



KOMATSU TRAINING ACADEMY CONSTRUCTION & SURFACE MINING COURSE GUIDE



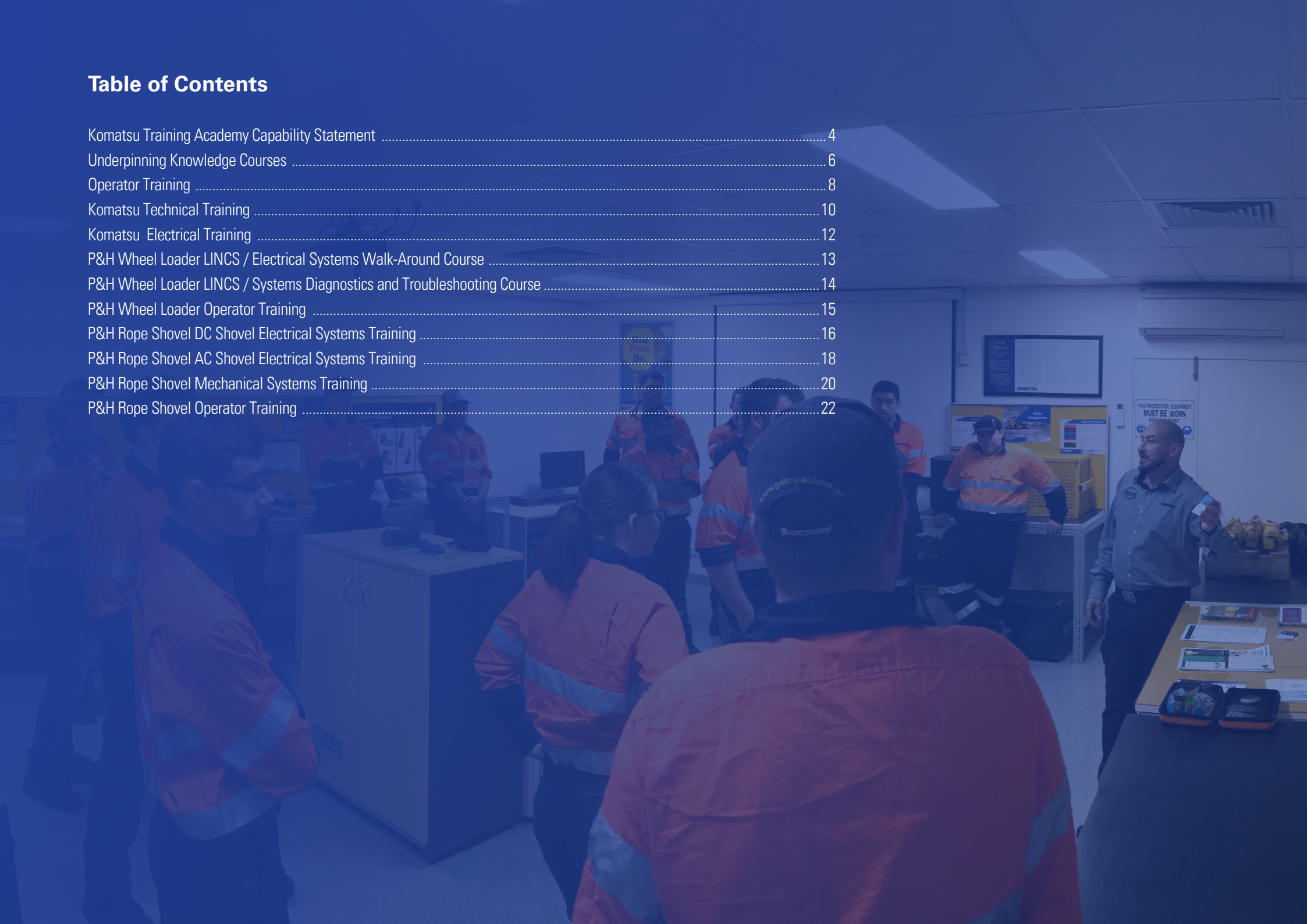
Komatsu Training Academy 1300 390 377

KOMATSU
Driven by your success



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Komatsu Training Academy Capability Statement



People-powered training & development services

Komatsu Training Academy is a Registered Training Organisation (RTO) specifically developed to assist our construction, quarry and mining customers by delivering nationally recognised and customised training where they need it – online, on-site, at customers' premises or at our own dedicated training facilities. Our offerings include a mix of nationally recognised courses and modules, along with purpose-designed operator, technical and management training.

The Komatsu Training Academy provides Komatsu machine users with appropriate training in service and repair technology as an essential part of our product support capability designed to improve productivity and lower the cost of ownership. As an industry leader we strive to deliver safe and innovative solutions that best meet your needs and expectations.

Our team of specialist, industry-qualified trainers deliver a broad spectrum of competency and skill-based development programs customised to your business and targeted to meet your specific industry needs. These programs include leadership and management training, operator skill proficiency development and customised technical training.

No matter what your training needs, our industry-specific tailored courses will enhance your people's skills, building your management and workforce capabilities, competencies and their proficiency – ensuring you are best equipped to handle the ever changing technical and technological challenges facing the industries we operate within now and into the future.

Who we are

Komatsu Australia is unique in being the only national distributor across the construction, quarrying and mining industries able to provide Nationally Recognised, customised, in-depth training tools for customers targeted to not only increase productivity, but also to improve efficiency and profitability.

In addition to our extensive range of training courses, we can also custom deliver productivity improvement initiatives for our construction, quarry and mining customers suitable for any size site or project.

Due to our extensive consultation and industry experience, we have assisted some of the industry's leading organisations to be able to solve complex issues, achieve measurably improved results and build leadership capabilities towards improvements in both productivity and in performance.

Benefits to your Business

As an industry specific RTO, you can be assured that Komatsu Training Academy delivers the very best training from experts who not only know this industry intimately, but who are passionately committed to achieving the right outcomes for you and your workforce.

Komatsu has established a reputation for products that combine innovation and technological advances, with industry-leading levels of reliability, durability and productivity and is one of the largest training organisations of apprentice Diesel Fitters, Boiler Makers and Auto Electrical trades persons in Australia.

We choose to do this, by delivering people powered technology trained technicians to ensure our customers experience the best possible Komatsu ownership and are involved every step of the way.

In today's labour market, where a shortage of experienced service technicians and skilled operators is impacting on the industries in which we operate and serve, all too often training has become focused on churning out numbers of apprentices, aiming more at quantity rather than at quality outcomes.



At Komatsu Training Academy, we focus on what is really needed: up-skilling for production improvement, preventive maintenance and safety.

We believe that the difference between a key technician or operator who is merely competent compared with one who is truly proficient at their job – can translate into significant benefits to your bottom line as well as having a more engaged and committed loyal workforce. We understand the challenges of your specific operating environment, and how to work with you to get the very best from your equipment and your management, technical and operational teams.

At Komatsu Training Academy, we understand the difficulties faced by our customers across highly diverse industry sectors – so we adapt delivery of our training to ensure we achieve the best outcomes for your investment.

When you need expert training for your people, Komatsu Training Academy is right there with you.

Skills Packages

At Komatsu Training Academy, we recognise that the first step in ensuring safe, productive and profitable worksites is to have plant operators and service technicians who can safely and competently operate and service their machines, then build on these core skills to develop into highly proficient professionals.

We offer a range of training and skills development courses, from industry-accredited nationally recognised machine-specific courses, through to specialist courses that ensure the highest levels of proficiency and professionalism – and capable of delivering measurable and sustainable improvements in productivity, cost reduction, machine reliability and safety.

Operator and technician training courses available through Komatsu Training Academy cover a variety of mining, construction and utility machines including backhoe/loaders, dozers, crushers, dump trucks, excavators (conventional and hybrid), graders and wheel loaders, as well as general systems and technologies.

In addition, Komatsu Training Academy can develop and tailor any training program to suit customers' specific requirements. Contact us to discuss how we can customise your training to meet your specific business objectives.

Our Training HQ: Komatsu Technical Education Centre (KTEC)

KTEC has become Komatsu Australia's primary training centre for operators and technicians in Australia, New Zealand and New Caledonia.

It is one of the region's most advanced technical training facilities for mining, earthmoving and utility equipment. Located on more than 3 hectares of land, it has more than 2600 sqm of dedicated training facilities, including seven classrooms, seven technical/electrical laboratories and a large machine workshop.

KTEC also incorporates a number of simulators, providing the ability for both novice and experienced operators to safely learn on a range of machines, from construction and utility size up to ultra-class mining equipment. KTEC was originally designed to specifically increase the technical capability of our own service and support people to the benefit of our customers.

It has now evolved to become an important element within our total customer satisfaction experience by ensuring we offer the best trained OEM support in the industry.

Lift your technical skills to the next level

Underpinning Knowledge Courses



Lead Hydraulics

This instructor-led course provides participants with knowledge of Open Load Sensing System (OLSS), Closed Load Sensing System (CLSS) and Hydrostatic systems applied to earthmoving and Komatsu equipment. In addition, it will provide an overview of diagnostic techniques with the use of practical training aids and “real world” situations. On the completion of this course the participants will be able to:

- » Read and interpret schematics
- » Understand the technologies used to build hydraulic equipment
- » Diagnose and assemble component parts of hydraulic control valves
- » Carry out diagnostic techniques safely and in a satisfactory manner
- » Understand and perform testing and troubleshooting using various equipment and techniques on machines and hydraulic simulation board
- » Identify the correct hydraulic symbols using schematics noting differences in country of origin.

Advanced Guide to Tier 4

This instructor-led course is designed to provide participants who have Komatsu Tier 3 engine experience, the necessary technical training for understanding the function, maintenance, service, repair and troubleshooting of the 6D107, 6D114, 6D125, and 6D140 Tier 4 engines.

Detailed information will be provided regarding redesigned EGR systems, new turbochargers, changes to the base engine, the need for injector trimming, and after-treatment systems.

Hands-on training will take place using a running engine training module, supplemented with loose assemblies such as a turbo and EGR valve. Stationary Manual Regenerations will be performed on the after-treatment system using the training module, followed by disassembly of the Diesel Particulate Filter (DPF) unit.

On the completion of this course the participants will be able to:

- » Understand Tier 4 engine systems, starting with air intake, continuing through fuel, cooling, lubrication, and exhaust systems
- » Identify engine sensors, the engine controller, and
- » Carry out troubleshooting procedures.

Underpinning Transmissions

This instructor-led course provides participants with the knowledge of Transmissions applied to earthmoving and Komatsu equipment. In addition, it will provide an overview of testing and troubleshooting techniques with the use of gauges, manuals, and tools.

On the completion of this course the participants will be able to:

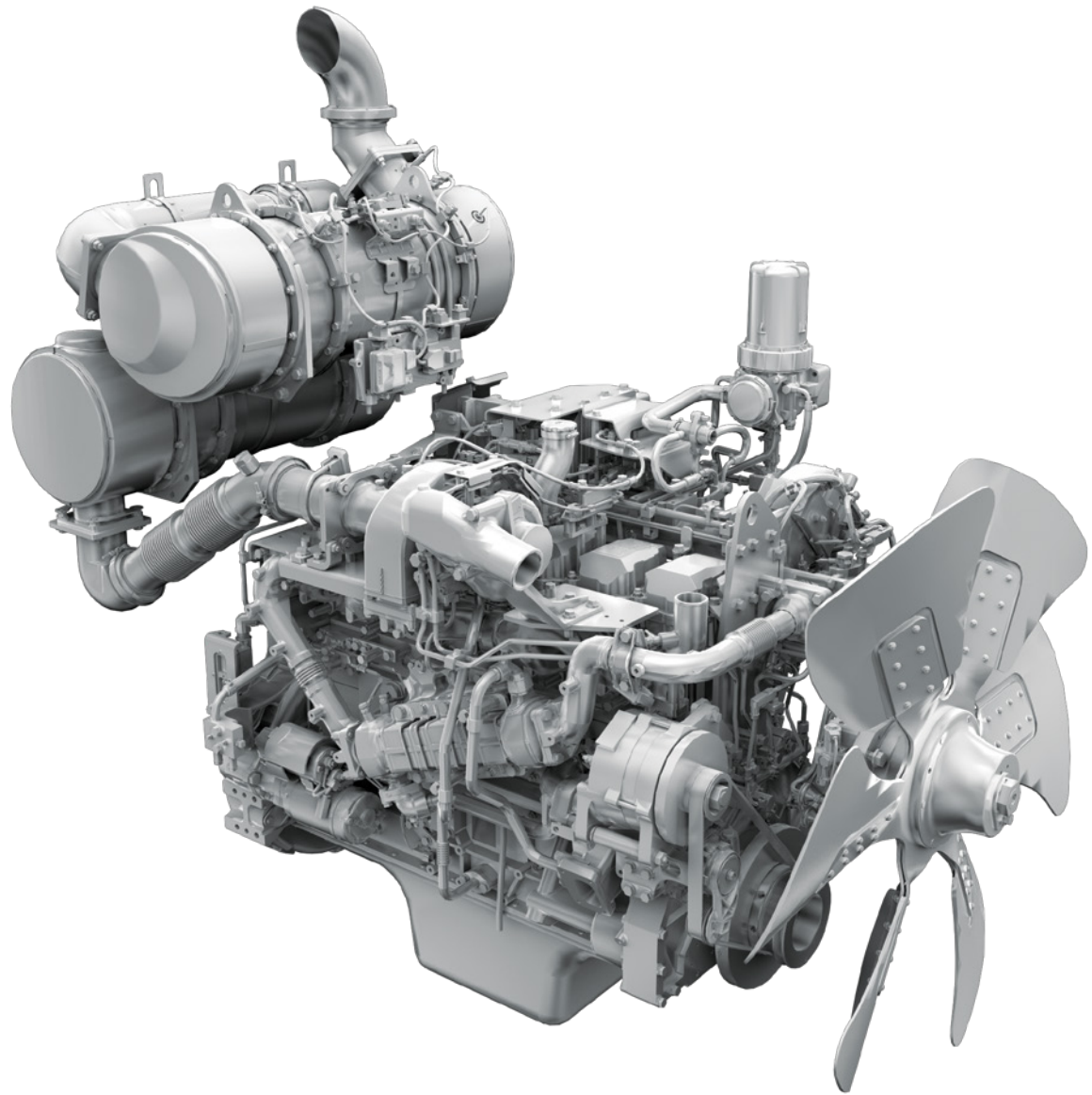
- » Understand dampers and torque convertors
- » Carry out diagnostics on transmissions
- » Understand ECMV's their function and operation
- » Understand countershaft and planetary transmissions
- » Disassemble and rebuild of planetary and countershaft transmissions.

Electrical Diagnostic Fundamentals

This instructor-led course is designed to give participants who have trade experience, the necessary technical skills to perform electrical diagnostics. Training will involve four days of classroom theory and workshop application of practical skills. The course is designed to carry the participant through revision of basic electrical fundamentals and their application on machines, testing of batteries, charging and starting systems, sensors, application of sensors and troubleshooting, reading schematics and an introduction to CAN bus.

On the completion of this course the participants will be able to:

- » Understand basic electrical fundamentals including identification of a variety of circuits and their components, analysis of the effects of faults, diagnosis and rectification
- » Identify batteries, starting and charging systems, including battery safety requirements and testing
- » Carry out sensor identification and testing e.g:
 - ▶ Correct use of testing equipment
 - ▶ CAN bus topography and testing
 - ▶ Reading schematics
 - ▶ Identifying schematic symbols and troubleshooting faults.



Maximise your return on investment

Operator Training



Komatsu is unique as we are the only national distributor in the industry providing an invaluable training tool for clients to increase production and therefore profitability. We carry out this training as well as longer term assignments for extraction and construction companies on any size site or project.

At Komatsu Training Academy, we recognise that the first step in ensuring safe, productive and profitable worksites is to have operators who can safely and competently operate their machines.

Our Operator Skills Development Packages are specifically designed to build on an operator's current basic core skill set. At Komatsu Training Academy we pride ourselves on our highly competent trainers who are committed to developing highly proficient operators who are professionals in their field.

Our Operator Skills Development Packages include:

- » **Introduction to Operator Training**
- » **Advanced Operator Proficiency Training**
- » **Plant Operator Machine-Specific Courses**

Introduction to Operator Training

Komatsu Training Academy's operator training provides participants with the knowledge and skills to operate load shifting equipment, conduct basic operator maintenance, and to plan and prepare for daily operations.

Duration of this course will vary depending on the experience of the participant. On completion of this course participants will be able to:

- » Demonstrate all safety precautions when operating the machine, including safe operating practices
- » Identify and locate major components of Komatsu machines
- » Locate and identify functions of cab fixtures including monitor panel
- » Demonstrate an understanding of emergency warning systems, steering and brake systems of the machine
- » Conduct correct walk around inspection techniques
- » Undertake effective operating procedures of the machine

This training is followed by practical assessment observation and instruction as required to ensure each operator operates the machinery safely, efficiently and in line with industry requirements.

Advanced Operator Proficiency Training

Operate for reliability and productivity

Measuring machine performance and productivity is critical to performance improvement and is often overlooked as an area where serious net gains can be made by customers. The focus of this training is to reduce downtime and unplanned maintenance costs by reducing incorrect machine usage and provide up-skilling training programs for hydraulic excavator/ face shovel, electric and mechanical drive wheel loaders, rope shovels, dozer, grader, water cart and haul truck operators on site.

Proficiency Training includes:

- » Site Observation Report - An initial assessment of your key operators, overall circuit and supervision is carried out by one of our senior trainers. This will occur over several weeks to ensure we are able to review key operators across each crew. A report will then be provided with recommendations for further training and up-skilling
- » Holistic Time & Motion Studies – to get an overall perspective on how the machine is interacting for the required tonnage target or production yield
- » Individual Operation Assessment i.e. we can assess to see that the machine is being used for what it is designed for
- » Proficiency Training - ongoing individual operator training, providing up-skilling to operators to increase production and reduce potential for machine damage
- » Machine Performance Studies - Analyse the performance of production loading machinery with recommendation for improvements
- » Consulting - A range of consulting options to all companies including setting operating standards, set up of new Greenfield operations or reviews of existing operations
- » Verification of Competency - Verification of Competency (VOC) is a method of assessment that assists employers to meet WHS requirements and ensure our team are still competent to operate equipment or perform a task. Assessing for Verification of Competency enables businesses to confirm that their employees are competent in their skills and using equipment.

These packages are specifically tailored to suit customers' specific requirements, with various reporting options available including the purchase of standard operating procedure documents for classroom teaching.

Contact KTA to discuss how we can customise your training to meet your specific business objectives.

Plant Operator Machine-Specific Courses

Komatsu Training Academy offers a range of industry-accredited short courses providing the formal qualifications required to safely and competently operate a range of equipment. These include the following accredited units:

RIIHAN308F	Load and unload plant
RIIMPO317F	Conduct roller operations
RIIMPO318F	Conduct civil construction skid steer loader operations
RIIMPO319E	Conduct backhoe / loader operations
RIIMPO320F	Conduct civil construction excavator operations
RIIMPO321F	Conduct civil construction wheeled front end loader operations
RIIMPO323E	Conduct civil construction dozer operations
RIIMPO324F	Conduct civil construction grader operations
RIIMPO325E	Conduct civil construction scraper operations
RIIMPO337E	Conduct articulated haul truck operations
RIISAM204D	Operate small plant and equipment
RIIVEH304D	Conduct tip truck operations



Courses are tailored to customer requirements.

Maximise your Mechanical diagnosis and repair skill

Komatsu Technical Training



Komatsu Training Academy mechanical and electrical training will provide you with the skills required as a mechanical and electrical tradesperson in the areas of technical servicing, diagnostics and maintenance. Technical Training modules are arranged by machine type, model or technology platform (such as hydraulics, electrics and engines).

Komatsu Technical Training covers all machine types and is suitable for both in-house Komatsu tradespeople and those employed externally by Komatsu customers.

Course Content

Komatsu Total Technical Picture (KTPP) – 4 days

KTPP is a four-day course recommended for technicians new to Komatsu products or the earthmoving industry. It covers the basic principles required to give all participants the fundamentals to perform the underpinning tasks of their role. In addition, all participants will be given a holistic view of Komatsu technical training (first level). This program covers the following:

Komatsu Literature and Service Environment – 1 day

Provides participants with knowledge of Komatsu manuals and their contents, along with availability of other sources of information, and a thorough understanding of correct paperwork, forms and their applications. Content can be modified to suit customer-specific applications if required.

Komatsu Hydraulics – 1 day

Provides participants with fundamental knowledge of hydraulic applications for earthmoving equipment generally, and specifically to Komatsu equipment. Participants will be given the skills to use and understand circuit diagrams and fundamental operating principals of the main hydraulic circuits.

Komatsu Electrical – 1 day

Provides participants with fundamental knowledge of electrical systems as they apply to earthmoving equipment generally, and specifically to Komatsu equipment. It will provide participants with the skills to use testing and diagnostic equipment using diagrams and circuit principles.

Troubleshooting – 1 day

Provides participants with the relevant techniques and knowledge to assist with diagnostics and troubleshooting for hydraulics and electrical circuits, using schematics and other supporting resources.

Customised machine technical training (duration varies depending on machine type and availability):

These packages provide value added solutions to our utility, construction and mining customers. Each level develops and builds skills, familiarisation and knowledge in each participant, and successful completion of these courses will enhance your technician's competency and proficiency. Komatsu Training Academy sees skills and proficiency training as critical to lifting productivity and efficiency to the overall performance of operating all construction, quarry and mine sites. Our training programs can also be customised to meet your organisations specific requirements if required.

Level 1: Introduction and General Service – 1 day

- » Identify safety requirements for maintenance and repair
- » Demonstrate knowledge of design features and characteristics
- » Locate and identify major components
- » Describe operational differences between previous model machines
- » List optional equipment available for the machine
- » Locate service points, describe specific service requirements as stated in the operating manual.

Level 2: Structure and Function – 1 day

- » Describe design concepts of each of the machine's systems
- » Demonstrate working knowledge of circuit diagrams relevant to the machine
- » Describe the principles of operation of all major systems on the machine
- » Demonstrate all safety precautions and procedures relevant to the machine.

Level 3: Test and Adjust – 1 day

- » Use of correct test equipment in maintaining the machine
- » Test and adjust engine components and powertrain (including hydraulics and electrical systems)
- » Interpret schematic drawings for hydraulic and electrical systems
- » Compare test results with specifications and make recommendations.

Level 4: Troubleshooting – 1 day

- » Ensuring all safety requirements are observed when evaluating and diagnosing the machine
- » Evaluate and diagnose engine faults, powertrain, undercarriage, electrical control system and hydraulic equipment
- » Demonstrate the correct sequence of troubleshooting.

Each level listed above is customised for all machine types.



Maximise your electrical diagnosis and repair skill

Komatsu Electrical Training



Electric-drive Truck Training (4-level course) – 4 days

This course provides mechanical, engine and electrical training for electric-drive trucks based on the same four-level structure of our machine-specific training courses.

In addition, Komatsu Training Academy can provide technical training specific to the electrical propulsion systems of Komatsu AC and DC drive system trucks, including the Invertex and Statex systems, Quad Chopper and fuel saver systems.

Advanced Electrical Propulsion Course – 3 days

This course has been developed to deliver training for service tradespeople working on Komatsu electric-drive trucks. On completion, all participants will have the knowledge and skills to:

- » Understand the operation of Quad choppers, fuel saver and other installed options
- » Conduct fault finding propulsion components by structured testing plans
- » Undertake safe testing and fault finding philosophies
- » Methods of identifying components and theory of operation
- » Use of wPTU software for troubleshooting
- » Use of graphical techniques to simplify data handling for truck performance analysis.
- » Capture data and test results to prewritten scenarios
- » Evaluate data from wPTU/DID/VHMS and Interface module
- » Invertex 1e layout and operation.

Restricted Electrical Licence (REL) Course – 5 days (WA & QLD only)

This course is designed for fitters/mechanics working on 3.3kV electric propulsion components of an engine driven, self-propelled earth moving vehicle. This nationally accredited course, provides you with the skills and knowledge to identify circuits and isolation arrangements, follow isolation procedures, select and use of HV testing and measuring devices, terminate and connect HV cables and conductors, and safely test electrical components of an electrical self-propelled engine driven earth moving vehicle, with a focus on high level of safety.

For more information on this course, please see our separate Nationally Recognised Training Course Guide.

P&H Wheel Loader Product Technical Training

LINCS / Electrical Systems Walk-Around Course



A clear understanding of the P&H Wheel Loader's propulsion system and digital control system (LINCS) is required for safe and effective maintenance, troubleshooting and repair of electrical & propulsion systems on the P&H Wheel Loader. The 'LINCS/Electrical Systems Walk-Around' training course is designed for electrical technicians who require the knowledge to effectively service the wheel loader's control & propulsion systems. There are no prerequisites for this course.

Learning Outcomes

To provide the knowledge and skills necessary for electrical technicians to be able to service, maintain and repair the P&H Wheel Loader's control & propulsion systems.

Course Topics

- » History and evolution of the P&H Wheel Loader
- » Safe work procedures (includes a daily 5-minute "Safety Share" session)
- » Loader specifications
- » Cab operations and control functions.
- » Component location and identification
- » Principle of operation
- » Maintenance requirements

- » Navigation and interpretation of electrical schematics
- » Component inspection and maintenance
- » Set up of RPT sensors on traction motors and generator
- » Basic troubleshooting and repair procedures
- » LINCS System navigation
- » Basic trouble shooting using LINCS.

Structure

The 'LINCS/Electrical Systems Walk-Around' training course is designed to be presented in 16 hours (2 days). The training session is to take place indoors using data projector, white board and laptop computer. Each trainee will be issued with:

- » Slide show handout
- » Loader schematics
- » Electronic copy of training material (upon request).

Format

The factory certified Technical Instructor will present the following:

- » Power Point presentation prepared from machine illustrating all operational, electrical, hydraulic, air system, and ancillary equipment on the machine. Instructor will take time to explain the location and operation of all facets of the machine and

answer questions from the trainees as required

- » Explanation of safety recommendations including the wheel loader's sources of energy and isolation procedures for the provision of a safe working environment
- » Wheel loader schematics displayed on projector whilst trainees follow from hard copy provided. Instructor will explain schematic layout, cross referencing and schematic wire number convention
- » The wheel loader's digital control system (LINCS) theory of operation and Architecture. Using LINCS simulation software displayed on projector, all functions of LINCS will be demonstrated and explained to Maintenance level access.

Implementation

The training session is to start at times that are convenient for the customer. Instructor is to use lap-top computer, data projector, and whiteboard and provided documentation to complete learning objectives. Video presentations are to be used to supplement the training where appropriate. Ten-minute breaks are recommended after every 90 minutes of training. The last 90 minutes of training are to be reserved for evaluation.

P&H Wheel Loader Product Technical Training

LINCS / Systems Diagnostics and Troubleshooting Course



A clear understanding of the P&H Wheel Loader's propulsion system and digital control system (LINCS) is required for effective maintenance, troubleshooting and repair of the wheel loader's electrical & propulsion systems. The 'LINCS/ Systems Diagnostics and Troubleshooting' training course is designed for electrical/mechanical technicians who are familiar with P&H Wheel Loaders and desire to attain an advanced level of knowledge of their electrical & mechanical systems.

It is a requirement that participants complete the prescribed training course 'LINCS/Electrical and Mechanical Systems Walk-Around' prior to attending the 'LINCS/ Systems Diagnostics and Troubleshooting' training course.

Learning Outcomes

To advance the knowledge and skills necessary for the technician to be able to troubleshoot, maintain and repair electrical & mechanical system components on the P&H Wheel Loader. At the conclusion of the course, participants will be able to:

- » Competently remove and replace major electrical/mechanical components
- » Competently navigate and interpret loader schematics
- » Apply advanced propulsion system troubleshooting techniques
- » Manipulate and interpret LINCS software
- » Navigate LINCS to Service level
- » Troubleshoot faults using LINCS
- » Troubleshoot and maintain mechanical systems
- » Troubleshoot and maintain both SR and 24V electrical systems
- » Troubleshoot and maintain the compressed air system
- » Troubleshoot and maintain the cooling air system
- » Troubleshoot and maintain hydraulic system
- » Maintain the machines grease system to the Komatsu standard

Structure

The 'LINCS Systems Diagnostics and Troubleshooting' training course is designed to be presented in 24 hours (3 days). The course is designed to take place at A KMC facility hosting the LINCS training panel.

System simulation software (for Generation 1 Wheel Loaders) and a Hands-on LINCS Simulator (for Generation 2 Wheel Loaders) are available at the facility for training purposes. Each trainee will be issued with:

- » Loader Schematics
- » System documentation (hard copy)
- » System documentation (electronic copy)
- » Selected promotional items (pending availability).

P&H Wheel Loader Product Technical Training

Operator Training



Level I Learning Outcomes

P&H Wheel Loader Generation II Authorised Operator Training is an introduction and familiarisation to the machine followed by training directed at the machine in production mode. All Training will include some form of O4R (Operate for Reliability) training. Practical applications and general digging theories will be applied to give operators the skills needed to safely and productively operate the machine in various working conditions. Using the Operators Handbook as a reference, the following will be covered:

- » Machine Specifications
- » Machine Safety and Emergency Shut down procedures
- » Machine Start up and Shut down procedures
- » Fire Suppression
- » LINC'S Navigation
- » Alarm / Warning Reaction
- » Machine Capabilities and Limits
- » Avoiding Hazards and Tyre Damage
- » Communication
- » Machine Pre-shift Inspection
- » Machine Controls and Functions
- » Introduction to digging theories
- » Questions and Answers

Level I Operator Training will accommodate 8 trainees in 2 ten hour days. Day one will be classroom and day two will be on the machine. This allows operators to get familiar with the machines controls in a safe operating location.

Site specific items can also be included into the course if prior arrangements have been made.

Level II Learning Outcomes

Upon satisfactory completion of the Level I course (time frame will vary depending on the level of exposure the operators have had with the Generation II Loader) the following points will be discussed in the classroom before putting them to practice in the field:

- » Proper truck placement
- » Applying different digging theories when needed
- » Digging effectively without tyre spin
- » Understanding Machines Controls
- » Understanding Machines limits and capabilities
- » Tram procedures
- » LINC'S Navigation
- » Control and maintaining work area
- » Importance of load placement
- » Understands production cycles

- » Emergency Procedures
- » Working with support equipment
- » Communication
- » Ensuring safe and productive attitude.

Level I should be limited to 12 people.

Level II should be limited to one or two operators.

Level I and Level II operator Training will train 8 people in 120 hours (12 days).

Operators completing this training will have a better understanding of their equipment and the ramifications of their actions on reliability. Operating the equipment consistently within its design criteria will result in greater reliability, lower maintenance costs and higher asset utilisation.

Courses are tailored to customer requirements.

P&H Rope Shovel Product Technical Training

DC Shovel Electrical Systems Training



Course Duration

Two days.

Target Audience

Electricians, Technicians and Engineers who will service and maintain P&H Mining shovels.

Description

The student is introduced to the operation and maintenance of the P&H Electrical mining shovel. Furthermore the course focuses on critical knowledge and skills required in supporting present day P&H Electrical mining shovels. Topics included are the Centurion DC Shovel Control System. The concepts that are covered in the classroom are reinforced in a laboratory environment that allows the students to load install and configure application software.

Prerequisites

Students are required to have knowledge of power electronics and computers. Students are to complete Power, Drive and Control System eLearning training modules prior to undertaking this course.

Course Location

» **Approved Customer Sites.**

Course Objectives

Upon completion of this course the student will be able to:

- » Identify and explain the purpose of all the major components
- » Use application software and programs as required
- » Remove and replace faulty components
- » Conduct failure analysis
- » Explain the inter-relationship of the shovel systems
- » Analyse schematics and control diagrams used for troubleshooting and repair.

Main Concepts

- » DC Power System overview
- » Drives Windows overview
- » AC800M (Advant Controller 800) Hardware overview
- » Control Builder overview
- » System Maintenance and Troubleshooting.

Day 1

Course Introduction

- » Introduction
- » Class Objectives
- » General Safety
- » ESD
- » Pre-Assessment

Electrical System Block Diagrams

- » Systems Diagram Overview
- » Shovel Schematics
- » Use of the index
- » Use of Location Codes
- » Reading P&H Schematics
- » Schematic Exercises

Touch Panel & GUI Systems

- » Touch Panel Navigation
- » Touch Panel Software Tools & Calibration
- » Limit Systems
- » Touch Panel Navigation LAB

DC Power Systems Overview

- » Power Conversion
- » P&H Converter Configuration
- » Protection Circuits
- » SCR Troubleshooting 101
- » RPC Power Circuit Operation
- » RPC Control Circuit Operation
- » RPC Intelligent PLC operation

Drive System Hardware Overview

- » DCS600 Circuit Board Operation
OR
- » DCS800 Circuit Board Operation
- » Fault Finding

Day 2

Advant Controller 800 & Remote I/O Hardware Review (AC800)

- » Advant Controller
- » Remote I/O
- » Monitoring I/O Status
- » *Student Exercises*

Air System

- » Theory of Operation
- » Hardware Overview
- » Troubleshooting
- » *Student Exercises*

Brake System

- » Theory of Operation
- » Hardware Overview
- » Troubleshooting

Automatic Lubrication System

- » Theory of Operation
- » Hardware Overview
- » Troubleshooting
- » Student Exercises

Hoist Lube Pump System(4100XPC)

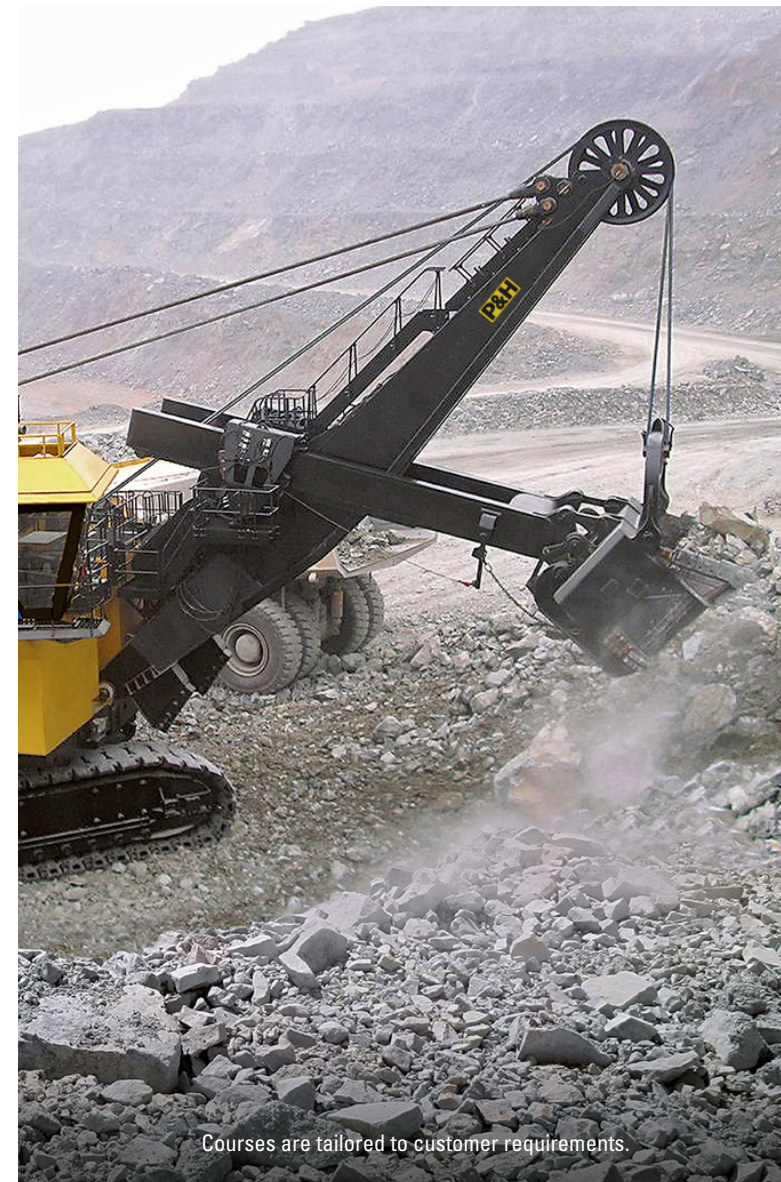
- » Theory of Operation
- » Hardware Overview

Auto Crowd Belt Tensioning System (4100XPC)

- » Theory of Operation
- » Hardware Overview
- » Troubleshooting

Course Evaluation and Wrap

- » Post-Assessment
- » Course Evaluation



Courses are tailored to customer requirements.

P&H Rope Shovel Product Technical Training

AC Shovel Electrical Systems Training



Course Duration

Two days.

Target Audience

Electricians, Technicians and Engineers who will service and maintain P&H Electrical Mining shovels.

Description

The student is introduced to the operation and maintenance of the P&H Electrical mining shovel. Furthermore the course focuses on critical knowledge and skills required in supporting present day P&H Electrical mining shovels. Topics included are the Centurion AC Shovel Control System. The concepts that are covered in the classroom are reinforced in a laboratory environment that allows the students to load, install and configure application software.

Prerequisites

Students are required to have knowledge of power electronics and computers. Students are to complete Power, Drive and Control System elearning training modules prior to undertaking this course.

Course Location

» **Approved Customer Sites.**

Course Objectives

Upon completion of this course the student will be able to:

- » Identify and explain the purpose of all the major components utilised
- » Use application software and programs as required
- » Remove and replace faulty components including a failure analysis
- » Explain the inter-relationship of the shovel systems
- » Analyse schematics and control diagrams utilised for troubleshooting and repair.

Main Concepts

- » AC Drive Line up overview
- » Drives Windows overview
- » AC800M (Advant Controller 800) Hardware overview
- » Control Builder overview
- » Auxiliary Systems Operation
- » System Maintenance and Troubleshooting.

Day 1

Course Introduction

- » Pre-assessment
- » General safety
- » ESD

Electrical System Diagrams

- » Systems diagram overview
- » Shovel schematics
- » Use of the index
- » Use of location codes
- » Reading P&H Schematics
- » *Schematic Exercises*

Touch Panel & GUI Systems

- » Touch panel navigation
- » Touch panel software tools and calibration
- » *Touch Panel Navigation Lab*

Day 1 (continued)

AC Power Systems - IGBT Devices (101)

- » Basic theory of operation
- » Basics troubleshooting techniques

IGBT Supply Unit (ISU)

- » Theory of operation
- » Hardware overview
- » Reduced run feature
- » Fault tracing

Inverter Unit (INV)

- » Theory of operation

Auxiliary Control Unit (ACU)

- » Theory of operation
- » Hardware overview

Drive Control Unit (RDCU)

- » Theory of operation
- » Hardware overview
- » Software chains
- » Group 19 data transfer
- » Student Lab Activities

Day 2

Advant Controller 800 and Remote I/O

- » Advant Controller Components
- » Remote I/O Components
- » Control builder overview
- » Monitoring I/O Status
- » Student Lab Activities

Day 2 (Continued)

Air System

- » Theory of Operation
- » Hardware Overview
- » Troubleshooting
- » *Student lab activities*

Brake System

- » Theory of Operation
- » Hardware Overview
- » Troubleshooting

Automatic Lubrication System

- » Theory of Operation
- » Hardware Overview
- » Troubleshooting
- » *Student lab activities*

Hoist Lube Pump System

- » Theory of Operation
- » Hardware Overview

Rear House Blower System

- » Theory of Operation
- » Hardware Overview

Auto Crowd Belt Tensioning System (4100XPC)

- » Theory of Operation

Course Evaluation and Wrap

- » Post-Assessment
- » Course Evaluation



Courses are tailored to customer requirements.

P&H Rope Shovel Product Technical Training

Shovel Mechanical Systems Training



Course Duration

Two days.

Target Audience

This training is targeted for Mechanical Maintenance and Supervisory personnel responsible for preventive and corrective maintenance and servicing of P&H electric mining shovels.

Description

The course introduces the student to the operation and maintenance of P&H electric mining shovels. It focuses on critical knowledge and skills required in supporting P&H electric mining shovels. All mechanical systems and adjustments are discussed. Recommended preventive and corrective maintenance procedures and practices are also discussed.

Prerequisites

Students are required to have knowledge of mechanical terminology and practical experience with maintenance equipment. It is also suggested that students complete the following eLearning training modules: Product Overview, General Assembly Procedures, Disc Brakes, Theory of Operation of the Propel, Swing, Hoist and Crowd Systems and Compressed Air and Lubrication systems.

Course Location

» **Approved Customer Sites.**

Course Objectives

Upon completion of this course the student will be able to:

- » Locate and identify major mechanical systems, subsystems and components
- » Identify and use available P&H reference material to operate or maintain the shovel
- » Understand the design and function of the various shovel mechanical systems
- » Conduct preventive maintenance inspections
- » Perform maintenance adjustments and repairs
- » Recognise safety hazards associated with inspection, repair and maintenance of shovel mechanical systems
- » System Maintenance and Troubleshooting.

Main Concepts

- » Review of relevant P&H 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.

Day 1

Sources of Information

- » Mechanical Maintenance Manual
- » LinkOne Parts Book
- » Service Bulletins and Service Notices

Shovel Orientation and Introduction

- » Shovel Orientation
- » Mechanical and Structural Overview

Safety Overview

- » Electrical and Mechanical Hazards
- » Stored Mechanical Energy

General Assembly Procedures

- » Bolt Torquing Principles and Practices
- » Bolt Tensioning
- » “SuperNuts”
- » Bearing Types and Adjustment

Shovel Systems: Propel

- » Lower Structure and Lower Works
- » Propel System Overview
- » DELTA Drive System
- » Crawler Track Tension Adjustment

Shovel Systems: Machinery House

- » House Ventilation and Pressurisation
- » AirScrubPro

Shovel Systems: Swing

- » Swing System Overview
- » Center Gudgeon Nut Adjustment

Day 2

Shovel Systems: Hoist

- » Hoist System Overview

Shovel Structures: Attachment

- » Boom, Handles and ABSS

Shovel Systems: Dippers

- » Dipper Wear Components
- » Dipper Trip Mechanism
- » “SnubRite” Snubbers
- » Pitch Braces

Shovel Systems: Crowd

- » Crowd System Overview
- » Crowd Belt Replacement and Tensioning
- » Shipper Shaft and Saddle Block Adjustments

Shovel Systems: Compressed Air System

- » Air System Overview
- » Air Compressor
- » Air System Control
- » Brake Air System
- » Lube Air System

Shovel Systems: Disc Brakes

- » Operation and Components Overview
- » Disc Brake Safety
- » Disc Brake Maintenance

Shovel Systems: Lubrication System

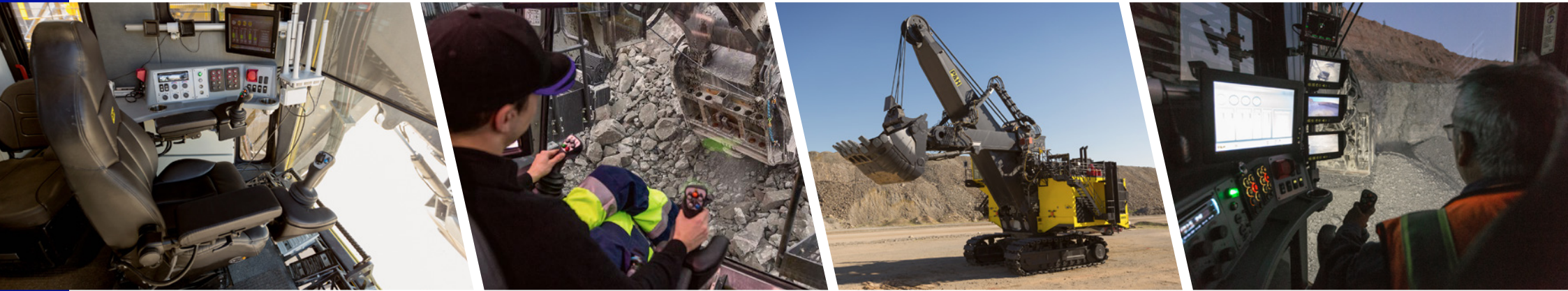
- » Types of Lubricants
- » Motor and Gearcase Lubrication
- » Automatic Lubrication System Overview



Courses are tailored to customer requirements.

P&H Rope Shovel Product Technical Training

Shovel Operator Training



Course Duration

Five days.

Target Audience

This training is designed for personnel who operate P&H Mining shovels for production.

Description

Operators will gain insight into the overall machine operation and learn required user maintenance areas. Initially a classroom presentation is conducted which is followed by hands-on training with the shovel in a production environment. Students will be given the opportunity to operate the shovel and practice the techniques covered in the classroom.

Prerequisites

Students are required to complete Operator eLearning training modules.

Course Location

» **Approved Customer Sites.**

Course Objectives

Upon completion of this course the student will be able to:

- » Undertake walk around safety inspections
- » Identify the location of the controls and warning systems
- » Understand the function the controls and warning systems
- » Perform minor mechanical repairs and adjustments
- » Operate the shovel in a productive and safe manner to avoid damage to equipment and reduce overall operating cost.

Main Concepts

- » Shovel Mechanical Overview
- » Production Techniques
- » Various Digging Techniques
- » User Maintenance Areas
- » Identifying Machine Problems
- » Drives Windows overview.

Course Outline

Safety

- » Safety equipment
- » Communications
- » Pre-operational checks
- » Inspection of operational area
- » Job conditions
- » Weather conditions
- » Operation at night

Operation

- » Communications
- » Shovel swing radius
- » Traffic patterns
- » Clean up at the shovel
- » Positioning of power cables
- » Maintaining bench grades

Feeding a Crusher

- » Communications
- » Traffic patterns
- » Inspection of working area
- » Material Selection

Truck Operation

- » Communications
- » Inspection of working area
- » Condition of the digging area
- » Blasting residue in the digging area
- » Type of material being loaded
- » Traffic patterns
- » Truck positioning
- » Uniform load
- » Loading set-up



Courses are tailored to customer requirements.



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