KOMATSU

Surface Mining Product Training

Providing high-value, data-driven training, optimizing skill and performance

Here at Komatsu, training is more than instruction - it's a commitment to safety, innovation, and excellence. Our global training network equips operators, technicians, and leaders with the skills to succeed in today's evolving industry.

Our Training Mission

"Our mission is to provide high-value, data-driven training and technical communication solutions that enhance skills, optimize performance, and deliver seamless customer experiences. Through innovative, tailored systems and solutions, we drive measurable results, enabling our business to stay competitive, agile, and customer-focused in a rapidly evolving digital landscape."

Our Equipment

Komatsu's Blasthole Drills deliver powerful, reliable drilling solutions for surface mining operations worldwide. Built for tough environments, these rigs combine advanced rotary and down-the-hole technology with features like automated systems, precision navigation, and operator-friendly controls. Designed for productivity, safety, and durability, Komatsu drills help mines achieve accurate, efficient blasting while minimizing downtime and operating costs.

Blasthole Drills

Komatsu's Electric Wheel Loaders deliver zero-emission performance with advanced battery-powered systems and electric drive technology. Designed for efficiency, low maintenance, and quiet operation, they offer powerful traction, rapid charging, and operator-friendly controls—helping reduce environmental impact while maintaining productivity.

Electric Wheel Loaders

Komatsu's Electric Drive Trucks combine high-capacity hauling with advanced electric drive technology for cleaner, more efficient mining operations. Featuring powerful electric wheel motors, regenerative braking, and reduced maintenance requirements, these trucks deliver lower emissions, improved energy efficiency, and dependable performance—helping mines achieve productivity goals while supporting sustainability.

Electric Drive Trucks

Komatsu's Electric Rope Shovels deliver powerful, efficient digging with advanced electric drive systems designed for large-scale mining. Featuring robust electric motors, precise control, and reduced maintenance compared to traditional hydraulic systems, these shovels provide high productivity, lower emissions, and dependable performance—helping mines operate sustainably without compromising output.

Electric Rope Shovels

Our Training Team - Training Managers

Technical Training - Electric Drive Trucks

Philip began his career in 1977 with the North Africa Wabco Distributor as a field service technician before relocating to South Africa in 1980 to serve as the field support depot manager at Iscor Sishen. In 2006, he joined Komatsu USA as an Electric Drive Truck technical instructor and material developer, later being appointed EDT Training Manager in 2012.

Philip Daniel

Technical Training - Electric Wheel Loaders

With 33 years of service, Seans background includes extensive product support and training for electric-drive wheel loaders (EWL), as well as R&D testing alongside engineering teams on new product introductions. His expertise spans EWL product training, content development, and NPI testing, where he has helped shape both technical readiness and high-quality training materials.

Sean Hopkins

Technical and Operator Training - Electric Rope Shovels & Blasthole Drills

Amy joined Komatsu in 2018, bringing experience as an MSHA safety instructor and mathematics educator. She quickly assumed responsibility for coordinating instructor-led and online training for shovel and drill operations, leading multiple content development initiatives and aligning policies and procedures. Amy leverages her expertise in education, LMS leadership, collaboration, and data-driven analysis to deliver safe and effective training and was progressed to Training Manager in 2024.

Amy Pender

Operator Training - Electric Drive Trucks & Electric Wheel Loaders

With 38 years in the automotive and diesel construction industry, Craig joined Komatsu in 2006 as a Technical Trainer and became Technical Training Manager for CE/Forestry in 2016. His role expanded in 2018 to include oversight of mining support equipment and EDT truck operator training. He continue to lead training strategy, strengthen operator and technician readiness, and support Komatsu's commitment to safety and performance.

Craig Yager

Our Training Team - Trainers

Specialty: Electric Rope Shovel - Operator

Work Experience:
- 13 years Shovel Operator experience at Asarco Mission Complex
- Experienced Shovel Operator with expertise in modern shovel technology and automation systems
- 8 years as a P&H Shovel Operator Instructor

Joseph Agular

Specialty: Blasthole Drill - Operator

Work Experience:
- 25+ years operator experience at surface & underground mines
- 21 years of operator training at various mine sites & as an independent contractor
- 6 years as a P&H Drill Operator Instructor

Mark Alterman

Specialty: Blasthole Drill - Operator

Work Experience:
- 20 years as a Freelance Graphic Designer
- 3 years experience as a heavy equipment operator
- 1 year as a P&H Drill Operator Instructor

Mark Alterman

Specialty: Electric Drive Truck - Technical

Work Experience:
- Lonest standing member of the team, on-boarded 2014
- Qualified electrical engineer and SME on all standard EDT products

Olatunde “Sunday” Ajewole

Specialty: Blasthole Drill - Technical

Work Experience:
- 36 years of mining experience
- 24+ years as high voltage electrician, product support technician, and trainer for LeTourneau wheel loaders
- 17 years as a P&H Drill Technical Instructor

Goran Badzic

Specialty: Electric Drive Truck - Operator

Work Experience:
- 30 years of mining experience focused on machine operation, leadman, and crew trainer
- 14 years with Komatsu training on Electric Drive Truck , Mining Dozer, and Grader Operation
- KLTD Certified Expert Trainer

Todd Bresemann

Our Training Team - Trainers

Specialty: Electric Wheel Loader - Technical

Work Experience:
- 16 years of service
- EWL product maintenance and operations instruction
- Training curriculum and content development

David Burke

Specialty: Electric Drive Truck - Technical

Work Experience:
- Newest member, on-boarded 2017
- Certified electro/mechanic technician, bringing 23 years of EDT support experience
- SME on all standard EDT and AHS

Ken Cook

Specialty: Electric Rope Shovel - Mechanical Systems

Work Experience:
- 16 years Building, Overhauling, Maintaining & Training new hires how to work on P&H equipment
- 9 years as a P&H Shovel Technical Instructor

Gabriel Cruz

Specialty: Electric Rope Shovel - Electrical Systems

Work Experience:
- 8+ years in the United States Navy Submarine Service
- 14 years open pit mining field engineering and field technician
- 18 years as a P&H Shovel Technical Instructor

Aaron Engleman

Specialty: Electric Rope Shovel - Electrical Systems

Work Experience:
- Electronic Engineer
- 27+ years global field experience & product support
- 13 years as a P&H Shovel Technical Instructor

Gino Gil

Specialty: Electric Wheel Loader- Technical

Work Experience:
- 24 years as a dealer service technician
- 8 years with Komatsu, senior loader TSR
- 4 years authorized factory technical trainer

Paul Goetz

Our Training Team - Trainers

Specialty: Electric Wheel Loader - Technical

Work Experience:

- Background in Maintenance and Adult Education
- Extensive Knowlege in Foundational Training, Safety Training, and EWL Loader Training
- 8 years with Komatsu

Tom Hall

Specialty: Electric Rope Shovel - Operator

Work Experience:

- 36 years of operator experience on Surface Mining Equipment
- 15 years as an operator trainer at Barrick Cortez & Kinross Bald Mountain
- New Hire as a P&H Shovel Operator Instructor

Dan Murphy

Specialty: Electric Drive Truck - Technical

Work Experience:

- On-boarded 2015
- Certified electrical technician and MSHA Heavy Equipment Green card holder
- SME on all standard EDT and lead for AHS products

Clayton Perkins

Specialty: Electric Drive Truck & Electric Wheel Loader - Operator

Work Experience:

- 35 years of mining industry experience, specializing in EWL, mechanical drive wheel loaders, excavators, EDT, mechanical drive trucks, and dozers
- 22 years as an operator and instructor
- 13 years operator instructor for Komatsu mining teams

Kurtis Wilson

Our Training Team - Developers

Specialty: Electric Rope Shovel & Blasthole Drill

Work Experience:
- 3D CAD and animation development, Adobe Cloud Products, UX & UI Design, as well as 3D printing
- 10+ years of project management
- 21 years as a Content Developer for P&H and Komatsu

Jim Benedict

Specialty: Electric Drive Truck

Work Experience:
- Graduate of the OSUIT Komatsu ACT program
- 5 years as an advanced Komatsu service tech
- 3 years as a mechanical assembler at Komatsu PMO

Jack Lindell

Specialty: Electric Rope Shovel & Blasthole Drill

Work Experience:
- Comprehensive knowledge of Lectora, Adobe cloud products, and Autodesk Maya
- Highly skilled at troubleshooting LMS and eLearning content
- 15 years as a Content Developer for P&H and Komatsu

Jose Ojeda

Specialty: Electric Wheel Loader

Work Experience:
- MBA, Master of Education with a background in Electronics, Programming, Learning Development
- Extensive knowlege in Application Development and Process Engineering
- 19 Years with P&H and Komatsu Training

Zack Peters

Specialty: Electric Wheel Loader

Work Experience:
- US Navy–trained Electronics Technician with Extensive control systems experience
- Extensive knowlege in 3D CAD Design, Media Creation, Photography and Videography
- 18 Years with P&H and Komatsu Training

Tracy Weldon

Our Training Facilities

Komatsu's **Milwaukee South Harbor Campus** opened in 2022, features a state-of-the-art training lab within its 185,000-square-foot, three-story office building. The facility includes an Automation Center, Electrical Engineering Lab, and a dedicated Training Lab designed for hands-on instruction. Courses cover technical and advanced technology skills, supported by the Komatsu Learning Management System and tailored modules. This lab reflects Komatsu's commitment to workforce development and its vision of "creating value together" through interactive training and community engagement.

Milwaukee

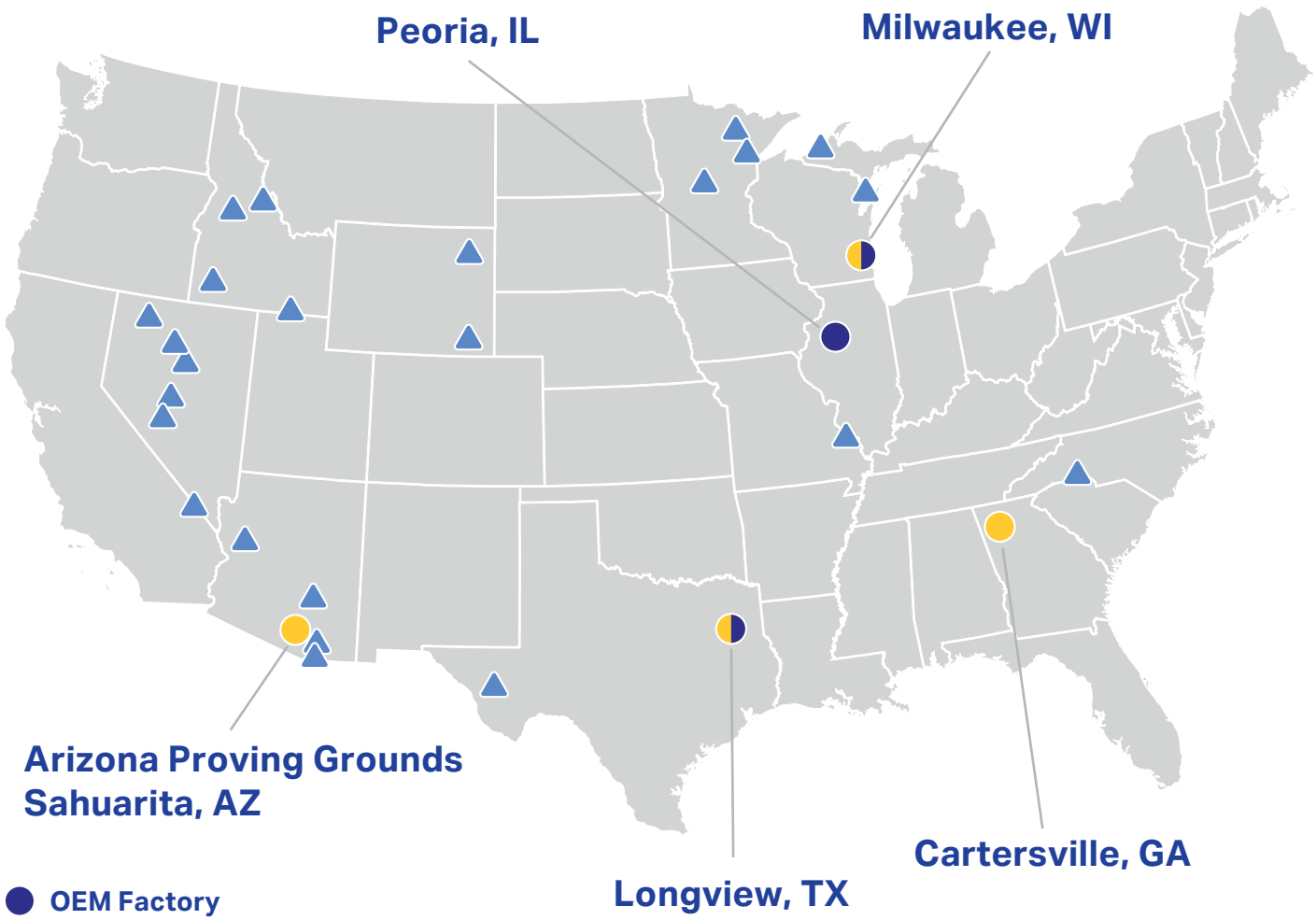
Komatsu's **Longview Training Center,** located on its Texas manufacturing campus, provides a dedicated space for hands-on learning and skill development. The facility supports technical and service training programs tailored to mining equipment and advanced technologies. Designed to enhance workforce capabilities, the center offers structured courses and practical instruction aligned with Komatsu's global standards. This investment underscores Komatsu's commitment to empowering customers and employees through comprehensive education and continuous improvement.

Longview

Komatsu's **Arizona Proving Grounds** in Sahuarita, AZ, offers a dedicated training environment within its 69,000-square-foot prototype shop. The facility focuses on operator, technical, and service training for mining equipment, including programs that incorporate Autonomous Haulage System (AHS) operations. By combining hands-on instruction with real-world testing scenarios, the proving grounds help customers and technicians build expertise while supporting product validation and site optimization.

AZPG

Our Training Facilities



South Harbor Campus - Milwaukee, WI

Komatsu's North American training facilities are designed to deliver hands-on, technology-driven education for operators, technicians, and sales professionals. Our campuses feature classrooms, labs, simulators, and real-world equipment environments to provide engaging courses in machine operation, maintenance, and advanced technologies, ensuring participants gain practical skills to maximize safety, efficiency, and productivity. Through expert-led instruction and innovative tools, Komatsu empowers customers and partners to keep their equipment—and their businesses—running at peak performance.

Customized Training Solutions

Komatsu's online training delivers flexible, self-paced learning through interactive modules and virtual classrooms. Covering machine operation, maintenance, safety, and advanced technologies, these courses provide the same high-quality instruction as in-person programs—accessible anytime, anywhere to help customers boost efficiency and reduce downtime.

Online Training

Komatsu's instructor-led training delivers hands-on learning in a structured classroom and field environment. Led by experienced trainers, these courses combine practical machine operation with in-depth maintenance and safety instruction. Participants benefit from real-world equipment access, interactive demonstrations, and personalized guidance to build confidence and maximize performance. This approach ensures teams gain the skills needed to operate efficiently and keep equipment running at peak reliability.

ILT - Face to Face

Komatsu's blended training combines the flexibility of online learning with the hands-on experience of instructor-led sessions. Participants start with self-paced digital modules to build foundational knowledge, then apply those concepts in practical, real-world environments guided by expert trainers. This approach maximizes convenience while ensuring deep skill development, helping teams operate safely and efficiently with minimal downtime.

Blended Learning

Contents

Centurion AC Electrical Systems Fundamentals

The **Centurion AC Electrical Systems Fundamentals** course provides a thorough, structured training program for electrical technicians working with P&H Electric Rope Shovels. Covering the foundational topics, the curriculum is designed to build essential knowledge and for safe, efficient, and effective shovel maintenance.

Participants will begin with an introduction to shovel sections, motions, systems, and components, gaining familiarity with both interior and exterior features. The course then explores operational basics, including motion controls, productive digging setup, and inspection procedures, followed by a detailed overview of electrical fundamentals such as electrostatic discharge (ESD), schematic navigation, troubleshooting techniques, and maintenance shutdown protocols.

Online Training

3 hours

Electrical Technicians

English / Spanish

Course Objectives

Upon completion, students will be able to:

- Identify and describe the major sections, motions, and systems of P&H Electric Rope Shovel
- Apply electrical safety guidelines included electrostatic discharge (ESD) precautions and maintenance shutdown procedures
- Explain the process of power distribution and the principles of power conversion, protective circuits and AC motors. Use this knowledge to perform related maintenance troubleshooting tasks
- Understand the operation and interaction of ABB and Siemens control system components
- Explain the operation of the drive control system components and how they interact with the Shovel Control and Power systems

Course Topics

Product Introduction

Power Systems

- Power Distribution
- Protective Circuits
- AC Motor Theory and Operation

Shovel Control System

- Centurion Control System
- Remote IO/Siemens IO
- Communication Devices

Drive Control System

- ACS800/ACS880

Miscellaneous Electrical Equipment

- UPS System
- TripRite®

Centurion DC Electrical Systems Fundamentals

Online Training

3 hours

Electrical Technicians

English / Spanish

The **Centurion DC Electrical Systems Fundamentals** course provides maintenance technicians with a thorough understanding of the electrical systems, components, and operational procedures of P&H Mining Electric Rope Shovels. The curriculum covers foundational concepts such as shovel sections, motions, and systems, progressing through detailed lessons on electrical theory, safety, troubleshooting, and maintenance practices. Participants will gain theoretical knowledge of high voltage distribution, power conversion, protective circuits, DC motor operation and maintenance, shovel control system and drive control systems. The course emphasizes safety, risk analysis, and proficiency in diagnostics and repairs, preparing learners to effectively maintain and troubleshoot electric rope shovels in diverse mining environments.

Course Objectives

Upon completion, students will be able to:

- Identify and describe the major sections, motions, and systems of P&H Electric Rope Shovel
- Apply electrical safety guidelines included electrostatic discharge (ESD) precautions and maintenance shutdown procedures
- Explain the principles of power conversion and protective circuits
- Understand the theory, operation, and maintenance of DC motors, including inspection and lubrication
- Understand the operation and interaction of ABB and Siemens control system components
- Explain the operation of the drive control system components and how they interact with the Shovel Control and Power systems

Course Topics

Product Introduction

Power Systems

- Power Distribution
- Power Conversion
- Protective Circuits
- RPC Theory and Operation – Centurion
- Theory of DC Motor Operation
- DC Motor Maintenance

Shovel Control System

- Centurion Control System
- Remote IO/Siemens IO
- Communication Devices

Drive Control System

- DCS800

Miscellaneous Electrical Equipment

- UPS System
- TripRite®

Shovel Mechanical Systems Fundamentals

The **Shovel Mechanical Systems Fundamentals** course provides a thorough, structured learning path for technicians working with P&H Electric Rope Shovels. Covering both foundational theory and practical maintenance, the curriculum is designed to build a solid foundation in the major mechanical systems and components of C-Series shovels.

Online Training

3 hours

Maintenance Technicians

English / Spanish / Portuguese

Participants will gain a comprehensive understanding of shovel sections, motions, and systems, with focused modules on disc brakes, propel and crawler systems, house filtration, mine air, swing and hoist systems, attachments, crowd systems, and air compressors. Each lesson blends component identification, operational theory, inspection procedures, adjustment techniques, and safety practices.

Objectives

Upon completion, students will be able to:

- Identify and describe the function and purpose of all major shovel components and assemblies
- Perform routine inspections and maintenance on critical systems
- Apply correct adjustment and repair procedures to ensure optimal performance and safety
- Recognize and mitigate hazards associated with stored mechanical energy and system malfunctions
- Apply troubleshooting techniques and safety protocols to address alarms, system malfunctions, and maintenance hazards, ensuring safe and efficient shovel operation

Course Topics

Product Introduction

Disc Brakes

Propel System

Air Filtration

Mine Air System

Swing System

Hoist System

Attachment

Crowd System

Auto Lubrication System

Air Compressors

New Operator Production Task Training

New Operator Production Task Training provides structured task training for operators with little to no experience assigned to operate a P&H Electric Rope Shovel in a production mining environment. This course develops machine familiarization, safety system awareness, inspection discipline, permissive validation, operator control proficiency, and controlled Dig Cycle execution under supervised production conditions. Emphasis is placed on correct shovel set-up, hazard recognition, disciplined motion control, and application of best practices that protect personnel, equipment, and production efficiency.

Instructor - Led Training

3 – 4 weeks, minimum 120 operating hours per participant*

New Operators for P&H Rope Shovels

Classroom/Field – Customer Mine Site

Prerequisites

Operators should have completed all e-learning modules. Simulator training is preferable but not required. Minimum passing score of 80% pre-knowledge assessment prior to commencing training.

Objectives

Upon completion, students will be able to:

- Identify major shovel systems
- Perform and document complete pre-operational inspections
- Apply safety systems, LOTOTO responsibilities, and permissive validation
- Operate controls and interpret GUI indicators, warnings, and faults
- Explain automation and limit system purpose and appropriate response
- Apply correct shovel positioning and Dig Cycle technique
- Demonstrate disciplined hoist, crowd, swing, and dumping control
- Apply best practices that reduce wear, prevent damage, and control cost
- Identify hazards and demonstrate safe operating discipline

Main Concepts

Review all relevant reference materials

- Machine-specific motion response, drive state awareness, and interaction between electrical, air, brake, and lubrication systems
- Minimum main air pressure and brake readiness requirements prior to Brake Release
- Brake transition discipline and permissive sequencing
- Limit protection systems and automation interaction (Active Limits, ABSS, Adaptive Controls if equipped)
- Structured inspection execution and evaluation standards
- Foundational operator fundamentals
- Coaching safe set-up, positioning, best practices, and hazard recognition

Experienced Operator – New Machine Task Training

The **Experienced Operator Task Training** provides machine-specific qualification for experienced operators transitioning to a new P&H shovel model. Focuses on configuration differences in drive architecture, brake systems, control logic, geometry, limit protections, and installed automation features. Emphasis is placed on validating system readiness, adapting techniques to model-specific characteristics, and maintaining disciplined performance prior to independent production assignment.

Instructor - Led Training

3 – 8 hour days

Experienced operators transitioning to new P&H Rope Shovel model or configuration

Classroom/Field – Customer Mine Site

Prerequisites

Operators should have a minimum of 1 year production experience on Electric Rope Shovels. Demonstrated Dig Cycle discipline and inspection compliance. Minimum passing score of 80% pre-knowledge assessment prior to commencing training.

Objectives

Upon completion, students will be able to:

- Identify configuration differences that affect motion control, geometry, and braking
- Verify system readiness, including Shovel Start, Drive Start, and Brake Release permissives and brake state, prior to motion
- Demonstrate model-specific drive state validation and proper Dig/Propel transition discipline
- Operate within installed limit and automation protection systems
- Interpret alarms and system status indicators accurately
- Demonstrate model-specific operating discipline prior to independent assignment

Main Concepts

Review all relevant reference materials

- Model-specific drive architecture, motion response, and resolver-based positioning feedback
- Brake configuration and Dig/Propel transfer discipline
- Shovel Start, Drive Start, and Brake Release permissive validation
- Touch Panel navigation and drive state awareness
- Propel carry position, travel restrictions, and grade considerations
- Limit protection systems (Boom Limits, Active Limits, ABSS if equipped)
- Automation interaction (Track Shield, Payload if equipped)
- Alarm hierarchy and corrective response
- Resolver-based position awareness and system feedback interpretation
- Calibration under authorized maintenance access level

Non-Production Task Training

The **Non-Production Task Training** provides structured qualification for maintenance personnel required to perform controlled machine movement in support of inspection, troubleshooting, calibration, commissioning, and re-commissioning activities. The course clearly defines maintenance-support movement authority. Hoist, Crowd, Swing, and limited Propel motions are executed strictly for testing, calibrations and validation. Emphasis is placed on permissive confirmation, brake and air system readiness, controlled positioning, and disciplined transition from maintenance condition to production-ready status


Instructor - Led Training


1 – 8 hour day, at least 1 hour of shovel operation per person


Maintenance personnel


Classroom/Field – Customer Mine Site

Prerequisites

Minimum 1 year maintenance experience. Authorized maintenance user-level access. Working knowledge of start-up and permissive logic.

Objectives

Upon completion, students will be able to:

- Execute controlled start-up and commissioning validation within maintenance authority
- Verify permissives, brake readiness, air system status, and automation readiness prior to motion
- Perform automation calibration procedures under authorized maintenance access (Active Limits, Track Shield, Payload 2, Adaptive Controls if equipped)
- Perform limited motion testing strictly for troubleshooting and validation
- Position and secure the shovel appropriately for maintenance execution
- Confirm documented operational and automation readiness prior to return to production

Main Concepts

Review all relevant reference materials

- Commissioning/re-commissioning validation procedures and system readiness verification
- Controlled Hoist, Crowd, Swing, and limited Propel movement for maintenance scope only
- Shovel Start, Drive Start, and Brake Release permissive verification
- Brake validation and minimum main air pressure requirements
- Authorized maintenance access level verification & system readiness confirmation
- Automation system calibration procedures
- Controlled positioning for maintenance shutdown and restart
- Verification of swing clearance, work area stability, and safe equipment distance prior to controlled movement
- Cable carrier hazard awareness and movement exclusion boundaries during maintenance tasks
- Post-maintenance functional testing and automation verification prior to return to service

Advanced Operation & Best Practices

The **Advanced Operation & Best Practices** course refines high-performance operating techniques under demanding production conditions. This course links operator input directly to structural loading control, component life, fill factor performance, and cycle efficiency. Emphasis is placed on precision force application, geometry discipline, swing optimization, and elimination of abuse factors.


Instructor - Led Training


3 – 8 hour days


Experienced P&H Rope Shovel Operators


Classroom/Field – Customer Mine Site

Prerequisites

Documented production experience on P&H Electric Rope Shovels. Demonstrated cycle discipline and inspection compliance.

Objectives

Upon completion, students will be able to:

- Apply precision coordination to maximize fill factor without exceeding structural limits
- Maintain controlled dig geometry and optimized swing arc to minimize impact loading and structural stress
- Select and execute appropriate loading methodology
- Demonstrate correct brake transition technique
- Identify and eliminate operating behaviors that increase structural loading or component wear

Main Concepts

Review all relevant reference materials

- Advanced Hoist and Crowd force balance
- Dig geometry control with dipper engagement under the boom point and vertical rise through the bank
- Fill factor management by material classification
- Stall prevention and controlled recovery to protect hoist machinery and rope life
- Swing arc optimization and haul unit positioning to minimize swing distance
- Structured digging sequences and bench control
- Brake transition discipline during Dig/Propel transfer
- Truck spotting optimization and swing distance reduction
- TRC configuration understanding and proper handle positioning fundamentals (if equipped)
- Trip Rite latch integrity and door protection
- Identification and correction of operator abuse factors
- Recognition of swing impact loading and improper digging force application

Automation & Systems Application

The **Automation & Systems Application** training develops operator familiarity with Centurion control architecture, controls, and machine features while explaining the operational purpose of the shovel's automation systems. Emphasis is placed on understanding how automation systems support machine protection, performance consistency, and operational efficiency, along with the proper execution and verification of related system calibrations.


Instructor - Led Training


2 – 8 hour days


Operators and maintenance personnel responsible for Automation and System Applications


Classroom/Field – Customer Mine Site

Prerequisites

Minimum 1 year operating or maintenance experience on P&H Electric Rope Shovels. Familiarity with Centurion operator interface and system status displays. Working knowledge of Dig Cycle execution and machine limit systems.

Objectives

Upon completion, students will be able to:

- Explain the purpose and operational impact of shovel automation systems
- Interpret system state indicators, permissives, and drive readiness conditions
- Verify system readiness prior to engaging motion or automation functions
- Distinguish warning conditions from fault conditions and determine appropriate response
- Perform and verify automation-related calibration procedures where applicable
- Demonstrate controlled machine stabilization following drive or limit faults

Main Concepts

Review all relevant reference materials

- Centurion control architecture and drives state sequencing
- Shovel Start, Drive Start, and Brake Release permissive logic
- Boom Limits, Active Limits, Track Shield, and system interlocks
- Adaptive Controls functionality and machine response
- Payload 2 operating cycle logic and cycle state recognition
- Resolver feedback and automation system calculations
- Alarm hierarchy and operator response
- Drive fault recognition and controlled machine stabilization procedures
- Proper override use in accordance with approved operating procedures
- Automation calibration and verification procedures
- Payload and production monitoring interaction

Production & Reliability Oversight Training

The **Production & Reliability Oversight** training strengthens supervisory capability to evaluate shovel performance against production efficiency, structural loading discipline, and equipment reliability standards.

Instructor - Led Training

1 – 2 days

Supervisors/Lead P&H Rope Shovel Operators

Classroom/Field – Customer Mine Site

Prerequisites

Supervisory or lead operator experience. Familiarity with shovel cycle metrics.

Objectives

Upon completion, students will be able to:

- Evaluate cycle performance using measurable indicators
- Detect technique-driven contributors to wear or stress
- Verify inspection and positioning compliance
- Implement corrective coaching to restore disciplined performance

Main Concepts

Review all relevant reference materials

- Cycle efficiency analysis including swing arc and truck positioning impact
- Fill factor consistency and load placement discipline
- Structural loading indicators and abuse detection
- Inspection and start-up compliance verification
- Corrective coaching methodology

Operator – Train the Trainer

The **Operator Train the Trainer** course prepares designated trainers to deliver structured task training for experienced Electric Rope Shovel operators aligned with OEM operating standards and machine-specific performance requirements. Emphasis is placed on technical accuracy, consistent instructional delivery, evaluation discipline, and reinforcement of machine-specific operating standards, limit system awareness, and production best practices during operator transition.

Instructor - Led Training

Full Course: 1 – 2 weeks (80-100 hours)
Accelerated Course: 4 – 5 days (40 – 50 hours)

Experience P&H Rope Shovel Operators, Supervisors, and aspiring trainers

Classroom/Field – Customer Mine Site

Prerequisites

Trainers should have a minimum of 5 years' mining experience in operating and demonstrate peer-to-peer coaching on Electric Rope Shovels. Documented disciplined operating performance.

Objectives

Upon completion, students will be able to:

- Deliver machine-specific training aligned with OEM standards for experienced operators
- Demonstrate structured coaching techniques for drive state validation and limit system compliance
- Evaluate experienced operator adaptation to configuration or automation changes
- Apply consistent, objective criteria when authorizing operator readiness following machine transition
- Incorporate foundational operator fundamentals into trainer-led delivery
- Reinforce safe operating practices, inspection discipline, and hazard awareness standards

Main Concepts

Review all relevant reference materials

- Delivery of OEM operating standards and model-specific system architecture
- Coaching brake transition and drive state validation
- Reinforcement of permissive sequencing and limit protections
- Automation interaction (Active Limits, ABSS, Adaptive Controls if equipped)
- Performance-based evaluation and qualification documentation
- Integration of foundational operator fundamentals (inspections, GUI/permissives, Dig Cycle discipline)
- Coaching safe set-up, positioning, and hazard recognition

Centurion AC Electrical Systems – Field

The **Centurion AC Electrical Systems** field training provides the students with the essential knowledge for servicing and maintaining P&H Rope Shovels, with a focus on the Centurion AC Shovel Control System. Participants will gain a comprehensive understanding of major shovel components, system interrelationship, and troubleshooting techniques through a blend of theoretical instruction and limited practical exercises.


Instructor - Led Training


2 – 8 hour days


Electrical Technicians


Customer site / distributor location

Prerequisites

Participants should have basic mechanical terminology knowledge, practical maintenance experience, and hands-on exposure to P&H Rope Shovels. Completion of our online training course is preferred.

Objectives

Upon completion, students will be able to:

- Identify and explain the function of all major shovel components
- Utilize application software programs effectively
- Perform component removal and replacement
- Analyze and interpret schematics and control diagrams for lockout / tagout troubleshooting and repair
- Understand the operation and maintenance of the auxiliary systems

Main Concepts

- AC Drive Overview
- Drive PC Tool Overview
- AC800M Hardware Overview
- Control Builder Overview
- Auxiliary Systems Operation
- System Maintenance and Troubleshooting

Centurion AC Electrical Systems – Factory

The **Centurion AC Electrical Systems** factory training is a hands-on course focused on maintaining P&H Mining Shovels, particularly the AC Control System. Combining classroom learning with practical exercises, it develops skills in reading electrical schematics, using touch panels, and troubleshooting AC drive components. The course highlights safety, diagnostics, and subsystem integration to prepare participants for real-world maintenance and repairs.


Instructor - Led Training


3 – 8 hour days


Electrical Technicians


Factory – Milwaukee, WI

Prerequisites

Students should have hands-on experience with P&H Rope Shovels as well as knowledge of power electronics. Completion of our field-based course and/or online training course is preferred.

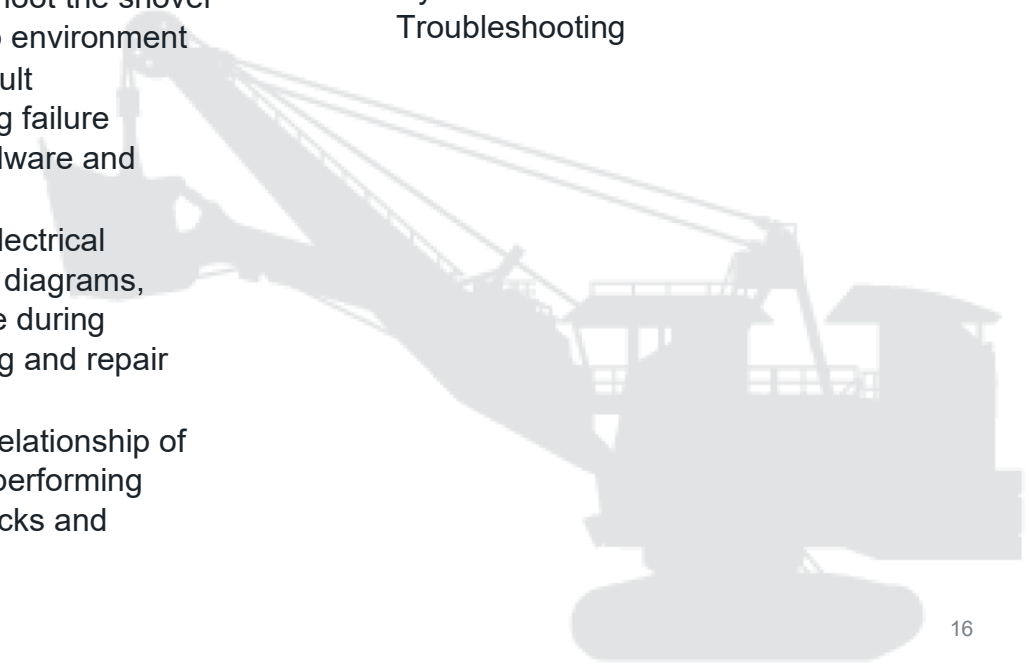
Objectives

Upon completion, students will be able to:

- Identify and explain the purpose of all major components utilized
- Use application software and diagnostic tools to load, install, configure, and troubleshoot the shovel control systems in a lab environment
- Remove and replace fault components, performing failure analysis using real hardware and simulation exercise
- Analyze and interpret electrical schematics and control diagrams, applying this knowledge during practical troubleshooting and repair labs
- Demonstrate the inter-relationship of shovel subsystems by performing integrated systems checks and maintenance tasks

Main Concepts

- AC Drive Overview
- Drive PC Tool Overview
- AC800M Hardware Overview
- Control Builder Overview
- Auxiliary Systems Operation
- System Maintenance and Troubleshooting



Centurion DC Electrical Systems – Field

The **Centurion DC Electrical Systems** field training provides the students with the essential knowledge for servicing and maintaining P&H Rope Shovels, with a focus on the Centurion DC Shovel Control System. Participants will gain a comprehensive understanding of major shovel components, system interrelationship, and troubleshooting techniques through a blend of theoretical instruction and limited practical exercises.

Instructor - Led Training

2 – 8 hour days

Electrical Technicians

Customer site / distributor location

Prerequisites

Participants should have basic electrical terminology knowledge, practical maintenance experience, and hands-on exposure to P&H Rope Shovels. Completion of our online training course is preferred.

Objectives

Upon completion, students will be able to:

- Identify and explain the function of all major shovel components
- Utilize application software programs effectively
- Perform component removal and replacement
- Analyze and interpret schematics and control diagrams for lockout/tagout troubleshooting and repair
- Understand the operation and maintenance of the auxiliary systems

Main Concepts

Review all relevant reference materials

- DC Drive Overview
- DC Power Systems
- Drive PC Tool Overview
- AC800M Hardware Overview
- Control Builder Overview
- Auxiliary Systems Operation
- System Maintenance and Troubleshooting

Centurion DC Electrical Systems – Factory

The **Centurion DC Electrical Systems** factory training is a hands-on course focused on maintaining P&H Mining Shovels, particularly the DC Control System. Combining classroom learning with practical exercises, it develops skills in reading electrical schematics, using touch panels, and troubleshooting DC drive components. The course highlights safety, diagnostics, and subsystem integration to prepare participants for real-world maintenance and repairs.

- Instructor - Led Training
- 3 – 8 hour days
- Electrical Technicians
- Factory – Milwaukee, WI

Prerequisites

Students should have hands-on experience with P&H Rope Shovels as well as knowledge of power electronics. Completion of our field-based course and/or online training course is preferred.

Objectives

Upon completion, students will be able to:

- Identify and explain the purpose of all major components utilized
- Use application software and diagnostic tools to load, install, configure, and troubleshoot the shovel control systems in a lab environment
- Remove and replace fault components, performing failure analysis using real hardware and simulation exercise
- Analyze and interpret electrical schematics and control diagrams, applying this knowledge during practical troubleshooting and repair labs
- Demonstrate the inter-relationship of shovel subsystems by performing integrated systems checks and maintenance tasks

Main Concepts

- DC Drive Overview
- Drive PC Tool Overview
- AC800M Hardware Overview
- Control Builder Overview
- Auxiliary Systems Operation
- System Maintenance and Troubleshooting

Shovel Mechanical Systems – Field

The **Shovel Mechanical Systems** field training delivers essential knowledge and skills for the maintenance of P&H Rope Shovels. The course provides comprehensive coverage of all mechanical systems and adjustments, with a focus on recommended preventive and corrective maintenance procedures and best practices.


Instructor - Led Training


2 – 8 hour days


Maintenance Technicians


Customer site / distributor location

Prerequisites

Participants should have basic mechanical terminology knowledge, practical maintenance experience, and hands-on exposure to P&H Rope Shovels. Completion of our online training course is preferred.

Objectives

Upon completion, students will be able to:

- Locate and identify major mechanical systems, subsystems, and components
- Identify and use available reference material to operate or maintain the shovel
- Understand the design and function of various Shovel Mechanical Systems
- Conduct preventive maintenance inspections
- Perform maintenance adjustments and repairs
- Recognize safety hazards associated with inspection, repair, and maintenance of shovel mechanical systems

Main Concepts

- Review of relevant reference material
- Shovel motions and major components
- Lower machine structure and Propel System
- Revolving Frame and Swing System
- Hoist System
- Boom Assembly and Crowd System
- Machinery House and Ventilation System
- Compressed Air System
- Brake System
- Automatic Lubrication System
- Inspections, tests, and adjustments of major Mechanical Systems
- Preventive and corrective maintenance procedures

Shovel Mechanical Systems – Factory

The **Shovel Mechanical Systems** factory training is designed for experiences mechanical maintenance and supervisory personnel responsible for the preventive and corrective maintenance of P&H Rope Shovels. The course delivers in-depth instruction on all major mechanical systems, subsystems, and components. Participants will engage in a blend of classroom learning and hands-on activities applying advanced maintenance techniques in simulated scenarios.


Instructor - Led Training


3 – 8 hour days


Maintenance Technicians


Factory – Milwaukee, WI

Prerequisites

Participants should have basic mechanical terminology knowledge, practical maintenance experience, and hands-on exposure to P&H Rope Shovels. Completion of our field-based training and/or online training course is preferred.

Objectives

Upon completion, students will be able to:

- Expertly locate and identify all major mechanical systems and components of the P&H Rope Shovel
- Apply advanced preventive and corrective maintenance techniques through hands-on practice
- Utilize technical documentation for complex troubleshooting and repairs
- Perform system-specific adjustments and repairs to our standards
- Recognize and mitigate safety hazards in mechanical maintenance
- Enhance shovel reliability and operational performance through advanced maintenance strategies

Main Concepts

- Review of relevant reference material
- Shovel motions and major components
- Lower machine structure and Propel System
- Revolving Frame and Swing System
- Hoist System
- Boom Assembly and Crowd System
- Machinery House and Ventilation System
- Compressed Air System
- Brake System
- Automatic Lubrication System
- Inspections, tests, and adjustments of major Mechanical Systems
- Preventive and corrective maintenance procedures

Advanced AC/DC Electrical Course

This course is designed to upskill Komatsu technicians. Learners will better understand the AC/DC electrical system, the function of transistors and diodes, and the purpose of an inverter and a solid-state drive system.

Online Training

7 – 14 hours

Technicians

English

Prerequisites

No Prerequisites required for this online course

Objectives

Upon completion, students will be able to:

- Apply Ohm's Law to an electrical circuit
- Describe the principles of electrical circuits
- Explain the principles of DC and AC traction motors
- Identify passive and active electrical devices and describe their function
- Describe the function of transistors and diodes
- Explain the purpose of an inverter and a solid-state drive system

Main Concepts

Modules

- Basic Electricity
- Motors
- Passive Electrical Devices
- Active Electrical Devices
- The Principles of Solid-State Drives

Final Assessment

- Each module will have a 'Test your knowledge' must pass with an 80% or higher
- Must obtain an 80% or higher on final quiz

Hoist System Functionality

In this course, you will learn more about the key components of the hoist system for EDT machines, how the hoist system works in different modes of operation, set-up and adjustments that need to be made for the hoist system. Throughout the course, the 930E-5 model is used as an example, but the information is applicable to most EDT products.

Online Training

4 – 8 hours

Technicians

English

Prerequisites

Fundamentals of Hydraulics

Objectives

Upon completion, students will be able to:

- Locate and identify all elements and devices of the EDT hoist system
- Analyses the hoist and brake cooling system layout
- Analyze the hoist valve internal structure and function
- Explain the hoist valve internal functionality in four modes of operation
- Demonstrate a thorough understanding of the EDT hoist system functionality to diagnose faults, abnormalities and rectify mal - adjustment of the system through tests and adjustment

Main Concepts

Modules

- EDT Hoist System Components
- Hoist System Structure and Function
- Hoist system Structure and Function

Final Assessment

- Each module will have a ‘Test your knowledge’ must pass with an 80% or higher
- Must obtain an 80% or higher on final quiz

Machine Familiarization Training

The **Machine Familiarization** training course provides new and developing operators with a comprehensive introduction to the systems, controls, and operating principles of electric drive mining trucks. Participants learn the layout and function of key components, including monitoring and retarding systems, along with proper use of machine controls. Training emphasizes safe mounting and dismounting, critical pre-operation inspections, and essential safety practices such as brake and steering checks.

Instructor - Led Training

3 days (24 hours) – minimum 4 hours classroom time

Maintenance Personal / New Operators

Classroom/Field – Customer Mine Site

Prerequisites

Basic familiarity with mining or heavy equipment operations, or completion of site-required safety orientation.

Objectives

Upon completion students will be able to:

- Identify major electric drive mining truck systems, components, and operating controls
- Perform pre-operation inspections and recognize critical daily checks that support safe, reliable operation
- Apply safe mounting, dismounting, and fundamental safety practices, including brake and steering checks
- Understand the function and use of monitoring and retarding systems
- Demonstrate safe driving techniques and awareness of machine capabilities, limitations, and electric drive operating characteristics

Main Concepts

Pre-operation Inspection

Safety

- Brake & Sterring Checks

Safe Driving Techniques

Machine Control

Fundamental Operator Training

The **Fundamental Operator** training course provides new and developing haul truck operators with a strong foundation in the skills, techniques, and safety practices required to operate electric drive mining trucks efficiently. Participants learn critical pre-operation inspections, safety system checks, and the fundamentals of dynamic retarding and how it affects truck performance throughout the haul cycle. Training focuses on mastering core operating techniques, including throttle application, retarder control, steering input, and safe navigation of loading and dumping areas.

Instructor - Led Training

3 – 5 days (24 – 40 hours)

New or developing operators within a production environment

Classroom/Field – Customer Mine Site

Prerequisites

Basic familiarity with mining or heavy equipment operations, or completion of site-required safety orientation.

Objectives

Upon completion students will be able to:

- Perform pre-operation inspections and safety system checks to support safe, reliable truck operation
- Understand the fundamentals of dynamic retarding and how it influences truck performance throughout the haul cycle
- Apply proper throttle application, retarder control, and steering techniques to maintain stability and efficiency
- Demonstrate safe driving techniques when navigating loading and dumping areas
- Recognize how operating practices impact machine performance, component life, and overall haul efficiency

Main Concepts

Pre-Operation Inspection

Safety

- Brake & Steering Checks

Safe Driving Techniques

Operating techniques

- Safe navigation of loading & dumping areas
- Machine performance
- Component life
- Haul efficiency

Maximizing Operator Efficiencies

Our **Maximizing Operator Efficiencies** course is designed for experienced haul truck operators seeking to improve production performance, reduce cycle times, and fully leverage the capabilities of electric drive mining trucks. Participants gain advanced insight into dynamic retarding, traction control, haul road conditions, and cycle requirements to establish efficient operating strategies. Training focuses on optimizing acceleration, speed management, retarder use, and travel paths to maintain smooth operation while reducing mechanical wear and energy loss.

Instructor - Led Training

3 – 5 days (24 – 40 hours)

Experienced operators within a production environment

Classroom/Field – Customer Mine Site

Prerequisites

Minimum 2 years of mining experience and electric drive truck operation.

Objectives

Upon completion students will be able to:

- Analyze haul road conditions and cycle requirements to support efficient operation
- Apply advanced dynamic retarding and traction control techniques to optimize truck performance throughout the haul cycle
- Demonstrate efficient acceleration, speed management, and retarder use to reduce cycle times and machine wear
- Execute safe driving techniques that improve stability, braking control, and tire life on variable terrain
- Optimize loading, hauling, and dumping practices through accurate positioning, controlled dumping, and effective communication
- Interpret onboard monitoring systems and machine health indicators to make informed operational adjustments

Main Concepts

Pre-operation Inspection

Safety

- Brake & Steering Checks

Safe Driving Techniques

Dump Management

Operator/Trainer Qualification

The **Operator/Trainer Qualification** course prepares highly skilled equipment operators to transition into professional trainers capable of developing safe, competent, and productive operators in construction and mining environments. Participants gain instructional knowledge, coaching techniques, and evaluation skills grounded in adult-learning principles to deliver effective classroom and field training.

Instructor - Led Training

80 hours

Experienced Operators

Arizona Proving Grounds

Prerequisites

Experience on similar types of equipment for a reasonable amount of time by Industry standards. Participants must also complete all online course materials.

Delivery Method & Class Size

The course is delivered through a combination of 40 hours of instructor led training (evaluation preparation) and 40 hours of qualification evaluation. Course size must have a minimum of 2 students but no more than 4 students.

Objectives

Upon completion students will be able to:

- Apply adult-learning principles to plan and deliver effective operator training
- Deliver clear, confident instruction in classroom and field settings
- Explain and demonstrate correct machine operation and safe work practices
- Coach operators to improve safety, productivity, and equipment care
- Evaluate operator performance, identify risk, and provide corrective feedback
- Document and validate operator competency using standardized assessments

Main Concepts

Machine Familiarization

- Operational safety requirements, machine features and specifications, cab controls, monitoring systems, pre-operational inspection

Functional Operation

- Demonstration safe start-up and shut-down, pre-operational inspections, emergency response, cab controls, and fundamental operating principles

Assessments & Testing

- Evaluate performance through observation and testing, assign completion levels, and issue a qualification certificate upon successful completion

Komatsu Electric Drive 730E-10 Electrical Systems

The **Electric Drive 730E-10 Electrical Systems** course**,** for serial number A50002 and up, is designed to provide participants who have Komatsu basic machine experience, knowledge and skills, an understanding of the overall function, operation, maintenance, service and repair of the 730E-10. This course is developed around one unit: Machine Familiarization and Machine Systems.

Instructor - Led Training

5 – 8 hour days

Technicians

Customer site, proving ground, distributor location

Prerequisites

All technical participants must have Introduction to Komatsu and all foundation courses.

Objectives

Upon completion students will be able to:

- Understand differences between the new 730E-10 and other EDT models
- Identify safety features of the 730E-10
- Perform a complete and thorough pre-operational inspection
- Learn basic operational techniques for running the 730E-10 in a production environment
- Locate service points and describe the specific service requirements for machine maintenance
- Leave with a better overall knowledge and understanding of the 24-volt non-propulsion system, Payload Meter IV, exhaust gas emissions control systems, Wabtec Electric Drive system controls with webPTU diagnostics
- Improve on their troubleshooting ability, knowledge, and technique

Main Concepts

Machine Familiarization

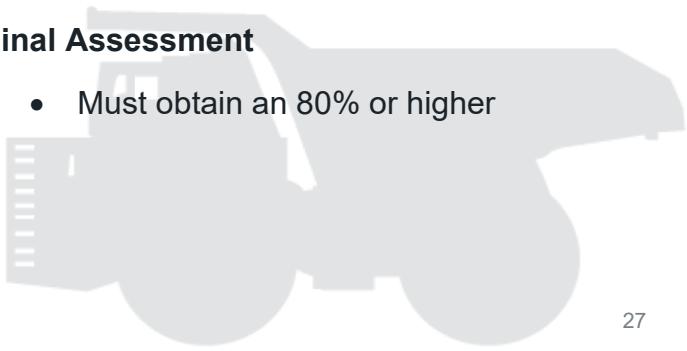
- Machine Introduction
- Machine Operation
- Cab and Controls

Machine Systems

- 24 Volt Circuits, PLMIV, and Emission Control
- Drive System Overview, AC Motors, and Inverters
- Wabtec Control Equipment 1 & 2
- Wabtec wePTU diagnostics
- Preventative Maintenance

Final Assessment

- Must obtain an 80% or higher



Komatsu Electric Drive 730E-10 Mechanical Systems

The **Electric Drive 730E-10 Mechanical Systems** course**,** for serial number A50002 and up, is designed to provide participants who have Komatsu basic machine experience, knowledge and skills, an understanding of the overall function, operation, maintenance, service and repair of the 730E-10. This course is developed around one unit: Machine Familiarization and Machine Systems.

Instructor - Led Training

5 – 8 hour days

Technicians

Customer site, proving ground, distributor location

Prerequisites

All technical participants must have Introduction to Komatsu and all foundation courses.

Objectives

Upon completion students will be able to:

- Understand differences between the new 730E-10 and other EDT models
- Identify safety features of the 730E-10
- Perform a complete and thorough pre-operational inspection
- Learn basic operational techniques for running the 730E-10 in a production environment
- Locate service points and describe the specific service requirements for machine maintenance
- Leave with a better overall knowledge and understanding of the 24-volt non-propulsion system, Payload Meter IV, exhaust gas emissions control systems, wheel axles, front and rear suspensions, hydraulic steering, hoist and service brake control, and brake cooling

Main Concepts

Machine Familiarization

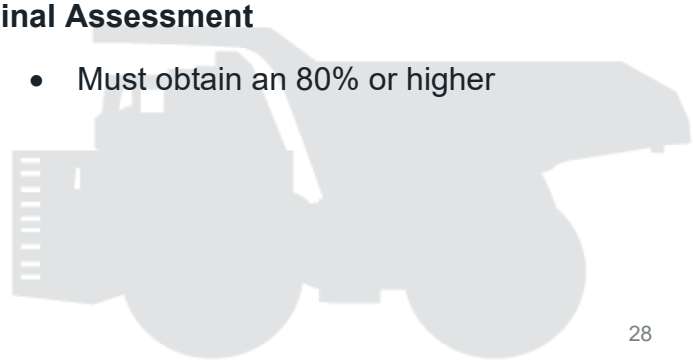
- Machine Introduction
- Machine Operation
- Cab and Controls

Machine Systems

- 24 Volt Circuits and Emission Control
- Wheels and Axles, Suspension, and PLMIV
- Steering, Brake, and Hoist Systems
- Eliminator and Reserve Oil Systems
- Preventative Maintenance

Final Assessment

- Must obtain an 80% or higher



Komatsu Electric Drive 830E-5 Electrical Systems

The **Electric Drive 830E-5 Electrical Systems** course**,** for serial number A50059 and up, is designed to provide participants who have Komatsu basic machine experience, knowledge and skills, an understanding of the overall function, operation, maintenance, service and repair of the 830E-5 Komatsu Rear Dump Truck. This course is developed around one unit: Machine Familiarization and Machine Systems.

Instructor - Led Training

5 – 8 hour days

Technicians

Customer site, proving ground, distributor location

Prerequisites

All technical participants must have Introduction to Komatsu and all foundation courses.

Objectives

Upon completion students will be able to:

- Understand differences between the new 830E-5 and other EDT models
- Identify safety features of the 830E-5
- Perform a complete and thorough pre-operational inspection
- Learn basic operational techniques for running the 830E-5 in a production environment
- Locate service points and describe the specific service requirements for machine maintenance
- Leave with a better overall knowledge and understanding of the 24-volt non-propulsion system, Payload Meter IV, exhaust gas emissions control process, and the Wabtec Drive system controls with webPTU diagnostics

Main Concepts

Machine Familiarization

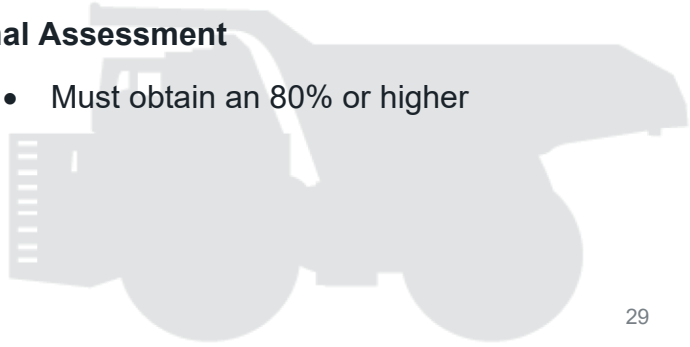
- Machine Introduction
- Machine Operation
- Cab and Controls

Machine Systems

- 24 Volt Circuits, PLMIV, and Emission Control
- Drive System Overview, AC Motors, and Inverters
- Wabtec Control Equipment 1 & 2
- Wabtec webPTU diagnostics
- Preventative Maintenance

Final Assessment

- Must obtain an 80% or higher



Komatsu 830E-5 Mechanical Systems

The **Electric Drive 830E-5 Mechanical Systems** course**,** for serial number A50059 and up, is designed to provide participants who have Komatsu basic machine experience, knowledge and skills, an understanding of the overall function, operation, maintenance, service and repair of the 830E-5 Komatsu Rear Dump Truck. This course is developed around one unit: Machine Familiarization and Machine Systems.

Instructor - Led Training

5 – 8 hour days

Technicians

Customer site, proving ground, distributor location

Prerequisites

All technical participants must have Introduction to Komatsu and all foundation courses

Objectives

Upon completion students will be able to:

- Understand differences between the new 830E-5 and other EDT models
- Identify safety features of the 830E-5
- Perform a complete and thorough pre-operational inspection
- Learn basic operational techniques for running the 830E-5 in a production environment
- Locate service points and describe the specific service requirements for machine maintenance
- Leave with a better overall knowledge and understanding of the 24-volt non-propulsion system, Payload Meter IV, exhaust gas emissions control systems, wheels and axles, front and rear suspension groups, hydraulic steering, hoist and service brake control, and cooling

Main Concepts

Machine Familiarization

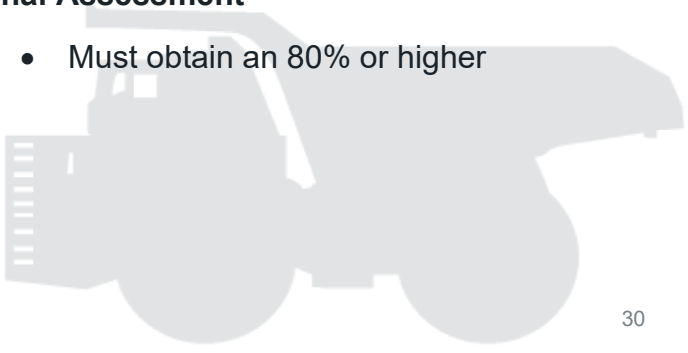
- Machine Introduction
- Machine Operation
- Cab and Controls

Machine Systems

- 24 Volt Circuits and Emission Control
- Wheels and Axles, Suspensions, and PLMIV
- Steering, Brake, and Hoist Systems
- Eliminator and Reserve Systems
- Preventative Maintenance

Final Assessment

- Must obtain an 80% or higher



Komatsu 860E-2KT Mechanical Systems

The **Komatsu 860E-2KT Mechanical Systems** course**,** for serial number A30119 and up, is designed to provide participants who have Komatsu basic machine experience, knowledge and skills, an understanding of the overall function, operation, maintenance, service and repair of the 860E-2KT Komatsu Rear Dump Truck. This course is developed around two units: Machine Familiarization and Machine Systems.

Instructor - Led Training

5 – 8 hour days

Technicians

Customer site, proving ground, distributor location

Prerequisites

All technical participants must have Introduction to Komatsu and all foundation courses

Objectives

Topic Name

- Identify safety features of the 860E-2KT, locate and understand the use of all operator controls and switches in the 860E-2KT Cab
- Learn basic operational techniques for running the 860E-2KT in a production environment
- Locate service points and describe the specific service requirements for machine maintenance
- Have a clear understanding of the Komatsu monitoring and diagnostic systems used on the machine
- Leave with a better overall knowledge and understanding of the 24-volt non-propulsion system, Payload Meter IV, wheels axels, front and rear suspension groups, hydraulic steering brake and hoist systems.

Main Concepts

Machine Familiarization

- Machine Introduction
- Machine Operation
- Cab and Controls

Machine Systems

- 24 Volt systems
- Wheels and Axles, Suspensions, and PLMIV
- Steering, Brake and Hoist/Trolley Systems
- Eliminator System
- Preventative Maintenance

Final Assessment

- Must obtain an 80% or higher

Komatsu 860E-2KT Electrical Systems

T The **Komatsu 860E-2KT Electrical Systems** course**,** for serial number A30119 and up, is designed to provide participants who have Komatsu basic machine experience, knowledge and skills, an understanding of the overall function, operation, maintenance, service and repair of the 860E-2KT Komatsu Rear Dump Truck. This course is developed around one unit: Machine Familiarization and Machine Systems.

Instructor - Led Training

5 – 8 hour days

Technicians

Customer site, proving ground, distributor location

Prerequisites

All technical participants must have Introduction to Komatsu and all foundation courses

Objectives

Topic Name

- Identify safety features of the 860E-2KT
- Locate and understand the use of all operator controls and switches in the 860E-2KT Cab and Electronic display
- Learn basic operational techniques for running the 860E-2KT in a production environment
- Locate service points and describe the specific service requirements for machine maintenance
- Have a clear understanding of the Komatsu monitoring and diagnostic systems used on the machine
- Leave with a better overall knowledge and understanding of the 24 volt non-propulsion system, Payload Meter IV, SiBas32 Trolley Drive System

Main Concepts

Machine Familiarization

- Machine Introduction
- Machine Operation
- Cab and Controls

Machine Systems

- 24 Volt circuits monitoring and PLMIV
- Drive System overview, AC motors, and Inverters
- Siemans SiBas32 Control Equipment 1 & 2
- Siemens Customer Monitor diagnostics
- Preventative Maintenance

Final Assessment

- Must obtain an 80% or higher

Komatsu 980E-5 Mechanical Systems

The **Komatsu 980E-5 Mechanical Systems** course**,** for serial number A50177 and up, is designed to provide participants who have Komatsu basic machine experience, knowledge and skills, an understanding of the overall function, operation, maintenance, service and repair of the 980E-5 Komatsu Rear Dump Truck. This course is developed around one unit: Machine Familiarization and Machine Systems.

Instructor - Led Training

5 – 8 hour days

Technicians

Customer site, proving ground, distributor location

Prerequisites

All technical participants must have Introduction to Komatsu and all foundation courses

Objectives

Topic Name

- Identify safety features of the 980E-5
- Locate and understand the use of all operator controls and switches in the 980E-5 Cab and MOD Electronic display
- Learn basic operational techniques for running the 980E-5 in a production environment
- Locate service points and describe the specific service requirements for machine maintenance
- Have a clear understanding of the Komatsu monitoring and diagnostic systems used on the machine
- Leave with a better overall knowledge and understanding of the 24-volt non-propulsion system, Payload Meter IV, wheels, axels, front and rear suspension groups

Main Concepts

Machine Familiarization

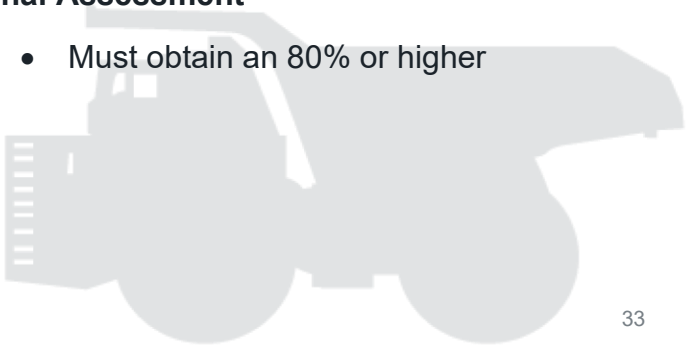
- Machine Introduction
- Machine Operation
- Cab and Controls

Machine Systems

- 24 Volt and Exh Cleaning Circuits
- Wheels and Axles, Suspensions and PLMIV
- Steering, Brake, and Hoist Systems
- Eliminator System
- Preventative Maintenance

Final Assessment

- Must obtain an 80% or higher



Komatsu Electric Drive 930E-5 Mechanical Systems

The **Electric Drive 930E-5 Mechanical Systems** course**,** for serial number A40330 and up, is designed to provide participants who have Komatsu basic machine experience, knowledge and skills, an understanding of the overall function, operation, maintenance, service and repair of the 930E-5. This course is developed around one unit: Machine Familiarization and Machine Systems.

Instructor - Led Training

5 – 8 hour days

Technicians

Customer site, proving ground, distributor location

Prerequisites

All technical participants must have Introduction to Komatsu and all foundation courses.

Objectives

Upon completion students will be able to:

- Understand differences between the new 930E-5 and other EDT models
- Identify safety features of the 930E-5
- Perform a complete and thorough pre-operational inspection
- Learn basic operational techniques for running the 930E-5 in a production environment
- Locate service points and describe the specific service requirements for machine maintenance
- Leave with a better overall knowledge and understanding of the 24-volt non-propulsion system, Payload Meter IV, exhaust gas emissions control systems, wheel, axles, front and rear suspensions, hydraulic steering, hoist and service brake control, and brake cooling

Main Concepts

Machine Familiarization

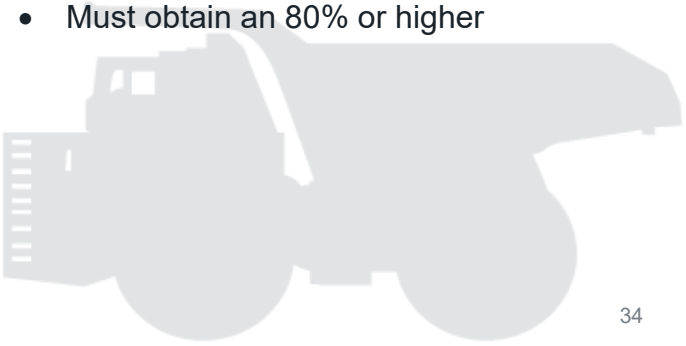
- Machine Introduction
- Machine Operation
- Cab and Controls

Machine Systems

- 24 Volt Circuits and Emission Control
- Wheels and Axles, Suspension, and PLMIV
- Steering, Brake, and Hoist Systems
- Preventative Maintenance

Final Assessment

- Must obtain an 80% or higher



Komatsu Electric Drive 930E-5 Electrical Systems

The **Electric Drive 930E-5 Electrical Systems** course**,** for serial number A40330 and up, is designed to provide participants who have Komatsu basic machine experience, knowledge and skills, an understanding of the overall function, operation, maintenance, service and repair of the 930E-5. This course is developed around one unit: Machine Familiarization and Machine Systems.

Instructor - Led Training

5 – 8 hour days

Technicians

Customer site, proving ground, distributor location

Prerequisites

All technical participants must have Introduction to Komatsu and all foundation courses.

Objectives

Upon completion students will be able to:

- Understand differences between the new 930E-5 and other EDT models
- Identify safety features of the 930E-5
- Perform a complete and thorough pre-operational inspection
- Learn basic operational techniques for running the 930E-5 in a production environment
- Locate service points and describe the specific service requirements for machine maintenance
- Leave with a better overall knowledge and understanding of the 24-volt non-propulsion system, Payload Meter IV, exhaust gas emissions control systems, wheels, axles, front and rear suspensions, hydraulic steering, hoist and service brake control, and brake cooling

Main Concepts

Machine Familiarization

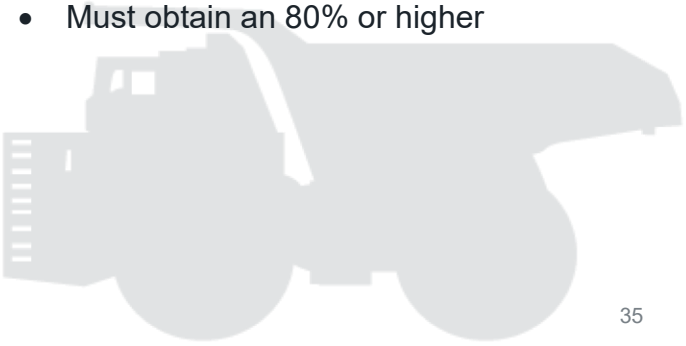
- Machine Introduction
- Machine Operation
- Cab and Controls

Machine Systems

- 24 Volt Circuits and Emission Control
- Wheels and Axles, Suspension, and PLMIV
- Steering, Brake, and Hoist Systems
- Preventative Maintenance

Final Assessment

- Must obtain an 80% or higher



Komatsu 960E-2k Electrical Systems

The **Komatsu Siemens Drive 960E-2k Electrical Systems** course**,** for serial number A50010 and up, is designed to provide participants who have Komatsu basic machine experience, knowledge and skills, an understanding of the overall function, operation, maintenance, service and repair of the 960E-2k Komatsu Rear Dump Truck. This course is developed around one unit: Machine Familiarization.

Instructor - Led Training

5 – 8 hour days

Technicians

Customer site, proving ground, distributor location

Prerequisites

All technical participants must have Introduction to Komatsu and all foundation courses

Objectives

Upon completion students will be able to:

- Identify safety features of the 960E-2K
- Locate and understand the use of all operator controls and switches in the 960E-2K Cab
- Learn basic operational techniques for running the 960E-2K in a production environment
- Locate service points and describe the specific service requirements for machine maintenance
- Have a clear understanding of the Komatsu monitoring and diagnostic systems used on the machine
- Leave with a better overall knowledge and understanding of the 24-volt non-propulsion system, Payload Meter IV, Siemens SiBas32 Drive System control and components, and service PC diagnostics

Main Concepts

Machine Familiarization

- Machine Introduction
- Machine Operation
- Cab and Controls

Machine Systems

- 24 Volt Circuits monitoring and PLMIV
- Drive System Overview, AC motors & Inverters
- Siemans SiBas32 Control Equipment 1&2
- Siemens Customer Monitor diagnostics
- Preventative Maintenance

Final Assessment

- Must obtain an 80% or higher

Komatsu 960E-2K Mechanical Systems

The **Komatsu Siemens Drive 960E-2k Mechanical Systems** course**,** for serial number A50010 and up, is designed to provide participants who have Komatsu basic machine experience, knowledge and skills, an understanding of the overall function, operation, maintenance, service and repair of the 960E-2k Komatsu Rear Dump Truck. This course is developed around two units: Machine Familiarization and Machine Systems.

Instructor - Led Training

5 – 8 hour days

Technicians

Customer site, proving ground, distributor location

Prerequisites

All technical participants must have Introduction to Komatsu and all foundation courses

Objectives

Upon completion students will be able to:

- Identify safety features of the 960E-2K
- Locate and understand the use of all operator controls and switches in the 960E-2K Cab
- Learn basic operational techniques for running the 960E-2K in a production environment
- Locate service points and describe the specific service requirements for machine maintenance
- Have a clear understanding of the Komatsu monitoring and diagnostic systems used on the machine
- Leave with a better overall knowledge and understanding of the 24-volt non-propulsion system, Payload Meter IV, wheels, axels, front and rear suspension groups, hydraulic steering brake and hoist system

Main Concepts

Machine Familiarization

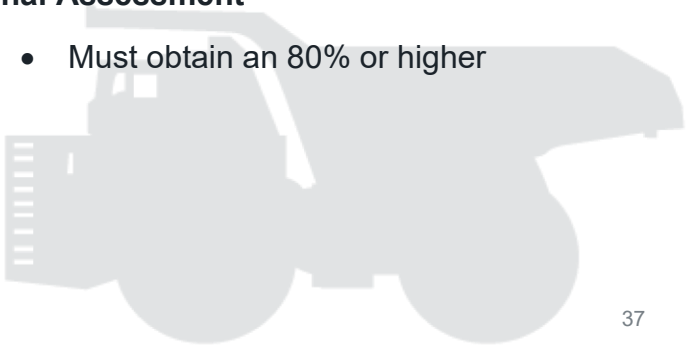
- Machine Introduction
- Machine Operation
- Cab and Controls

Machine Systems

- 24 Volt systems
- Wheels and Axles, Suspensions, and PLMIV
- Steering, Brake and Hoist Systems
- Eliminator System
- Preventative Maintenance

Final Assessment

- Must obtain an 80% or higher



Komatsu 980E-5 Electrical Systems

The **Komatsu 980E-5 Electrical Systems** course**,** for serial number A50177 and up, is designed to provide participants who have Komatsu basic machine experience, knowledge and skills, an understanding of the overall function, operation, maintenance, service and repair of the 980E-5 Komatsu Rear Dump Truck. This course is developed around one unit: Machine Familiarization and Machine Systems.

Instructor - Led Training

5 – 8 hour days

Technicians

Customer site, proving ground, distributor location

Prerequisites

All technical participants must have Introduction to Komatsu and all foundation courses

Objectives

Upon completion students will be able to:

- Identify safety features of the 980E-5
- Locate and understand the use of all operator controls and switches in the 980E-5 Cab and MOD Electronic display
- Learn basic operational techniques for running the 980E-5 in a production environment
- Locate service points and describe the specific service requirements for machine maintenance
- Have a clear understanding of the Komatsu monitoring and diagnostic systems used on the machine
- Leave with a better overall knowledge and understanding of the 24-volt non-propulsion system, Payload Meter IV Wabtec Electric Drive System, Invertex II control and components

Main Concepts

Machine Familiarization

- Machine Introduction
- Machine Operation
- Cab and Controls

Machine Systems

- 24 Volt circuits monitoring, PLM IV, and Engine Exhaust cleaning
- Drive System overview, AC motors, and Inverters
- Wabtec Electric Control Equipment 1 & 2
- Wabtec Electric web PTU & VID diagnostics
- Preventative Maintenance

Final Assessment

- Must obtain an 80% or higher

Komatsu Wabtec Electric Drive 930/980E-5

Instructor - Led Training

10 - 8 hour days

Technicians

Customer site, proving ground, distributor location

The **Wabtec Electric Drive 930/980E-5** course is designed to provide participants who have Komatsu basic machine experience, knowledge and skills, an understanding of the overall function, operation, maintenance, service and repair of the 930 and 980E-5 Komatsu Rear Dump Truck, suitable for serial #A40330/A50162 and up.
All participants of this new product introduction will be able to recognize key similarities with other Electric Drive Trucks, locate and identify safety features, describe operation of machine and use of cab controls. Perform pre-operation walk around machine inspections and be able to identify areas of maintenance with repair guidelines. This course is developed around one unit: Machine Familiarization and Machine Systems.

Prerequisites

Introduction to Komatsu, All Foundation Courses, AC/DC Motors and Inverters

Objectives

Upon completion students will be able to:

- Understand differences between the new 930E-5 and 980E-5 models
- Identify safety features
- Perform a pre-operational inspection
- Locate and understand the use of all Operator controls in the Operators Cab and MOD electronic display panel.
- operational techniques for running the 930/980E-5
- Locate service points and the specific service requirements
- Have a clear understanding of the Komatsu monitoring and diagnostic systems
- Overall understanding of the 24-volt non-propulsion system and Payload Meter IV, the exhaust gas emission control systems, wheels, axles, front and rear suspensions groups. hydraulic steering, hoist and service brake control and cooling.
- Wabtec AC drive system diagnostics /controls.
- Improve on their troubleshooting ability, knowledge, and technique.

Main Concepts

Machine Familiarization

- Machine Introduction
- Machine Operation
- Cab and Controls Approx. 4 hrs.

Machine Systems Days

- 24-volt Circuits and Emission Control
- Wheels and Axles, Suspensions and PLMIV
- Steering, Brake and Hoist Systems.
- Eliminator & Preventative Maintenance
- Wabtec Drive Overview & system components
- Drive system Controls 1 and 2
- Wabtec webPTU diagnostics

Final Assessment:

- 125 multi chose answers assessment for Machine Introduction, Mechanical and Electrical systems. Must obtain an 85%.

Operator

The Electric Wheel Loader **Operator** is a Gen 2 Loader training course that is completely online, completed at your own pace. This course contains 7 modules with 5 individual lessons that focus on different systems on the wheel loader. This course provides basic orientation overview of the components and systems associated with Komatsu Wheel Loaders.

Online Training

2 – 3 hours

Entry Level Technicians / Sales

English / Spanish

Course Objectives

Upon completion, students will be able to:

- Apply safe operating principles and identify safety equipment and features on the Komatsu Wheel Loader
- Perform daily and pre-shift preventive maintenance inspections
- Identify key machine components, controls, instruments, and indicators, and understand their functions
- Operate the machine correctly, including special starting, operating, and maintenance procedures

Course Topics

General Safety Practices

Loader Orientation

Operation

Operator Inspection and Procedures

General Safety Practices

The Electric Wheel Loader **General Safety Practices** is a Gen 2 Loader training course that is completely online, completed at your own pace. This course contains 8 modules with 6 individual lessons that focus on different systems on the wheel loader. This course provides general safety information to understand when working with Komatsu Wheel Loaders.

Online Training

2 – 3 hours

Technicians / Operators

English / Spanish

Course Objectives

Upon completion, students will be able to:

- Understand Lockout/Tagout, job planning, crew responsibilities, and sources of safety information
- Identify safety hazards and conduct electrical, mechanical, and operational risk analyses on Komatsu Electric Drive Wheel Loaders
- Understand Electrostatic Discharge (ESD) and how to prevent equipment damage
- Properly use onboard fire protection systems, including fire extinguishers and automatic fire suppression (where equipped)

Course Topics

General Safety

Electrical Hazards

Mechanical Hazards

Noise Hazards

Fire Hazards

Operational Hazards

Product Introduction

The Electric Wheel Loader **Product Introduction** is a Gen 2 Loader training course that is completely online, completed at your own pace. This course contains 4 modules with 3 individual lessons that focus on different systems on the wheel loader. This course provides a first look at Komatsu Wheel Loaders.

Online Training

1 hour

Technicians / Operators / Sales / Support

English / Spanish

Course Objectives

Upon completion, students will be able to:

- Understand the general description of the Komatsu Electric Drive Wheel Loader
- Describe the interior, electrical, and mechanical components associated with the Komatsu Electric Drive Wheel Loader

Course Topics

Orientation

Electrical Overview

Mechanical Overview

Mechanical Part 1

The Electric Wheel Loader **Mechanical Systems Part 1** is a Gen 2 Loader training course that is completely online, completed at your own pace. This course contains 5 modules with 4 individual lessons that focus on different systems on the wheel loader. This course provides an overview of certain mechanical systems used by Komatsu Wheel Loaders.

- Online Training
- 2 – 3 hours
- Technicians / Operators
- English / Spanish

Course Objectives

Upon completion, students will be able to:

- Understand the theory of operation, components, settings, and adjustments of structural systems.
- Perform planetary drive and traction motor inspection, removal, installation, maintenance, and post-service requirements.
- Apply proper criteria for planetary drive repair or rebuild decisions.
- Follow applicable warnings, precautions, welding standards, and structural repair procedures.
- Understand the theory of operation, components, and lubrication circuits of the hydraulic pump drive (HPD) system.

Course Topics

Loader Structural Systems

Planetary Drives

Field Welding

Hydraulic Pump Drive (HPD)

Mechanical Part 2

The Electric Wheel Loader **Mechanical Systems Part 2** is a Gen 2 Loader training course that is completely online, completed at your own pace. This course contains 6 modules with 5 individual lessons that focus on different systems on the wheel loader. This course provides an overview of certain mechanical systems used by Komatsu Wheel Loaders.

Online Training

2 – 3 hours

Technicians / Operators

English / Spanish

Course Objectives

Upon completion, students will be able to:

- Understand the theory of operation of the balls, caps and pins used on the EWL product
- Understand the lubrication methods for the balls, caps, and pins
- Understand the operation and types of ladders used on Komatsu Electric Drive Wheel Loaders
- Understand the operation of the tires and rims used on the EWL product
- Understand the operation of the engines used on Komatsu Electric Drive Wheel Loaders
- Understand the basic operation of the fire suppression system used on Komatsu Electric Drive Wheel Loaders

Course Topics

Balls, Caps, and Pins

Ladders

Tires and Rims

Engine

Fire Suppression

Electrical System

The Electric Wheel Loader **Electrical Systems** is a Gen 2 Loader training course that is completely online, completed at your own pace. This course contains 5 modules with 4 individual lessons that focus on different systems on the wheel loader. This course provides an overview of the electrical systems used by Komatsu Wheel Loaders.

Online Training

2 – 3 hours

Technicians / Operators

English / Spanish

Course Objectives

Upon completion, students will be able to:

- Understand the basic principles of switched reluctance operation
- Understand the basic principles of the LINCS II 24 Volt DC System
- Understand how the LINCS II system operates
- Understand the circuit descriptions related to the LINCS II system
- Navigate through the LINCS II System screens

Course Topics

SR Drive System

LINCS

Component Heaters

Air System

The Electric Wheel Loader **Air Systems** Gen 2 Loader training course that is completely online, completed at your own pace. This course contains 5 modules with 4 individual lessons that focus on different systems on the wheel loader. This course provides an overview of the different types of air systems used by Komatsu Wheel Loaders.

Online Training

1 – 2 hours

Technicians / Operators

English / Spanish

Course Objectives

Upon completion, students will be able to:

- Identify the major components of the Air Conditioning System
- Identify the major components of the Heating System
- Understand the controls for the Air Conditioning and Heating Systems
- Understanding the Air Brake System
- Identify the common components of the Air Brake System
- Identify the brake controls
- Identify components of the compressed air system
- Usage of air components powered by the compressed air system
- Identify auxiliary components of the compressed air system
- Identify components of the KLENZTM System

Course Topics

Air Conditioning

Brakes

Compressed Air System

Cooling Air System (KLENZ™)

Machine Familiarization Training

The **Machine Familiarization Training** will allow operators to gain insight into the general safety practices required for machine operation. Initial classroom presentation will be conducted followed by hands-on training with the Electric Wheel Loader in a non-production environment. Students will be required to demonstrate and practice the operational techniques covered in this training course.

Instructor – Led Training

3 days (24 hours) – minimum 4 hours classroom time

Maintenance Personal / New Operators

Classroom/Field – Customer Mine Site

Prerequisites

Basic familiarity with mining or heavy equipment operations, or completion of site-required safety orientation.

Objectives

Upon completion, students will be able to:

- Understand wheel loader layout, major components, and core systems
- Perform basic pre-operation inspections and identify critical safety checks
- Safely mount, dismount, and maneuver the machine in mining environments
- Recognize and use primary machine controls and operator interfaces
- Apply basic operating principles while understanding machine capabilities and limitations

Main Concepts

- Machine specifications
- Machine safety and emergency shut down procedures
- Machine start up and shut down procedures
- Fire suppression
- LINCS navigation
- Alarm/warning reaction
- Machine capabilities and limits
- Avoiding hazards and tire damage
- Machine pre-shift inspection
- Machine controls and functions
- Introduction to digging theories
- Basic Operating Principles
- Questions and answers

Fundamental Operator Training

Our **Wheel Loader Operator** training is an in-depth program where operators will gain detained knowledge in the overall machine operation. Initial classroom presentation is conducted, followed by hands-on training with the Electric Wheel Loader in a production environment. Students will be required to demonstrate and practice the operational techniques covered in the course.

Instructor – Led Training

3 – 5 days (24 – 40 hours)

Wheel loader operators with little or no experience

Classroom/Field – Customer Mine Site

Prerequisites

Basic familiarity with mining or heavy equipment operations, or completion of site-required safety orientation.

Objectives

Upon completion, students will be able to:

- Perform pre-operation inspections and assess work areas to support safe, efficient loader operation
- Set up the machine for optimal visibility, stability, and productivity
- Apply effective travel techniques and smooth machine movement principles
- Execute proper bucket-fill techniques, including approach angle, penetration, and rack-back timing
- Manage floor and dig face conditions to maintain safe, efficient loading environments
- Position and load trucks accurately using correct spotting, alignment, and V-loading patterns

Main Concepts

- Proper truck placement
- Applying different digging theories when needed
- Digging effectively without tire spin
- Understanding machine's controls
- Understanding machine's limits and capabilities
- Tram procedures
- LINCS navigation
- Control and maintaining work area
- Importance of load placement
- Understand production cycles
- Emergency procedures
- Working with support equipment
- Communication
- Ensuring safe and productive attitude
- Questions and answers

Maximizing Operator Efficiencies

The **Maximizing Operator Efficiencies** course provides operators with a comprehensive understanding of Electric Wheel Loader operation in a production environment. Training begins with a structured classroom session focused on core operating principles, site variables, and production efficiency, followed by hands-on field training where operators apply learned concepts in real working conditions.

Instructor – Led Training

10 days (80 hours) – Demonstration, observation, & evaluation

Experienced wheel loader operations within a production environment

Classroom/Field – Customer Mine Site

Prerequisites

Previous fundamental operator training and three years of operating experience.

Objectives

Upon completion, students will be able to:

- Optimize machine set-up and operating techniques to improve productivity and reduce machine wear
- Evaluate and manage floor, bench, and dig-face conditions for safe, efficient digging performance
- Refine bucket-fill techniques to achieve consistent payloads while minimizing tire wear and fuel consumption
- Apply cycle-time optimization strategies through effective travel paths, swing angles, and braking control
- Position and manage trucks efficiently using proper spotting, alignment, and V-loading patterns
- Coordinate smoothly with haul trucks to reduce delays and maintain efficient, high-volume loading operations

Main Concepts

- Truck availability
- Haul truck flow
- Digging conditions
- Proper use of support conductions
- Weather
- Haul distances
- Questions and answers

Demonstration, observation, & evaluation process will include:

- Site Evaluation – Cycle Time Analysis
- View Work – Pre & Post Recommendations
- Operator Evaluations
- Full report with recommendations
- Audit report

Operator/Trainer Qualification

The **Operator/Trainer Qualification** course prepares highly skilled equipment operators to transition into professional trainers capable of developing safe, competent, and productive operators in construction and mining environments. Participants gain instructional knowledge, coaching techniques, and evaluation skills grounded in adult-learning principles to deliver effective classroom and field training.


Instructor-Led Training


80 hours


Experienced Operators


Customer Mine Site

Prerequisites

Experience on similar types of equipment for a reasonable amount of time by Industry standards. Participants must also complete all online course materials.

Delivery Method & Class Size

The course is delivered through a combination of 40 hours of Instructor lead training (evaluation preparation) and 40 hours of qualification evaluation. Course size must have a minimum of 2 students but no more than 4 students.

Objectives

Upon completion students will be able to:

- Apply adult-learning principles to plan and deliver effective operator training
- Deliver clear, confident instruction in classroom and field settings
- Explain and demonstrate correct machine operation and safe work practices
- Coach operators to improve safety, productivity, and equipment care
- Evaluate operator performance, identify risk, and provide corrective feedback
- Document and validate operator competency using standardized assessments

Main Concepts

Machine Familiarization

- Operational safety requirements, machine features and specifications, cab controls, monitoring systems, pre-operational inspection

Functional Operation

- Demonstration safe start-up and shut-down, pre-operational inspections, emergency response, cab controls, and fundamental operating principles

Assessments & Testing

- Evaluate performance through observation and testing, assign completion levels, and issue a qualification certificate upon successful completion

GEN 1 Maintenance Training – Electrical Systems

Our **GEN 1 Electrical Systems** course provides technicians with integrated training on DC (SCR) and SR propulsion systems and the LeTourneau LINCS digital control system. Topics include system theory, major component identification, circuit operation, generator and traction motor maintenance, ground fault diagnosis, load bank testing, and the use of LINCS for system navigation, calibration, diagnostics, and troubleshooting.

Instructor – Led Training

Field/Virtual – 3 days, 24 hours

Factory – 4 days, 32 hours

Technicians

Field/Virtual/Factory – Longview, TX

Prerequisites

Participants should have basic electrical terminology knowledge, practical maintenance experience, and hands-on exposure to LeTourneau Wheel Loaders. Completion of our online training course is preferred.

Objectives

Upon completion, students will be able to:

- Locate, identify, and understand the function of the major system components
- Read and interpret machine schematics and system diagrams
- Perform basic generator and traction motor maintenance
- Apply correct propulsion system repair procedures in accordance with applicable troubleshooting manuals
- Diagnose ground faults
- Conduct load bank testing
- Use LINCS for system monitoring, calibration, troubleshooting, and repair
- Bypass system limits as required for preventative maintenance activities

Main Concepts

- Theory of Operation
- System Components and Hardware
- Circuit Operation
- LINCS Navigation and Configuration
- Troubleshooting and Diagnostics
- Maintenance, Testing, and Service Procedures

GEN 1 Maintenance Training – Mechanical Systems

The **GEN 1 Mechanical Systems** training course advances the knowledge and skills required for technicians to effectively troubleshoot, maintain, and repair the mechanical, hydraulic, and air systems on P&H brand LeTourneau-series wheel loaders.

Instructor – Led Training

Field/Virtual – 3 days, 24 hours

Factory – 4 days, 32 hours

Technicians

Field/Virtual/Factory – Longview, TX

Prerequisites

Participants should have basic mechanical terminology knowledge, practical maintenance experience, and hands-on exposure to LeTourneau Wheel Loaders. Completion of our online training course is preferred.

Objectives

Upon completion, students will be able to:

- Locate and identify major machine components
- Troubleshoot, maintain, and repair system components and related issues
- Read and interpret applicable schematics
- Test and set pump and fan pressures as well as speeds in accordance with OEM specifications

Main Concepts

Central Air Blower System & Compressed Air System

- LINCS I Overview
- Theory of Operation
- Component Descriptions
- Circuit Descriptions

Hydraulic Systems

- LINCS I Overview
- Theory of Operation
- Component Descriptions
- Circuit Descriptions

Ball and Socket Joints & Pins and Bushings

- Grease System Overview
- Theory of Operation
- Component Descriptions

Settings and Adjustments

Installation and Removal

Troubleshooting

GEN 2 or GEN 3 Maintenance Training – Electrical Systems

Our **GEN 2 or GEN 3 Electrical Systems** course builds the knowledge and skills required for technicians to troubleshoot, maintain, and repair SR Drive and propulsion systems using LeTourneau LINCS II digital control systems. Technicians learn to confidently navigate LINCS, identify faults, perform critical drive system diagnostics, and apply proven repair practices to minimize downtime and maximize machine performance.

Instructor – Led Training

Field/Virtual – 3 days, 24 hours

Factory – 4 days, 32 hours

Technicians

Field/Virtual/Factory – Longview, TX

Prerequisites

Participants should have basic electrical terminology knowledge, practical maintenance experience, and hands-on exposure to LeTourneau Wheel Loaders. Completion of our online training course is preferred.

Objectives

Upon completion, students will be able to:

- Explain the LINCS II Drive and LINCS digital control system architecture and principles of operation
- Read and interpret drive system and machine schematics for effective diagnostics
- Locate and identify major SR Drive, propulsion, and LINCS system components
- Perform essential maintenance tasks including AC generator service and traction motor isolation
- Diagnose drive system faults, including ground faults, using approved troubleshooting procedures and manual
- Utilize LINCS tools to access maintenance functions, perform calibrations, and troubleshoot drive and propulsion system faults

Main Concepts

SR-SR Propulsion

- Theory of Operation
- Component Descriptions
- Circuit Descriptions
- Installation, Removal, & Isolation

LINCS II

- Theory of Operation
- Component Descriptions
- Circuit Descriptions
- Navigation
- Troubleshooting
- Support Software and Tools

GEN 2 or GEN 3 Maintenance Training – Mechanical Systems

The **GEN 2 or Gen 3 Electric Wheel Loader Mechanical** training course advances the knowledge and skills required for technicians to effectively troubleshoot, maintain, and repair the mechanical, hydraulic, and air systems on P&H brand LeTourneau-series wheel loaders.

Instructor – Led Training

Field/Virtual – 3 days, 24 hours

Factory – 4 days, 32 hours

Technicians

Field/Virtual/Factory – Longview, TX

Prerequisites

Participants should have basic mechanical terminology knowledge, practical maintenance experience, and hands-on exposure to LeTourneau Wheel Loaders. Completion of our online training course is preferred.

Objectives

Upon completion, students will be able to:

- Locate and identify major machine components
- Troubleshoot, maintain, and repair system components and related issues
- Read and interpret applicable schematics
- Test and set pump and fan pressures as well as speeds in accordance with OEM specifications

Main Concepts

Central Air Blower System & Compressed Air System

- LINCS I Overview
- Theory of Operation
- Component Descriptions
- Circuit Descriptions

Hydraulic Systems

- LINCS I Overview
- Theory of Operation
- Component Descriptions
- Circuit Descriptions

Ball and Socket Joints & Pins and Bushings

- Grease System Overview
- Theory of Operation
- Component Descriptions

Settings and Adjustments

Installation and Removal

Troubleshooting

ZT44 Product & Operator Overview

The ZT44 **Product & Operator Overview** course introduces the major systems and defining features of the track drill, giving the learner a solid foundation in its design and components. You will learn how to identify and inspect essential areas before operation, ensuring the drill is safe and ready for use. Through a detailed walk-around inspection process, you'll develop the skills to spot potential issues and maintain optimal equipment performance. The course also familiarizes you with the operator's cab layout, controls, and monitors, building your confidence for safe and effective operation. Finally, you'll explore the recommended maintenance schedule and key checkpoints to keep the track drill in top working condition. By the end of this course, you will be equipped to operate, inspect, and maintain a track drill safely and efficiently.

Online Training

1 hour

Technicians / Operators

English / Russian

Objectives

Upon completion, students will be able to:

- Identify and describe the major systems and defining features of a track drill
- Conduct a thorough pre-operation inspection of a track drill
- Detect and address potential equipment issues
- Navigate the operator's cab and utilize controls and monitors effectively
- Follow the recommended maintenance schedule and procedures
- Demonstrate safe and efficient operation, inspection, and maintenance practices

Course Topics

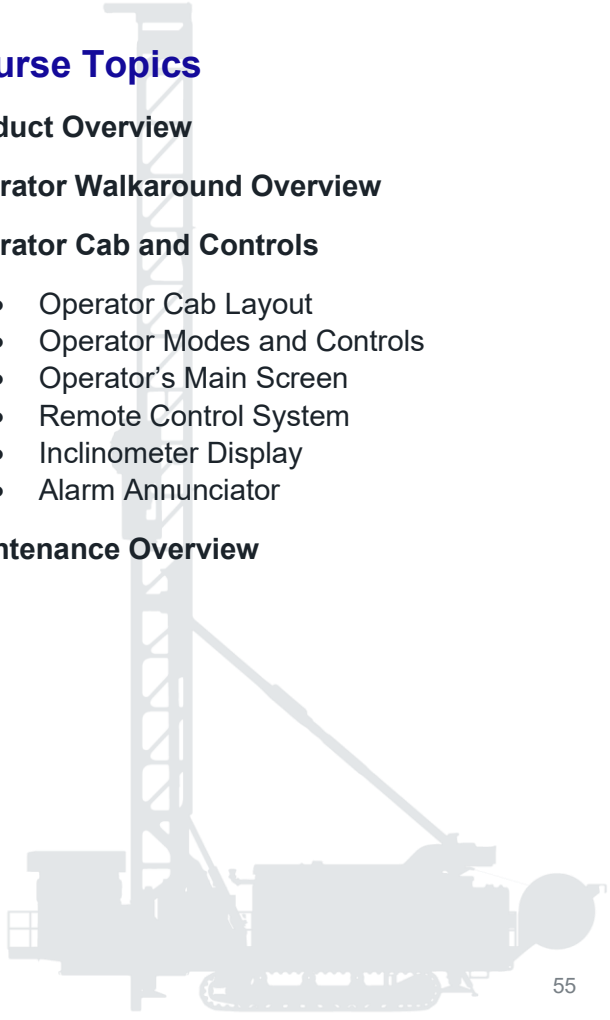
Product Overview

Operator Walkaround Overview

Operator Cab and Controls

- Operator Cab Layout
- Operator Modes and Controls
- Operator's Main Screen
- Remote Control System
- Inclinometer Display
- Alarm Annunciator

Maintenance Overview



ZR77 Drill Operator Essentials: Quick Start Guides

In this ZR77 **Drill Operator Essentials** course, you will learn how to perform a pre-operational inspection of the air filters and key components of the air system. This will include detailed steps for checking the air filters for blockages, inspecting hoses and connections for leaks, and ensuring all components are functioning within manufacturer specifications. You'll also explore the Deck Wrench and master the functionality of the operator's joysticks. Safety is a core focus throughout the course. Before raising or lowering the drill mast, you'll review critical safety protocols, including area clearance, inspection of mast locking mechanisms, and use of personal protective equipment. The guide introduces the one touch mast raise and lower button, demonstrating step-by-step procedures for smooth and controlled mast operation. You'll learn how to troubleshoot common issues and respond to warning indicators, ensuring both operator safety and equipment reliability.

Online Training

30 minutes

Technicians / Operators

English

Objectives

Upon completion, students will be able to:

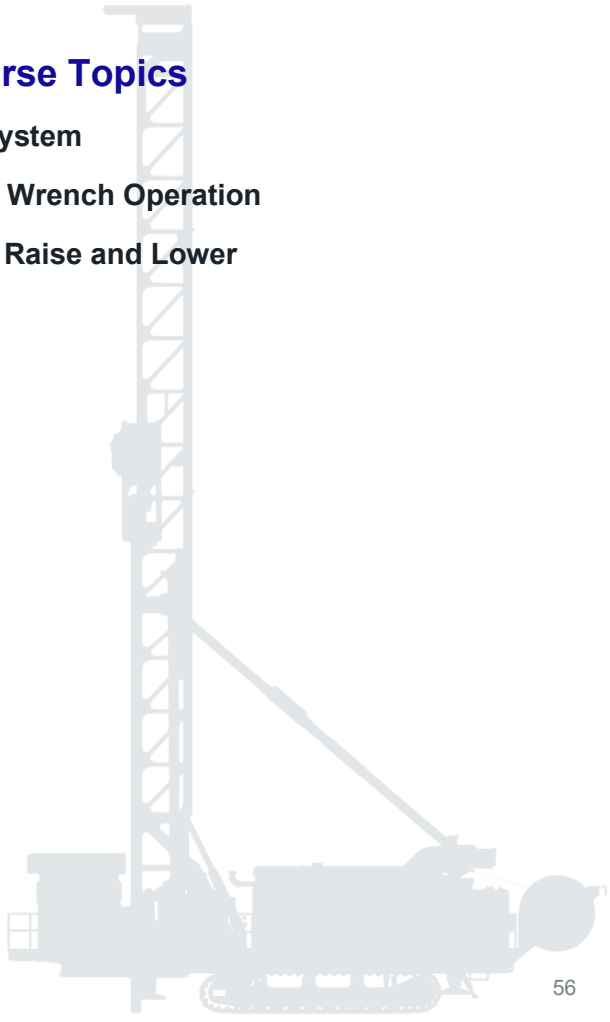
- Locate the air filters
- Be able to identify and locate the filter bag and filter gauge
- Know how to complete the necessary steps in checking the air filters
- Understand the Deck Wrench operation and the functionality of the joysticks
- Understand safety aspects of raising and lowering the mast
- Have a basic understanding of raising and lowering the drill mast using the one touch button

Course Topics

Air System

Deck Wrench Operation

Mast Raise and Lower



ZR Series - Product Systems and Cab Control Fundamentals

This **Product Systems and Cab Control** course introduces you to the major systems and defining features of the ZR series Blasthole Drills, providing a solid foundation in their design and operation. You will learn to identify and understand the Power Module, Hydraulic System, Propel System, Main Air System, Mast, Rotary Carriage Equipment, Pipe and Bit Handling Equipment, and Control System. Each lesson includes detailed descriptions and component locations, helping you recognize how these systems work together for optimal drill performance. Through graphical hands-on walkthroughs, you'll explore the operator's cab layout, master the use of left- and right-hand joysticks, and operate keypad controls. The course emphasizes practical skills for safe operation, routine maintenance, and troubleshooting, ensuring you are prepared to maintain equipment reliability and maximize productivity.

Online Training

3 hours

Technicians / Operators

English / Spanish

Objectives

Upon completion, students will be able to:

- Identify and describe the major systems and components of the ZR series Blasthole Drills
- Understand the purpose, operation, and functionality of each system and its key components
- Apply best practices for inspection and maintenance of the drill and its systems

Course Topics

Product Overview

Power Module

Hydraulic System

Propel System

Main Air and Water Injection System

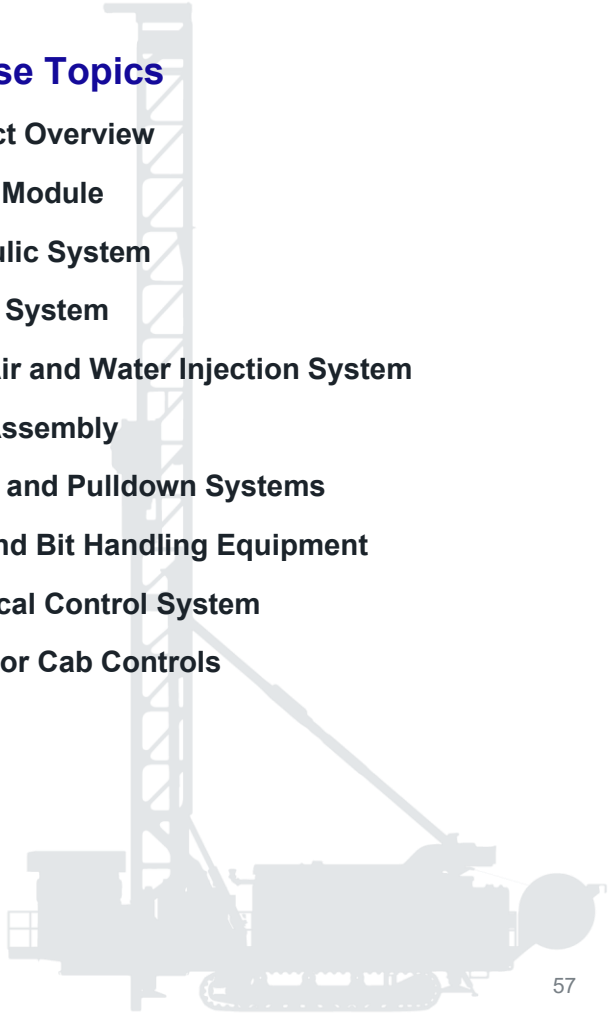
Mast Assembly

Rotary and Pulldown Systems

Pipe and Bit Handling Equipment

Electrical Control System

Operator Cab Controls



XPC Series - Product Systems Fundamentals

This **Product Systems Fundamentals** course introduces you to the key systems and components of the XPC Blasthole Drills, providing a solid foundation in their design, layout, and operation. You will learn to identify and locate the Power Unit, Hydraulic System (including Propel and Auxiliary Hydraulics, Fan Drive, and Recirculation), Main Air System, Water Injection System, Mast Assembly, Rotary Carriage Equipment, Pipe Handling Equipment, and Leveling System. Through detailed walkthroughs, you'll explore how each system functions, how their components interact, and how to perform essential inspections. Special focus is given to the Auto Lubrication System, ensuring you understand its role in maintaining equipment reliability. You'll also gain practical skills in troubleshooting and maintaining the Electrical System, learning how power is distributed and how components work together to achieve motion.

Online Training

3 hours

Technicians / Operators

English / Spanish / Portuguese

Objectives

Upon completion, students will be able to:

- Identify and locate the major systems and components of the XPC series Blasthole Drill
- Understand the purpose, operation, and functionality of each system and its key components
- Apply knowledge of system operation and maintenance for safe, efficient drill performance

Course Topics

Product Overview

Power Unit

Hydraulic System

Propel System

Main Air System

Water Injection System

Mast Assembly

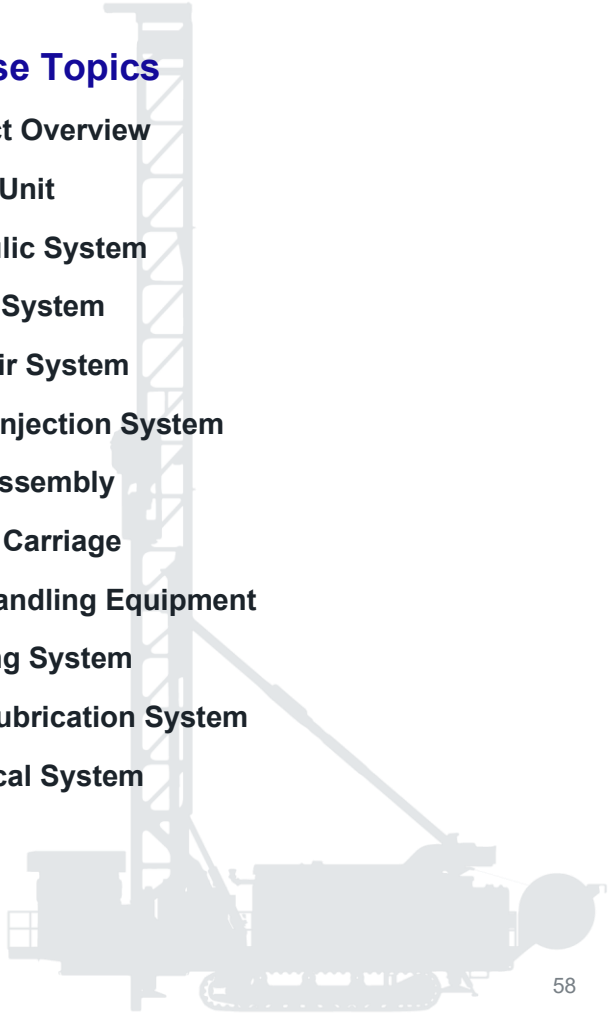
Rotary Carriage

Pipe Handling Equipment

Leveling System

Auto Lubrication System

Electrical System



New Operator Training

The **New Operator Training** program is designed for entry-level operators. This in-depth program includes classroom instruction, simulator practice (if available), and extended field training. Within the course, the instructor will focus on critical knowledge and skills required to operate a Komatsu and/or P&H Blasthole Drill. The course will be tailor based on the machine class the mine site operates.

Instructor – Led Training

5 days (40 hours); based on trainee performance

Operator with little or no drill experience

Classroom / Field – Customer Mine Site

Prerequisites

Minimum 1 year of general mining experience. Self-paced, online training and/or simulator exposure recommended.

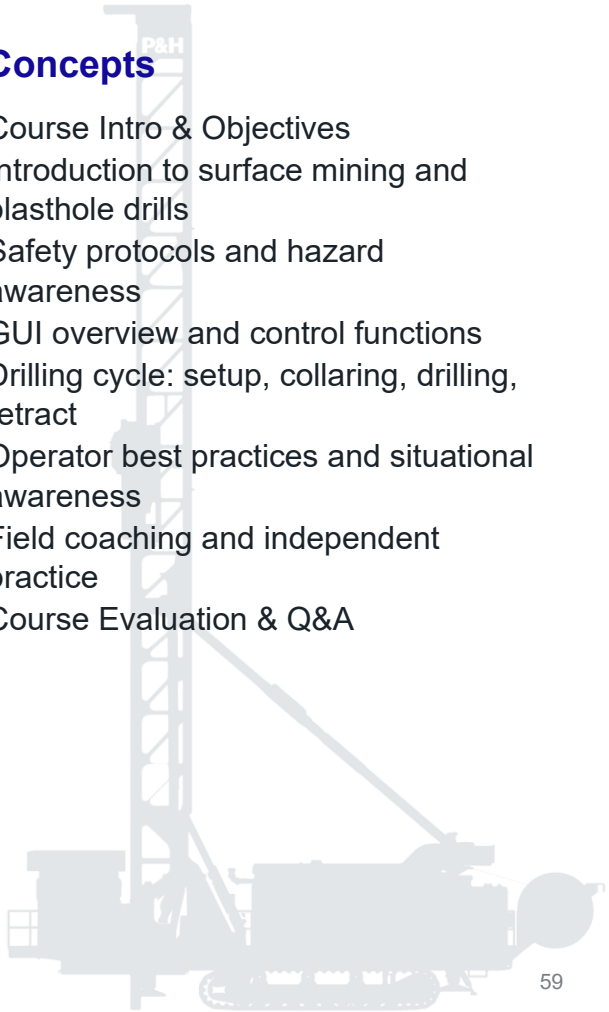
Objectives

Upon completion, students will be able to:

- Gain foundational knowledge in mining and drilling operations
- Perform daily inspections and machine startup/shutdown
- Develop drilling cycle proficiency
- Apply operator best practices in field conditions
- Recognize hazards and avoid machine abuse

Main Concepts

- Course Intro & Objectives
- Introduction to surface mining and blasthole drills
- Safety protocols and hazard awareness
- GUI overview and control functions
- Drilling cycle: setup, collaring, drilling, retract
- Operator best practices and situational awareness
- Field coaching and independent practice
- Course Evaluation & Q&A



Experience Operator Production Training

The **Experienced Operator Production Training** is an in-depth program where the operators will gain detailed knowledge of safety protocols, machine systems, functionality, best drill practices, and basic troubleshooting required to operate a Komatsu and/or P&H Blasthole Drill. The course begins with classroom instruction followed by hands-on production environment training. The course will be tailor based on the machine class the mine site operates.

Instructor – Led Training

4 – 8 hour days, at least 24 hours of on-drill operation per person

Experienced drill operators within in production environments

Classroom / Field – Customer Mine Site

Prerequisites

Minimum 2 years of mining experience and drill operation. Passing score (80%) on pre-course knowledge assessment prior to commencing training.

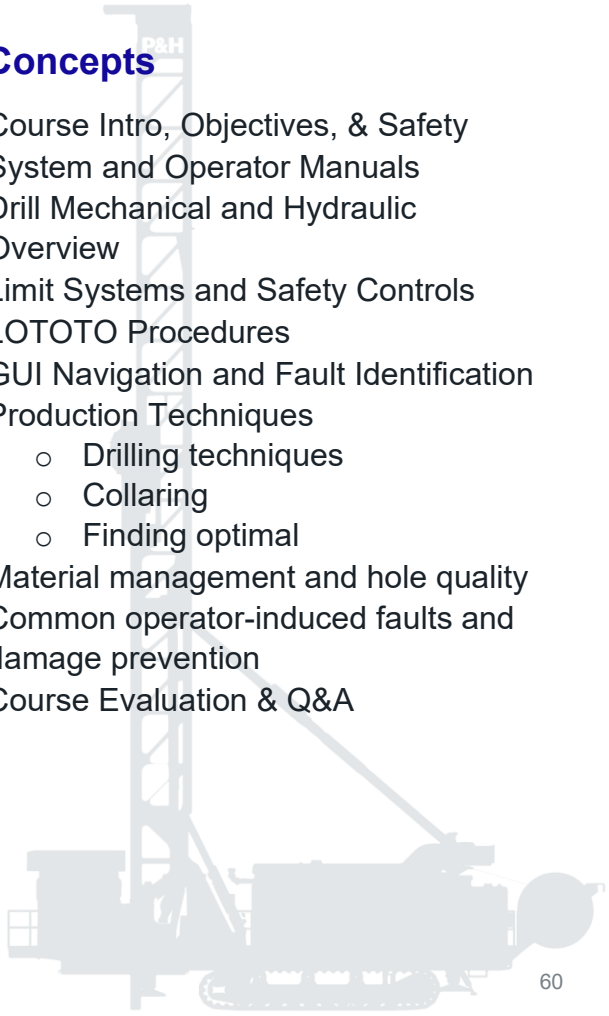
Objectives

Upon completion, students will be able to:

- Identify all major components of our blasthole drills
- Perform safety inspections and pre-start checks
- Understand drill control systems and GUI navigation
- Identify fault codes and system alerts
- Operate the drill safely and productively
- Reduce component wear and unplanned downtime

Main Concepts

- Course Intro, Objectives, & Safety
- System and Operator Manuals
- Drill Mechanical and Hydraulic Overview
- Limit Systems and Safety Controls
- LOTOTO Procedures
- GUI Navigation and Fault Identification
- Production Techniques
  - Drilling techniques
  - Collaring
  - Finding optimal
- Material management and hole quality
- Common operator-induced faults and damage prevention
- Course Evaluation & Q&A



Non-Production Task Training

The **Non-Production Tast Training** course is designed for support personnel and maintenance team members who require a strong foundation in drill safety, machine layout, and system functionality. It emphasizes essential operational skills and procedures that are critical outside of active production environments, such as maintenance, troubleshooting, and safe equipment handling.

Instructor – Led Training

1 – 8 hour day, at least 1 hour of on-drill operation per person

Support personnel and maintenance team members

Classroom / Field – Customer Mine Site

Prerequisites

Minimum 2 years of mining experience preferred. Passing score (80%) on pre-course assessment.

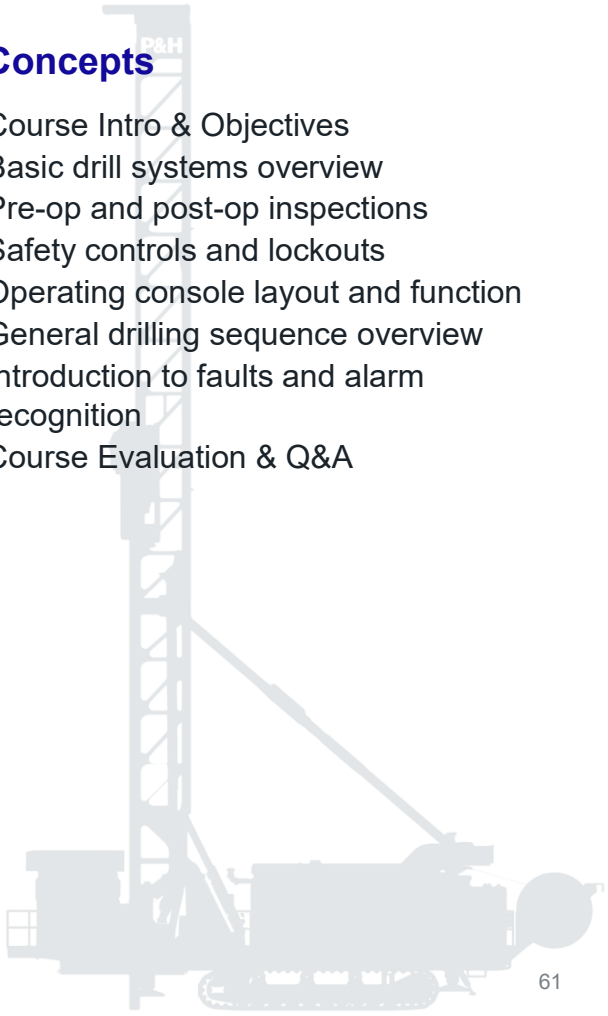
Objectives

Upon completion, students will be able to:

- Learn basic operation and machine layout
- Understand safety and LOTOTO procedures
- Identify control systems and GUI functions
- Conduct pre-start and walk-around inspections

Main Concepts

- Course Intro & Objectives
- Basic drill systems overview
- Pre-op and post-op inspections
- Safety controls and lockouts
- Operating console layout and function
- General drilling sequence overview
- Introduction to faults and alarm recognition
- Course Evaluation & Q&A



Operator Automation Training

Our **Operator Automation Training** is an intensive course providing a detailed understanding of automation systems used on our Komatsu and P&H Blasthole Drills. This includes Auto Drill, Remote Operating Console (ROC), Auto Level, PGS Integration, Line-of-Sight (LOS) and Non-Line-of-Sight (NLOS) operations.

Instructor – Led Training

3 – 8 hour days

Drill Operators / Supervisors / Maintenance Personnel

Classroom / Field – Customer Mine Site

Prerequisites

Basic understanding of drill operations and GUI interface. Familiarity with HPGPS systems is an asset.

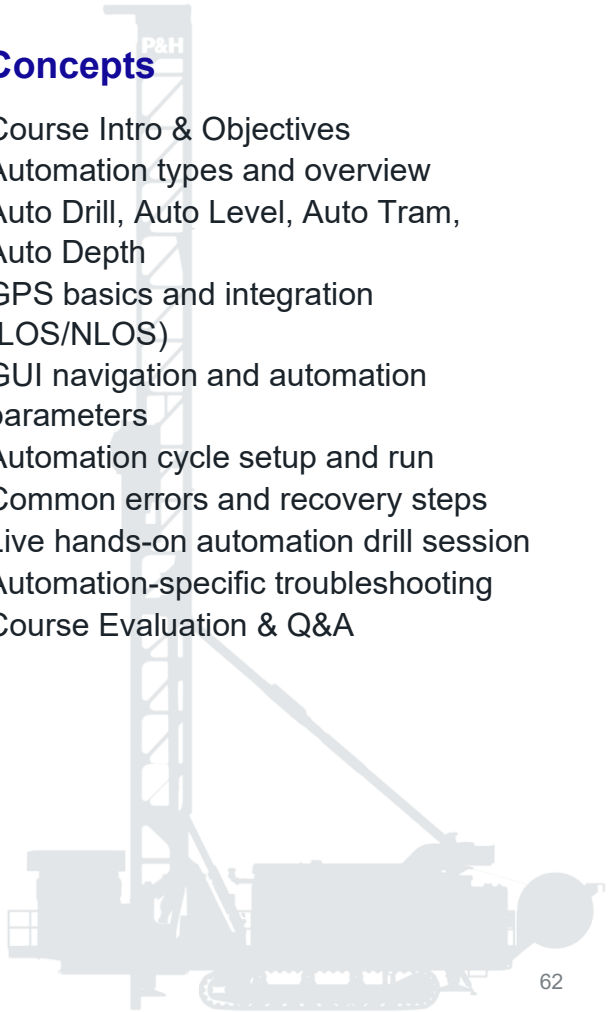
Objectives

Upon completion, students will be able to:

- Understand automation levels and their benefits
- Interpret automation control displays and GUI elements
- Identify setup procedures and calibrations
- Troubleshoot common automation-related issues
- Understand safety protocols under automated operations

Main Concepts

- Course Intro & Objectives
- Automation types and overview
- Auto Drill, Auto Level, Auto Tram, Auto Depth
- GPS basics and integration (LOS/NLOS)
- GUI navigation and automation parameters
- Automation cycle setup and run
- Common errors and recovery steps
- Live hands-on automation drill session
- Automation-specific troubleshooting
- Course Evaluation & Q&A



Train the Trainer – Experienced Trainers New to Drills

Specifically designed for experienced trainers transitioning into drill operations, this advanced **Train the Trainer** course provides a comprehensive blend of operational expertise and specialized instructional strategies. Participants will develop a deep understanding of drill systems while learning proven methods to effectively teach and mentor new operators. By the end of the program, trainers will be fully prepared to deliver impactful, safety-oriented instruction that drives both individual and team performance.

Instructor – Led Training

4 weeks (160 hours) with quarterly field follows and an annual refresher

Corporate trainers / Safety trainers

Classroom / Field – Customer Mine Site

Prerequisites

3+ years of training experience in heavy equipment or mining. No prior drill operation experience is required.

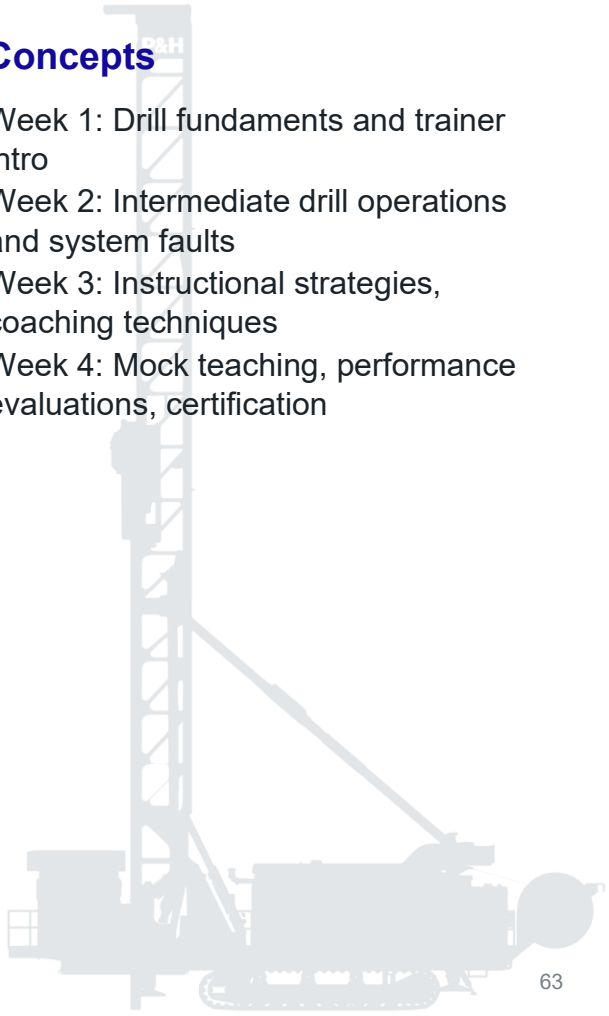
Objectives

Upon completion, students will be able to:

- Build foundational knowledge of drill operations
- Translate existing training experience to drill-specific content
- Apply classroom and field delivery techniques
- Conduct accurate assessments of drill operator performance
- Coach and mentor new and experienced operators effectively

Main Concepts

- Week 1: Drill fundaments and trainer intro
- Week 2: Intermediate drill operations and system faults
- Week 3: Instructional strategies, coaching techniques
- Week 4: Mock teaching, performance evaluations, certification



Train the Trainer – New Drillers & Trainers

This **Train the Trainer** course is designed for those new to drills and delivering training in drill operations. The program introduces foundational concepts in both drill system operations and effective instructional techniques. New trainers will gain practical knowledge of drill equipment, learn how to communicate technical information clearly, and develop the confidence to lead engaging, safety-focused training sessions. By course end, participants will be ready to support operator development and promote a culture of safety and learning.

Instructor – Led Training

8 weeks (320 hours) with quarterly field follows and an annual refresher

Aspiring trainers new to drill operations

Classroom / Field – Customer Mine Site

Prerequisites

None. Mining experience is helpful but not required.

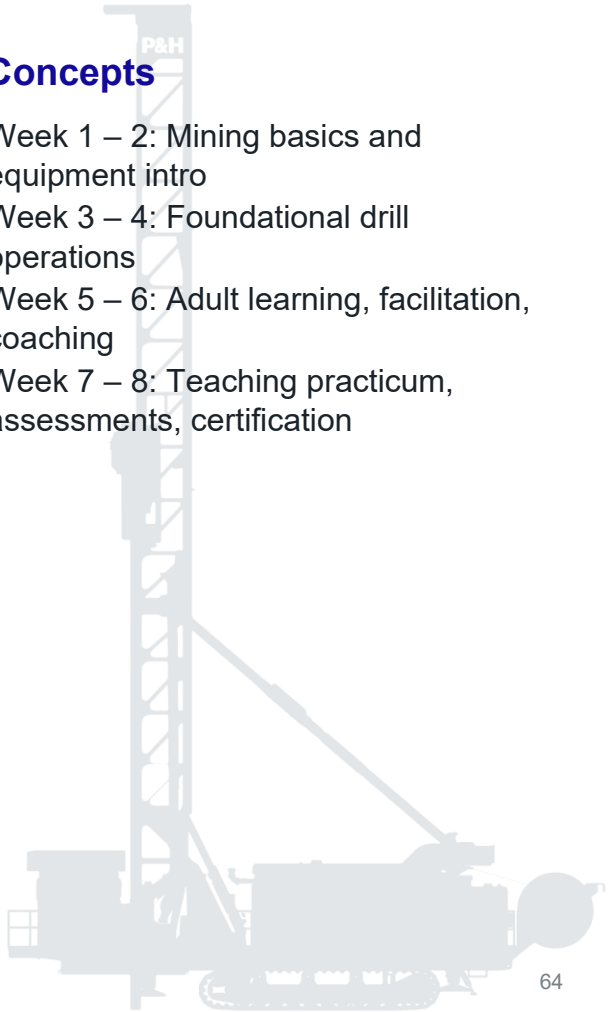
Objectives

Upon completion, students will be able to:

- Develop operational skills from the ground up
- Learn different training principles and classroom management
- Deliver effective field instruction and feedback
- Recognize operator behaviors and correct unsafe practices
- Monitor progress and drive continuous improvement

Main Concepts

- Week 1 – 2: Mining basics and equipment intro
- Week 3 – 4: Foundational drill operations
- Week 5 – 6: Adult learning, facilitation, coaching
- Week 7 – 8: Teaching practicum, assessments, certification



Train the Trainer – Experienced Drill Operators New to Training

This **Train the Trainer** course equips drill operators with a foundational understanding of adult learning principles, techniques, and behaviors that enhance knowledge retention and application in real-world work environments. The course explores the unique characteristics and motivations of adult learners, emphasizing the importance of self-direction, relevance, and practical problem-solving. Through a blend of scenario-based learning, case studies, hands-on demonstrations, and group discussions, attendees will learn to address diverse learning styles and foster an inclusive, engaging training environment.

Instructor – Led Training

2 weeks (80 hours)

Experienced drill operators with little to no formal training experience

Classroom / Field – Customer Mine Site

Prerequisites

Minimum 2 years of mining experience and drill operation.

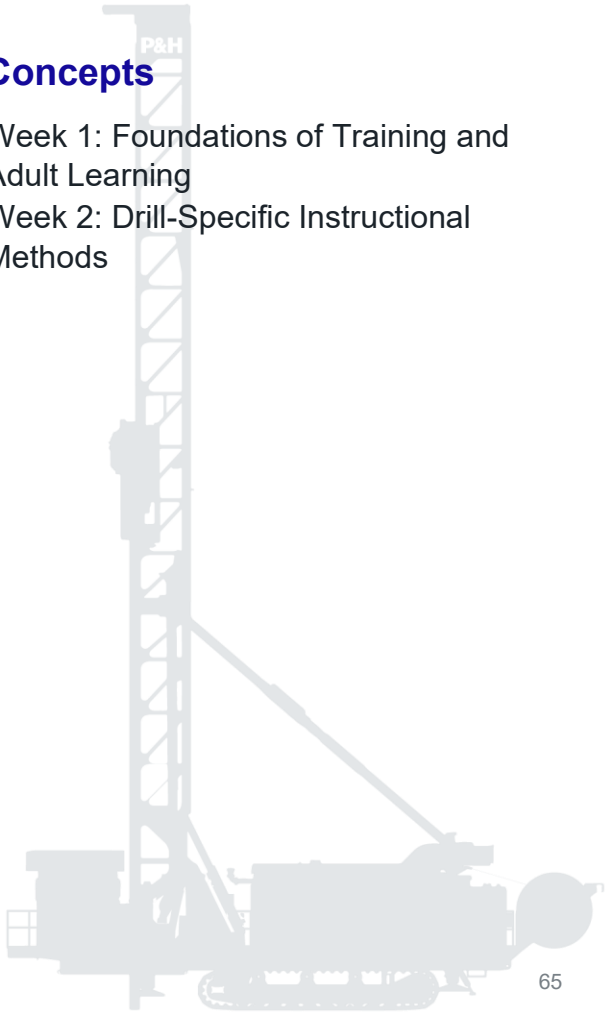
Objectives

Upon completion, students will be able to:

- Understand how adults learn and apply appropriate teaching methods
- Confidently deliver content in a classroom and field setting
- Coach operators in real time, identifying and correcting poor habits
- Structure training sessions using lesson plans and checklists
- Handle resistance and motivate different personality types
- Evaluate operator performance effectively and fairly

Main Concepts

- Week 1: Foundations of Training and Adult Learning
- Week 2: Drill-Specific Instructional Methods



ZT44 Electrical and Mechanical Systems

The **ZT44 Electrical and Mechanical Systems** course equips technicians with essential skills for troubleshooting and maintaining the drill. Participants will gain in-depth knowledge of the drill's electrical and mechanical systems, including system adjustments. The curriculum covers comprehensive preventive and corrective maintenance procedures, such as scheduled inspections, component servicing, system calibrations, and repair techniques. Emphasis is placed on safety protocols, effective use of maintenance manuals and schematics, and best practices to ensure reliable equipment performance and minimize downtime.

Instructor – Led Training

5 days (40 hours)

Electrical & Mechanical Maintenance / Supervisory Personnel

Customer site / Distributor Location / Factory

Prerequisites

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

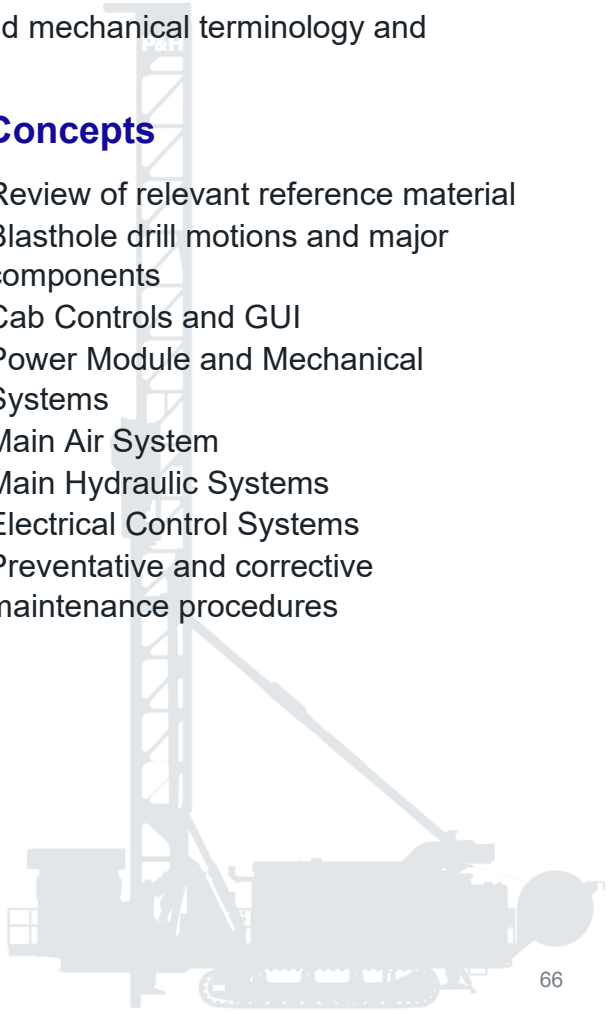
Objectives

Upon completion, students will be able to:

- Identify safety hazards during drill maintenance practices
- Identify controls in the cab
- Identify and describe general purpose of all electrical and mechanical systems
- Use GUI screens for diagnostics
- Reference manuals and schematics for troubleshooting
- Describe the relationship between the Control System and the Machine Hardware
- 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
- Main Air System
- Main Hydraulic Systems
- Electrical Control Systems
- Preventative and corrective maintenance procedures



ZR Series Electrical and Mechanical Systems

The **ZR Series Electrical and Mechanical Systems** course provides technicians with targeted instruction in troubleshooting and maintaining the drill. Participants will develop expertise in the drill's electrical and mechanical systems, including system diagnostics and adjustments. The curriculum covers comprehensive preventive and corrective maintenance procedures, such as scheduled inspections, component servicing, system calibrations, and repair techniques. Emphasis is placed on safety protocols, effective use of maintenance manuals and schematics, and best practices to ensure reliable equipment performance and minimize downtime.

Instructor – Led Training

5 days (40 hours)

Electrical & Mechanical Maintenance / Supervisory Personnel

Customer site / Distributor Location / Factory

Prerequisites

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

Objectives

Upon completion, students will be able to:

- Identify safety hazards during drill maintenance practices
- Identify controls in the cab
- Identify and describe general purpose of all electrical and mechanical systems
- Use GUI screens for diagnostics
- Reference manuals and schematics for troubleshooting
- Describe the relationship between the LINCS II Control System (PLC) and the machine hardware
- 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

320XPC Electrical Systems

The **320XPC Electrical Systems** course delivers targeted instruction for technicians responsible for the maintenance of the 320XPC Blasthole Drill. Core topics include electrical system architecture, device setup, and system adjustments. Preventive maintenance procedures cover scheduled inspections, system calibrations, and component servicing. Corrective maintenance includes fault diagnostics, troubleshooting, and repair of high- and low-voltage systems. Safety protocols and technical documentation usage are integrated throughout to support reliable equipment performance and minimize downtime.

Instructor – Led Training

3 days (24 hours)

Electrical Maintenance / Supervisory Personnel

Customer site / Distributor Location / Factory

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.

Objectives

Upon completion, students will be able to:

- Identify controls in the cab
- Identify and explain the purpose of all the Electrical Systems utilized
- Use GUI to locate relevant information
- Interpret schematics, control diagrams, and function block diagrams
- Configure Profibus, CAN bus, Ethernet, DDCS, and remote I/O systems
- 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

320XPC Mechanical Systems

The **320XPC Mechanical Systems** course provides technical instruction on the maintenance of the 320XPC Blasthole Drill, covering structural, mechanical, air, and hydraulic systems. Maintenance modules include preventive tasks such as scheduled inspections, lubrication, and system calibrations, as well as corrective procedures for troubleshooting, component replacement, and system adjustments. The curriculum emphasizes the use of technical documentation, analysis of schematics and control diagrams, and adherence to safety protocols to ensure optimal equipment reliability and performance.

Instructor – Led Training

3 days (24 hours)

Mechanical Maintenance / Supervisory Personnel

Customer site / Distributor Location / Factory

Prerequisites

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

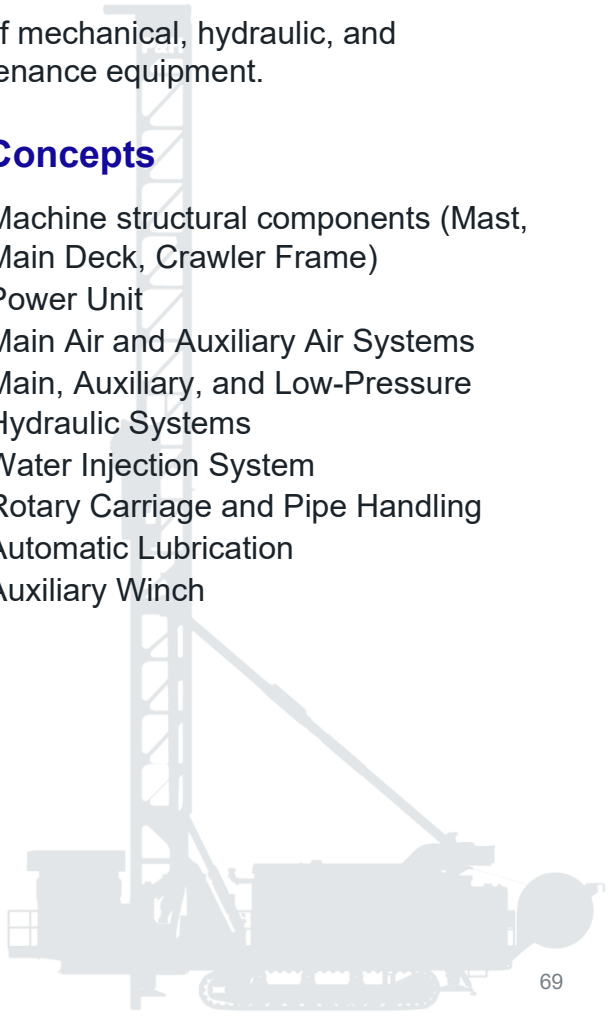
Objectives

Upon completion, students will be able to:

- 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



KOMATSU

Surface Mining Product Training

Please Be Safe and Always Mine to Conditions