydraulic Operation
- Topic 4: Auxiliary Hydraulic Operation
- Topic 5: Fan Drive Hydraulic Operation
- Topic 6: Recirculation Hydraulics

Propel System

Lesson description:
In this lesson you will know how the Rotary class of drills propel in the different available directions of movement. You will also see a brief overview of the components that create the Propel System. While reviewing this lesson, having a general understanding of the main components of the system and how they operate will enhance your knowledge for this class of drill.

Objectives:
Upon completion of this lesson the student will:

- Understand how the Propel System functions
- Identify the main components of the Propel System
- Describe and identify the main components of the Propel Motors and Propel Transmissions

Lesson outline:

- Topic 1: Propel System Overview
- Topic 2: Propel System Components

Main Air and Water Injection System

Lesson description:
This lesson will provide you with the information necessary to gain an understanding of the purpose, operation, as well as the components of the Main Air System. While reviewing this lesson, it is important to be aware of the various components of the Main Air System and to familiarize yourself with the locations of the components.

Objectives:
Upon completion of this lesson the student will:

- Describe the purpose of the Main Air System
- Identify the components of the Main Air System
- Describe the functionality of the Main Air System

Lesson outline:

- Topic 1: Main Air Major Component Location
- Topic 2: Main Air Major Components – Power Skid
- Topic 3: Main Air Major Components – Deck
- Topic 4: Main Air Major Components – Mast
- Topic 5: Main Air Major Components – Rotary Carriage
- Topic 6: Water Injection System

Mast Assembly

Lesson description:
This lesson will provide you with the information necessary to gain an understanding of the purpose, operation, as well as the components of the Mast. The Mast lesson is important to review to understand what the main components of the system are and how the components operate. The Mast is a very important part of the drills operation so understanding the operation and the components of the Mast will be helpful in maintaining the drill and in proper operation.

Objectives:
Upon completion of this lesson the student will:

- Describe the purpose of the Mast
- Identify the main components of the Mast
- Describe the functionality of the Mast Components

Lesson outline:

- Topic 1: Mast Introduction
- Topic 2: Mast Components
- Topic 3: Mast Maintenance

Rotary and Pulldown Systems

Lesson description:
This lesson provides information on the purpose, operation, and components of the Rotary Carriage Equipment. It's very important to review this section to understand the main components of the system, and how the components operate. The rotary carriage equipment is an important part of the drill's operation so maintain this equipment will be very important to the life of the parts as well as keeping the drill working at all times.

Objectives:
Upon completion of this lesson the student will:

- Describe the purpose of the Rotary and Pulldown Systems
- Identify the main components of the Rotary and Pulldown Systems
- Understand the operation of the Rotary and Pulldown Systems

Lesson outline:

- Topic 1: Introduction and Operation
- Topic 2: System Components

Pipe and Bit Handling Equipment

Lesson description:
In this lesson you will see a brief overview of each of the major systems of the Pipe and Bit Handling Equipment. At the end of this lesson, you will understand each system and the main functionality of the Pipe and Bit Handling Equipment.

Objectives:
Upon completion of this lesson the student will:

- Have a brief understanding of the Pipe and Bit Handling Equipment
- Be able to identify the system components
- Have a brief understanding of the system that makes up the Pipe and Bit Handling Equipment

Lesson outline:

- Topic 1: System Overview
- Topic 2: System Components
- Topic 3: Theory of Operation

Electrical Control System

Lesson description:
In this lesson you will be given a basic understanding of the Control System. Descriptions and locations of the various components will be provided to give a better understanding of how this system operations. While reviewing this lesson, it is important to be aware of the various components of the electrical system and to familiarize yourself with how they work together.

Objectives:
Upon completion of this lesson the student will:

- Identify and locate the electrical components
- Understand how the electrical control system functions

Lesson outline:

- Topic 1: Introduction
- Topic 2: CAN Bus Network
- Topic 3: CAN Bus Machine Components
- Topic 4: Operator Cab Components
- Topic 5: Deck Mounted Components
- Topic 6: Safety & Maintenance

Operator Cab Controls

Lesson description:
In this lesson you will see a brief walk through of the Operator's Cab and Controls available to operate the Rotary class of Blasthole Drills. At the end of this lesson, you will understand the general cab layout, the left-hand and right-hand joysticks, as well as the keypad controls.

Objectives:
Upon completion of this lesson the student will:

- Have a brief understanding of the Operator Cab Controls
- Be able to identify the major controls available to the operator while sitting in the operator's seats
- Have a brief understanding of the functionality of the left-hand and right-hand joysticks

Lesson outline:

- Topic 1: Operator's Cab
- Topic 2: Operator's Controls
- Topic 3: Operator's Movement Controls
- Topic 4: Operator's Panel
- Topic 5: Operator's Touch Screen

XPC Drill Standard Maintenance Curriculum

Product Overview

Lesson description:
This lesson will provide a base knowledge of the XPC drills. Descriptions and locations of the various components will be provided to give a better understanding of the drill's layout.

Objectives:
Upon completion of this lesson the student will:

- Discuss major historical developments and facts associated with Blasthole Drills
- Identify the importance of the Blasthole Drills in mine operations
- Describe the purpose of the capabilities of the XPC Blasthole Drills
- Identify the main systems of the XPC Blasthole Drills

Lesson outline:

- Topic 1: Drill Introduction
- Topic 2: Main Systems

Power Unit

Lesson description:
This lesson will provide a base knowledge of the XPC Drill's Power Unit. Descriptions and locations of the various components will be provided to give a better understanding of the drills system.

Objectives:
Upon completion of this lesson the student will:

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

Lesson outline:

- Topic 1: Power Unit
- Topic 2: Main Motor
- Topic 3: Pump Drive Transmission

Hydraulic System

Lesson description:
This lesson will take you through the Hydraulic System for the XPC Blasthole Drills. The lesson breaks the Hydraulic System down to help you understand each section of the system including Propel Hydraulics and Auxiliary Hydraulics.

Objectives:
Upon completion of this lesson the student will:

- Understand the Main Hydraulic System and its components
- Understand the Auxiliary Hydraulic System and its components
- Have a complete understanding of how this system works as a whole

Lesson outline:

- Topic 1: Hydraulic System Overview
- Topic 2: Hydraulic System Components
- Topic 3: Main Hydraulic Operation
- Topic 4: Auxiliary Hydraulic Operation

Propel System

Lesson description:
This lesson provides information on the purpose, operation, and components of the Propel System.

Objectives:
Upon completion of this lesson the student will:

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

Lesson outline:

- Topic 1: Propel System Overview
- Topic 2: Propel System Components
- Topic 3: Propel Motor
- Topic 4: Propel Transmission

Main Air System

Lesson description:
This lesson provides information on the purpose, operation, and components of the Main Air System.

Objectives:
Upon completion of this lesson the student will:

- Describe the purpose of the Main Air System
- Identify the components of the Main Air System
- Understand the operation of the Main Air System

Lesson outline:

- Topic 1: Main Air Overview
- Topic 2: System Components

Water Injection System

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

Objectives:
Upon completion of this lesson the student will:

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

Lesson outline:

- Topic 1: Water Injection Overview
- Topic 2: Water Tank
- Topic 3: Water Pump
- Topic 4: Control Components

Mast Assembly

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

Objectives:
Upon completion of this lesson the student will:

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

Lesson outline:

- Topic 1: Mast Overview
- Topic 2: Back Braces
- Topic 3: Anchor Pins
- Topic 4: Mast Cylinders
- Topic 5: Auxiliary Winch

Rotary Carriage

Lesson description:
The lesson provides information on the purpose, operation, and components of the Rotary Carriage Equipment.

Objectives:
Upon completion of this lesson the student will:

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

Lesson outline:

- Topic 1: Rotary Carriage Overview
- Topic 2: Pulldown/Hoist Machinery
- Topic 3: Rotary Machinery

Pipe Handling System

Lesson description:
This lesson provides information on the purpose, operation, and components of the Pipe Handling Equipment.

Objectives:
Upon completion of this lesson the student will:

- Describe the purpose of the Pipe Handling System, Pipe Rack, Breakout Wrench, and Deck Wrench
- 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, Pipe Rack, Breakout Wrench, Deck Wrench
- Identify the main components of the Pipe Rack, Breakout Wrench, and Deck Wrench

Lesson outline:

- Topic 1: Pipe Handling Equipment Overview
- Topic 2: Pipe Rack
- Topic 3: Breakout Wrench
- Topic 4: Deck Wrench

Leveling System

Lesson 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
- 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 1: Leveling System Overview
- Topic 2: System Components
- Topic 3: Leveling System Operation

Auto Lubrication System

Lesson description:
In this lesson the lubrication of the drill's 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:
Upon completion of this lesson the student will:

- Understand the different types of lubrication used on the drill
- Learn the components used in the lubrication of different assemblies of the drill
- Understand the Automatic Lubrication System's operation and its components

Lesson outline:

- Topic 1: Drill Lubrication Overview
- Topic 2: Auto Lubrication System Components
- Topic 3: Auto Lubrication System Operation

Electrical System

Lesson description:
In this lesson you will learn about the XPC Electrical System, from where the power starts to how the components come together to achieve motion. This lesson will help you become familiar with the Electrical System and its components making for better troubleshooting and maintenance.

Objectives:
Upon completion of this lesson the student will:

- Understand the theory of the Electrical System operation
- Understand what components make up the Electrical System
- Understand the system's components and what they do to make the system function

Lesson outline:

- Topic 1: Introduction
- Topic 2: Electrical Components

Drill Instructor-Led Training Outlines

Operator Training

Track Drill Operator Training (ZT Class Drills)

Course Description:
The course introduces all levels of drillers to the safe and productive operation of a Track Blasthole Drill. Within the course, the instructor will focus on critical knowledge and skills required to operate a Track Blasthole Drill.

Course Duration:
Two – eight-hour days (16 hours) with a minimum of eight (8) hours operating the drill. The hours are based off semi-experienced operators and per person. Additional one day, eight-hours for non-English speaking customers allowing time for translations.

Target Audience:
This training is targeted for blasthole drill operators of a Track Blasthole Drill.

Prerequisites:
Operators should have a basic knowledge of blasthole drills.

Course Location:
Field

Objectives:
Upon completion of this lesson the student will:

- Identify the controls within the cab
- Identify and have general knowledge of all critical components
- Propel the drill in a safe manner
- Add and subtract drill pipe, change a bit
- Position drill on a pattern and pattern approach
- Identify and recognize potential risks and hazards; devise a plan on what to do
- Start up and Shut down the drill
- Conduct pre-operation inspections
- Operate the drill in a safe and productive manner

Main Concepts:

- Review of relevant reference material
- Blasthole drill motions and major components
- Cab Controls
- Propelling and Tracks Systems
- Collaring the hole
- Bit and Pipe Handling
- Drill rig set up, start up, and shut down
- Hazard recognition and best management practices

Course Outline:

Course Introduction

- Instructor and participants introduction
- Course objectives
- General, on-site safety
- Knowledge evaluation

Source Information

- Operator's Manual

Drill Overview

- Blasthole drill orientation
- Major Systems Overview

Safety Controls

- E-Stops
- Fire Suppression (if applicable)
- Rig limits and warnings
- LOTOTO (Lockout, Tryout, Tagout)

Pre-Operations

- Work area inspection
- Walk around
- Fluid and hardware checks

Drill Set-Up

- Leveling the drill
- Raising and lowering Mast
- Propelling/positioning the drill
- Bit and steel checks

Controls in the cab

- Describe every function (PODS), joystick (UDC), Console controls (non-UDC), and GUI Display

Drilling

- Proper hole collaring techniques
- What to do if the steel is stuck and how to resolve
- Proper air, water, rotation, and down feed settings and how to adjust them
- Finishing the hole and pulling the steel
- Positioning the drill bit on the target
- Adding and subtracting drill pipe and racking pipe in carousel
- Proper knowledge and use of cab controls
- Bit changes
- Propelling hole to hole, pattern to pattern, and on haul roads
- Auto Drill
- GUI panel and system navigation
- Best Management Practices for Blasthole drills and operators

Course Evaluation and Wrap

- Post-assessment
- Course evaluation

Rotary Drill Operator Training (ZR Class Drills)

Course Description:
The course introduces all levels of drillers to the safe and productive operation of a Rotary Blasthole Drill. Within the course, the instructor will focus on critical knowledge and skills required to operate a Rotary Blasthole Drill.

Course Duration:
Two – eight-hour days (16 hours) with a minimum of eight (8) hours operating the drill. The hours are based off semi-experienced operators and per person. Additional one day, eight-hours for non-English speaking customers allowing time for translations.

Target Audience:
This training is targeted for blasthole drill operators of a Rotary Blasthole Drill.

Prerequisites:
Operators should have a basic knowledge of blasthole drills.

Course Location:
Field

Objectives:
Upon completion of this lesson the student will:

- Identify the controls within the cab
- Identify and have general knowledge of all critical components
- Propel the drill in a safe manner
- Add and subtract drill pipe, change a bit
- Position drill on a pattern and pattern approach
- Identify and recognize potential risks and hazards; devise a plan on what to do
- Start up and Shut down the drill
- Conduct pre-operation inspections
- Operate the drill in a safe and productive manner

Main Concepts:

- Review of relevant reference material
- Blasthole drill motions and major components
- Cab Controls
- Propelling and Tracks Systems
- Collaring the hole
- Bit and Pipe Handling
- Drill rig set up, start up, and shut down
- Hazard recognition and best management practices

Course Outline:

Course Introduction

- Instructor and participants introduction
- Course objectives
- General, on-site safety
- Knowledge evaluation

Source Information

- Operator's Manual

Drill Overview

- Blasthole drill orientation
- Major Systems Overview

Safety Controls

- E-Stops
- Fire Suppression (if applicable)
- Rig limits and warnings
- LOTOTO (Lockout, Tryout, Tagout)

Pre-Operations

- Work area inspection
- Walk around
- Fluid and hardware checks

Drill Set-Up

- Leveling the drill
- Raising and lowering Mast
- Propelling/positioning the drill
- Bit and steel checks

Controls in the cab

- Describe every function (PODS), joystick, and GUI Display

Drilling

- Proper hole collaring techniques
- What to do if the steel is stuck and how to resolve
- Proper air, water, rotation, and down feed settings and how to adjust them
- Finishing the hole and pulling the steel
- Positioning the drill bit on the target using GPS and other means
- Adding and subtracting drill pipe and racking pipe in carousel
- Proper knowledge and use of cab controls
- Bit changes
- Propelling hole to hole, pattern to pattern, and on haul roads
- Auto Drill
- GUI panel and system navigation
- Best Management Practices for Blasthole drills and operators

Course Evaluation and Wrap

- Post-assessment
- Course evaluation

XPC Drill Operator Training

Course Description:
The course introduces all levels of drillers to the safe and productive operation of a XPC Blasthole Drill. Within the course, the instructor will focus on critical knowledge and skills required to operate a XPC Blasthole Drill.

Course Duration:
Two – eight-hour days (16 hours) with a minimum of eight (8) hours operating the drill. The hours are based off semi-experienced operators and per person. Additional one day, eight-hours for non-English speaking customers allowing time for translations.

Target Audience:
This training is targeted for blasthole drill operators of a XPC Blasthole Drill.

Prerequisites:
Operators should have a basic knowledge of blasthole drills.

Course Location:
Field

Objectives:
Upon completion of this lesson the student will:

- Identify the controls within the cab
- Identify and have general knowledge of all critical components
- Propel the drill in a safe manner
- Add and subtract drill pipe, change a bit
- Position drill on a pattern and pattern approach
- Identify and recognize potential risks and hazards; devise a plan on what to do
- Start up and Shut down the drill
- Conduct pre-operation inspections
- Operate the drill in a safe and productive manner

Main Concepts:

- Review of relevant reference material
- Blasthole drill motions and major components
- Cab Controls
- Propelling and Tracks Systems
- Collaring the hole
- Bit and Pipe Handling
- Drill rig set up, start up, and shut down
- Hazard recognition and best management practices

Course Outline:

Course Introduction

- Instructor and participants introduction
- Course objectives
- General, on-site safety
- Knowledge evaluation

Source Information

- Operator's Manual

Drill Overview

- Blasthole drill orientation
- Major Systems Overview

Safety Controls

- E-Stops
- Fire Suppression (if applicable)
- Rig limits and warnings
- LOTOTO (Lockout, Tryout, Tagout)

Pre-Operations

- Work area inspection
- Walk around
- Fluid and hardware checks
- Cable set up

Drill Set-Up

- Leveling the drill
- Raising and lowering Mast
- Propelling/positioning the drill
- Bit and steel checks

Controls in the cab

- Describe every function (PODS), joystick (UDC), Console controls (non-UDC), and GUI Display

Drilling

- Proper hole collaring techniques
- What to do if the steel is stuck and how to resolve
- Proper air, water, rotation, and down feed settings and how to adjust them
- Finishing the hole and pulling the steel
- Positioning the drill bit on the target using GPS and other means
- Adding and subtracting drill pipe and racking pipe in carousel
- Proper knowledge and use of cab controls
- Bit changes
- Propelling hole to hole pattern to pattern, and on haul roads
- Auto Drill
- Cable Reel and Cable Management
- GUI panel and system navigation
- Best Management Practices for Blasthole drills and operators

Course Evaluation and Wrap Up

- Post-assessment
- Course evaluation

Maintenance Training

ZT44 Electrical and Mechanical Systems Training

Course Description:
The course introduces the technicians to the operation, troubleshooting, and maintenance of ZT44 Blasthole drill. Within the course, the instructor will focus on critical knowledge and skills required in supporting the ZT44 Blasthole Drill. All electrical and mechanical systems and adjustments will be discussed. Recommended preventive and corrective maintenance procedures and practices are also covered.

Course Duration:
Five days, 40 hours (Additional one day (8-hours) for non-English speaking customers allowing time for translation)

Target Audience:
This training is targeted for Electrical and Mechanical Maintenance and Supervisory personnel responsible for the preventive and corrective maintenance, troubleshooting, and servicing of ZT44 Blasthole Drills.

Prerequisites:
Technicians should have a basic knowledge of electrical and mechanical terminology and practical experience with maintenance equipment.

Course Location:
Field

Objectives:
Upon completion of this lesson the student will:

- Recognize safety hazards associated with inspection, repair, and maintenance of blasthole drill electrical and mechanical systems
- Identify controls in the cab
- Identify and describe general purpose of all electrical and mechanical systems
- Use machine and automations GUI screens to locate relevant information
- Identify and use available reference materials, such as Maintenance Manuals and Schematics to troubleshoot, repair, and maintain the Blasthole Drill
- Describe the relationship between the Control System and the Machine Hardware (Sensors, IO Modules, Hydraulics, Mechanical Systems, etc.).
- Describe and troubleshoot drill Automation Systems
- Conduct preventive maintenance inspections
- Perform maintenance adjustments and repairs

Main Concepts:

- Review of relevant reference material
- Blasthole drill motions and major components
- Cab Controls and GUI
- Power Module and Mechanical Systems
- Automatic Lubrication System
- Main Air System
- Main Hydraulic Systems
- Electrical Control Systems
- Preventative and corrective maintenance procedures

Course Outline:

Day 1

Course Introduction

- Instructor and participants introduction
- Course objectives
- General, on-site safety
- Knowledge evaluation

Source Information

- Maintenance and Operator Manuals
- Schematics and diagrams
- Service bulletins and notices

Safety Overview

- Safety decals and signs
- Electrical and mechanical hazards
- Stored Energy

Drill Overview

- Blasthole drill orientation
- Major Systems Overview

Controls in the Cab

- Describe every button, joystick, and display in the cab
- Touch screen navigation

Preventative Maintenance

- Schedules & Documentation

Power Unit

- Engine
- Air Compressor

Day 2/3

Main Air System and Compressor Lubrication

- Air compressor lubrication
- Air compressor regulation (displacement and pressure)
- Air tank and oil separators
- Oil Cooler

Water Injection System

- Water tank, water pump
- Relief Valve
- Water heaters (optional)

Main Hydraulic System

- Hydraulic tank and pressurization
- Main pump's description, adjustments, troubleshooting
- Propel system description, adjustments, troubleshooting
- Propel brakes, tracks & propel transmission

Auxiliary Hydraulic System

- Hydraulic Tank and pressurization
- Auxiliary Hydraulic Pump description

Hydrostatic Cooling System

- Cooling Pump
- Oil Cooler fan motor
- Air system oil cooler fan motor

Automatic Lubrication System

Day 4/5

Electrical System

- Schematic Overview, labels, symbols, reference pages
- Operator Cab component layout
- Main control cabinet layout
- 24 VDC supply circuitries
- Controller description, troubleshooting
- CAN bus networks

Use of Screens for Diagnostic

- Use of Control System for problem solving, troubleshooting, alarms, warning events, charting, downloading logs

Course Evaluation and Wrap Up

- Q&A as needed
- Transfer of knowledge questionnaire
- Course evaluation

ZR77 Electrical and Mechanical Systems Training

Course Description:
The course introduces the technicians to the operation, troubleshooting, and maintenance of ZR77 Blasthole drill. Within the course, the instructor will focus on critical knowledge and skills required in supporting the ZR77 Blasthole Drill. All electrical and mechanical systems and adjustments will be discussed. Recommended preventive and corrective maintenance procedures and practices are also covered.

Course Duration:
Five days, 40 hours (Additional one day (8-hours) for non-English speaking customers allowing time for translation)

Target Audience:
This training is targeted for Electrical and Mechanical Maintenance and Supervisory personnel responsible for the preventive and corrective maintenance, troubleshooting, and servicing of ZR77 Blasthole Drills.

Prerequisites:
Technicians should have a basic knowledge of electrical and mechanical terminology and practical experience with maintenance equipment.

Course Location:
Field

Objectives:
Upon completion of this lesson the student will:

- Recognize safety hazards associated with inspection, repair, and maintenance of blasthole drill electrical and mechanical systems
- Identify controls in the cab
- Identify and describe general purpose of all electrical and mechanical systems
- Use machine and automations GUI screens to locate relevant information
- Identify and use available reference materials, such as Maintenance Manuals and Schematics to troubleshoot, repair, and maintain the Blasthole Drill
- Describe the relationship between the LINCS II Control System (PLC) and the machine hardware (Sensors, IO Modules, Hydraulics, Mechanical Systems, etc.).
- Describe and troubleshoot drill Automation Systems
- Conduct preventive maintenance inspections
- Perform maintenance adjustments and repairs

Main Concepts:

- Review of relevant reference material
- Blasthole drill motions and major components
- Cab Controls and GUI
- Power Module and Mechanical Systems
- Automatic Lubrication System
- Main Air System
- Water Injection System
- Main Hydraulic Systems (Propel, Rotary and Pull Down), Auxiliary Hydraulic Systems, Cooling Fan Hydrostatic Drive
- Electrical Control Systems, CAN bus, CAN components
- Drill Automation
- Preventative and corrective maintenance procedures

Course Outline:

Day 1

Course Introduction
- Instructor and participants introduction
- Course objectives
- General, on-site safety
- Knowledge evaluation

Source Information
- Maintenance and Operator Manuals
- Schematics and diagrams
- Service bulletins and notices

Safety Overview
- Safety decals and signs
- Electrical and mechanical hazards
- Stored Energy

Drill Overview
- Blasthole drill orientation
- Major Systems Overview

Controls in the Cab
- Describe every button, joystick, and display in the cab
- Touch screen, GUI, and LINCS screens navigation

Preventative Maintenance
- Schedules & Documentation

Power Unit
- Engine
- PDT (lubrication)
- Torque convertor (oil circulation, cooler, relief valves)
- Air Compressor

Day 2

Main Air System and Compressor Lubrication
- Air compressor lubrication
- Air compressor regulation (displacement and pressure)
- Air tank and oil separators
- Oil Cooler
- Butterfly valve, ball valve

Water Injection System
- Water tank, water pump
- Relief Valve
- Water heaters (optional)

Main Hydraulic System
- Hydraulic tank and pressurization
- Main pump's description, adjustments, troubleshooting
- Propel system description, adjustments, troubleshooting
- Propel Brakes, Tracks & Propel Transmission
- Rotary System description, adjustments, troubleshooting
- Rotary Transmission
- Pulldown System description, adjustments, troubleshooting
- Pulldown brakes
- Rack and Pinion
- Rotary Carriage adjustment
- Pulldown transmission

Day 3

Auxiliary Hydraulic System
- Hydraulic Tank and pressurization
- Auxiliary Hydraulic Pump description
- Pilot System, Load Sense Configuration
- Valve Bank 1, Mast geometry
- Valve Bank 2, Pipe Carousel Swing, indexing, and pipe positioner
- Valve Bank 3, Breakout Wrench geometry
- Valve Bank 4, Bit/Pipe Handling
- Valve Bank 5, Bit Handling
- Head brake, Water Injection, Bit Air Valve, HVAC
- Left and Right Leveling Systems description, adjustments, troubleshooting
- Leveling System, valves, jacks

Hydrostatic Cooling System
- Cooling Pump (tandem)
- Oil Cooler fan motor
- Air system oil cooler fan motor

OGL Lubrication
- Description, operation

Automatic Lubrication
- Grease tank, pump, and components, grease injectors

Dry Air Dust Collector (Optional)
- Description, pulse valves, hydraulic motors, filters

Course Outline:

Day 4

Electrical System

- Schematic overview, labels, symbols, reference pages
- 24 VDC batteries and battery charge
- Stand-by Generator (optional)
- Operator Cab component layout
- Main Control Cabinet layout
- 24 VDC supply circuitries
- Emergency stop relay
- Key Switch
- Controllers description, troubleshooting
- CAN bus networks
- CAN bus component description, addressing, troubleshooting: Joysticks, pressure/temperature sensors, I/O modules (200A, CR2032, CR2031, and CR2016), Encoders, Graphical displays, etc.)
- CAN bus component programing

Day 5

Use of LINCS Screens for Diagnostic

- Use of LINCS System for problem solving, troubleshooting, alarms, warning events, charting, downloading logs
- Updating LINCS software

Drill Advanced Automation (Optional)

- Hardware (controller, sensors, CAN bus)
- LINCS Advance Automation screen navigation

Prevail System

- System description
- HMI, data logger

Machine Visit

- If drill is available, visit the drill to show components and systems discussed in the classroom

Course Evaluation and Wrap Up

- Q&A as needed
- Transfer of knowledge questionnaire
- Course evaluation

ZR122 Electrical and Mechanical Systems Training

Course Description:
The course introduces the technicians to the operation, troubleshooting, and maintenance of ZR122 Blasthole drill. Within the course, the instructor will focus on critical knowledge and skills required in supporting the ZR122 Blasthole Drill. All electrical and mechanical systems and adjustments will be discussed. Recommended preventive and corrective maintenance procedures and practices are also covered.

Course Duration:
Five days, 40 hours (Additional one day (8-hours) for non-English speaking customers allowing time for translation)

Target Audience:
This training is targeted for Electrical and Mechanical Maintenance and Supervisory personnel responsible for the preventive and corrective maintenance, troubleshooting, and servicing of ZR122 Blasthole Drills.

Prerequisites:
Technicians should have a basic knowledge of electrical and mechanical terminology and practical experience with maintenance equipment.

Course Location:
Field

Objectives:
Upon completion of this lesson the student will:

- Recognize safety hazards associated with inspection, repair, and maintenance of blasthole drill electrical and mechanical systems
- Identify controls in the cab
- Identify and describe general purpose of all electrical and mechanical systems
- Use machine and automations GUI screens to locate relevant information
- Identify and use available reference materials, such as Maintenance Manuals and Schematics to troubleshoot, repair, and maintain the Blasthole Drill
- Describe the relationship between the LINCS II Control System (PLC) and the machine hardware (Sensors, IO Modules, Hydraulics, Mechanical Systems, etc.).
- Describe and troubleshoot drill Automation Systems
- Conduct preventive maintenance inspections
- Perform maintenance adjustments and repairs

Main Concepts:

- Review of relevant reference material
- Blasthole drill motions and major components
- Cab Controls and GUI
- Power Module and Mechanical Systems
- Automatic Lubrication System
- Main Air System
- Water Injection System
- Main Hydraulic Systems (Propel, Rotary and Pull Down), Auxiliary Hydraulic Systems, Cooling Fan Hydrostatic Drive
- Electrical Control Systems, CAN bus, CAN components
- Drill Automation
- Preventative and corrective maintenance procedures

Course Outline:

Day 1

Course Introduction
- Instructor and participants introduction
- Course objectives
- General, on-site safety
- Knowledge evaluation

Source Information
- Maintenance and Operator Manuals
- Schematics and diagrams
- Service bulletins and notices

Safety Overview
- Safety decals and signs
- Electrical and mechanical hazards
- Stored Energy

Drill Overview
- Blasthole drill orientation
- Major Systems Overview

Controls in the Cab
- Describe every button, joystick, and display in the cab
- Touch screen, GUI, and LINCS screens navigation

Preventative Maintenance
- Schedules & Documentation

Power Unit
- Engine
- PDT (lubrication)
- Torque convertor (oil circulation, cooler, relief valves)
- Air Compressor

Day 2

Main Air System and Compressor Lubrication
- Air compressor lubrication
- Air compressor regulation (displacement and pressure)
- Air tank and oil separators
- Oil Cooler
- Butterfly valve, ball valve

Water Injection System
- Water tank, water pump
- Relief Valve
- Water heaters (optional)

Main Hydraulic System
- Hydraulic tank and pressurization
- Main pump's description, adjustments, troubleshooting
- Propel system description, adjustments, troubleshooting
- Propel Brakes, Tracks & Propel Transmission
- Rotary System description, adjustments, troubleshooting
- Rotary Transmission
- Pulldown System description, adjustments, troubleshooting
- Pulldown brakes
- Rack and Pinion
- Rotary Carriage adjustment
- Pulldown transmission

Day 3

Auxiliary Hydraulic System
- Hydraulic Tank and pressurization
- Auxiliary Hydraulic Pump description
- Pilot System, Load Sense Configuration
- Valve Bank 1, Mast geometry
- Valve Bank 2, Pipe Carousel Swing, indexing, and pipe positioner
- Valve Bank 3, Breakout Wrench geometry
- Valve Bank 4, Bit/Pipe Handling
- Valve Bank 5, Bit Handling
- Head brake, Water Injection, Bit Air Valve, HVAC
- Left and Right Leveling Systems description, adjustments, troubleshooting
- Leveling System, valves, jacks

Hydrostatic Cooling System
- Cooling Pump (tandem)
- Oil Cooler fan motor
- Air system oil cooler fan motor

OGL Lubrication
- Description, operation

Automatic Lubrication
- Grease tank, pump, and components, grease injectors

Dry Air Dust Collector (Optional)
- Description, pulse valves, hydraulic motors, filters

Course Outline:

Day 4

Electrical System

- Schematic overview, labels, symbols, reference pages
- 24 VDC batteries and battery charge
- Stand-by Generator (optional)
- Operator Cab component layout
- Main Control Cabinet layout
- 24 VDC supply circuitries
- Emergency stop relay
- Key Switch
- Controllers description, troubleshooting
- CAN bus networks
- CAN bus component description, addressing, troubleshooting: Joysticks, pressure/temperature sensors, I/O modules (200A, CR2032, CR2031, and CR2016), Encoders, Graphical displays, etc.)
- CAN bus component programing

Day 5

Use of LINCS Screens for Diagnostic

- Use of LINCS System for problem solving, troubleshooting, alarms, warning events, charting, downloading logs
- Updating LINCS software

Drill Advanced Automation (Optional)

- Hardware (controller, sensors, CAN bus)
- LINCS Advance Automation screen navigation

Prevail System

- System description
- HMI, data logger

Machine Visit

- If drill is available, visit the drill to show components and systems discussed in the classroom

Course Evaluation and Wrap Up

- Q&A as needed
- Transfer of knowledge questionnaire
- Course evaluation

320XPC Electrical Systems Training

Course Description:
The course introduces the technicians to the operation and maintenance of 320XPC Blasthole drill. Within the course, the instructor will focus on critical knowledge and skills required in supporting the 320XPC Blasthole Drill. All electrical, device set-ups and adjustments will be discussed. Recommended preventive and corrective maintenance procedures and practices are also covered.

Course Duration:
Three days, 24 hours (Additional one day (8-hours) for non-English speaking customers allowing time for translation)

Target Audience:
This training is targeted for Electrical Maintenance and Supervisory personnel responsible for the preventive and corrective maintenance, troubleshooting, and servicing of 320XPC Blasthole Drills.

Prerequisites:
Technicians should have an adequate level of knowledge about electrical theories and terminology as well as practical experience with maintenance equipment. High voltage circuits are discussed; therefore, all participants must be aware of high voltage hazards. Only qualified and authorized personnel should be allowed to work on high voltage circuits.

Course Location:
Field

Objectives:
Upon completion of this lesson the student will:

- Identify controls in the cab
- Identify and explain the purpose of all the Electrical Systems utilized
- Use GUI to locate relevant information
- Analyze schematics and control diagrams for troubleshooting and repair of the high/low voltage Electrical Systems
- Identify Profibus, CAN bus (when applicable), Ethernet and DDCS components and set them for proper operation
- Identify and explain the purpose of all Remote I/O Systems on a drill
- Follow function block diagrams to identify the state of inputs/outputs
- Troubleshoot and set DCS800/ACS800 drives
- Locate information for proper maintenance of the main AC and Pulldown/Rotary DC Motors

Main Concepts:

- Kirk Key, Main transformer, Soft Start Autotransformer, Main and Motor High Voltage Switches, 480/380VAC and 520VAC ground fault detection circuits
- Main and Rotary Motors, DC Drive Modules
- AC VF Drive Modules, various starters, circuit breakers and contactors
- Profibus and CAN bus protocols, hardware and software components, I/O Systems ET200S and ET-200S ECOfast
- CAN bus hardware and software components (UDC Cab)
- DDCS Protocol

Course Outline:

Day 1

Course Introduction

- Instructor and participants introduction
- Course objectives
- General, on-site safety
- Knowledge evaluation

Source Information

- Maintenance Manuals
- LinkOne Parts Book
- Service bulletins and notices

Drill Safety and Systems Introduction

- General safety information, safety websites
- Safe operating practices
- Safety decals and signs
- Introduction to drills systems
- Electrostatic discharge

Cab Controls

- Discuss every button, lever, and display in the cab
- Touch panel and GUI - discuss all relevant GUI screens

High Voltage Circuitry

- High Voltage disconnect switches, vacuum contactors
- Kirk Key Interlock System
- Main AC motor, description, operation, maintenance
- Hoist/Pulldown motor circuitry and DCS800 drives, rotary motors circuitry and DSC800 drive, DDCS network

Day 2

K-504T Motor

- Principal of operation, components
- Commutation, commutator, film, TIR, neutral plane, insolation resistance, bearing temperature
- Maintenance and preventive maintenance

Oil Cooler and Water Injection Pump

- VFD drives, ACS 800 operation, set-up

Miscellaneous 480/320 VAC Circuitry

- Jib Crane, Aux. Air Compressor, Welder Transformer, Air Conditioner (this module does not cover AC recharging), low pressure pump/motor, blower motors, oil circulation pump/motor

Miscellaneous 208/120 VAC Circuitry

- Various 120VAC starters and relays, heaters, lights, auto lube AC motor
- Transient suppression filters, 120VAC/24VDC power supplies
- Smart UPS system, description, components, software, messages
- Air System Control
- Brake Air & Lube Air System

Profibus

- Protocol definition, (DP-V1), optical and copper conductors, terminators
- Ethernet network
- AC800M controller, description, set-up, troubleshooting

Day 2 (continued)

Profibus (continued)

- OBT, ET-200S I/O (interface module, I/O modules, termination module), ET-200S ECOfast (description, terminations, addressing)
- Resolver, vibration sensors, various pressure/temperature sensors

CAN bus (Universal Drill Cab – UDC)

- CAN bus description, protocol definition (CAN Open)
- CAN components description, set-up, troubleshooting

Day 3

CAN bus (Universal Drill Cab – UDC)

- CAN bus description, protocol definition (CAN Open)
- CAN components description, set-up, troubleshooting

Remote Propel System

- Control Chief, description, set up

Machine Visit

- If drill is available, visit the drill to show components and systems discussed in the classroom

Course Evaluation and Wrap Up

- Post-assessment
- Course evaluation

320XPC Mechanical Systems Training

Course Description:
The course introduces the technicians to the operation and maintenance of 320XPC Blasthole drill. Within the course, the instructor will focus on critical knowledge and skills required in supporting the 320XPC Blasthole Drill. All structural, mechanical, air, and hydraulic systems and adjustments will be discussed. Recommended preventive and corrective maintenance procedures and practices are also covered.

Course Duration:
Three days, 24 hours (Additional one day (8-hours) for non-English speaking customers allowing time for translation)

Target Audience:
This training is targeted for Mechanical Maintenance and Supervisory personnel responsible for the preventive and corrective maintenance and servicing of 320XPC Blasthole Drills.

Prerequisites:
Technicians should have an adequate level of knowledge of mechanical, hydraulic, and pneumatic terminology and practical experience with maintenance equipment.

Course Location:
Field

Objectives:
Upon completion of this lesson the student will:

- Identify and explain the purpose of all the major components utilized
- Identify controls in the cab
- Location information about the Preventative and Regular Maintenance procedures in the Mechanical Systems Manual
- Explain the relationship between PLC and the rest of the Drill systems
- Analyze schematics and control diagrams utilized for troubleshooting and repair

Main Concepts:

- Machine structural components (Mast, Main Deck, Crawler Frame)
- Power Unit
- Main Air and Auxiliary Air Systems
- Main, Auxiliary, and Low-Pressure Hydraulic Systems
- Water Injection System
- Rotary Carriage and Pipe Handling
- Automatic Lubrication
- Auxiliary Winch

Course Outline:

Day 1

Course Introduction
- Instructor and participants introduction
- Course objectives
- General, on-site safety
- Knowledge evaluation

Source Information
- Maintenance Manuals
- LinkOne Parts Book
- Service bulletins and notices

Drill Safety and Systems Introduction
- General safety information, safety websites
- Safe operating practices
- Safety decals and signs
- General drill systems descriptions

Preventative Maintenance
- Preventive maintenance intervals and procedures

Cab Controls
- Discuss every button, lever, and display in the cab
- Touch panel and GUI

Power Unit
- Description, alignment

Cable Reel
- Descriptions
- Hydraulics, transmission, wind, adjustments

Shovel Systems: Machinery House
- House Ventilation and Pressurization
- AirScrubPro

Day 2

Main Air System and Compressor Lubrication
- All Main Air System Components, including PLC controls
- Air Compressor Lubrication
- Air inlet valves (GD only)
- Pump relief valve, oil cooler, T-tank
- Butterfly Valve

Water Injection System
- Water Tank, Pump/Motor, Valves, Plumbing

Main Hydraulic System
- Closed loop hydrostatic drive
- Main pumps propel motors, propel transmissions
- Propel brakes
- Optional two package

Auxiliary Hydraulic System
- Auxiliary Pump, Valve Banks
- PLC Controls, Unloader/Diverter Volves, Pipe Racks, Dust Curtain, Mast Hoist, Auxiliary Winch, Mas Anchor Pins, Back Brace Locks, Deck Wrench, Breakout Wrench
- ID RUN Overview
- Loading drive back-up package
- Creating drive back up
- Creating a parameter file
- Loading a parameter file
- Parameter file comparison
- Using drive monitor and data logger

Day 3

Auxiliary Hydraulic System (Continued)
- Leveling System, Leveling Jacks, operation, and troubleshooting
- Miscellaneous Auxiliary Hydraulic Circuits and Systems

Lower Pressure Hydraulic System
- Motor/Pump Assembly, operation, and adjustment

Automatic Lubrications
- Motor/Pump Assembly, Relief Valves, Vent Valve
- Pressure Switches, Zone Solenoids
- SLV Injector description, adjustment, and troubleshooting

Rotary Carriage Assembly
- Hoist/Pulldown Machinery description
- Pulldown Brakes description, adjustment, and troubleshooting
- Rotary Machinery description
- Rotary Carriage Assembly, roller adjustment

Course Evaluation and Wrap Up
- Q&A as needed
- Transfer of knowledge questionnaire
- Course evaluation