

## PRODUCTION MAINLINE GRINDERS



**Improves safety and controls  
rail defects producing**

- Correct interface between wheel and rail
- Maximized rail life
- Extended wheel life
- Quiet rail

# Introduction

Harsco Rail, Harsco Corporation is a major international supplier to the world's railways of track construction and maintenance equipment. Harsco Rail has sales, engineering, manufacturing, and field service operations in 9 locations.

### Locations

Fairmont, MN USA  
Ludington, MI USA  
Cherry Hill, NJ USA  
West Columbia, SC USA  
Queensland, Australia  
Rio de Janeiro, Brazil  
Ratingen, Germany  
Abu Dhabi, UAE  
Nottingham, UK

### Overview

Harsco Rail manufactures a complete line of rail grinding equipment for the International and North American markets. The product line is divided into two families: Switch and Crossing, Transit Grinders and Production Mainline Grinders. This brochure highlights our Production Mainline Rail Grinders.

Many configurations are available for our production rail grinders. Specialized grinders have been built ranging from 16 to 120 grinding heads.

Harsco Rail has been grinding rail

for over 57 years with the first rail grinder being built in the mid 50's.

Over 160 rail grinders have been manufactured and shipped in the last 25 years, and all rail grinders built by Harsco Rail in the past 10 years are still in service today.

Our rail grinders are currently being operated in over 15 countries including:

Argentina	Italy
Australia	Japan
Brazil	Malaysia
Canada	Manila
China	Mexico
Colombia	Singapore
Germany	Taiwan
Hong Kong	Turkey
Ireland	United Kingdom
Israel	USA



Harsco Rail has been involved in successful global contract operations since 1980.

Rail grinders have been designed to accommodate the varying operating and environmental conditions encountered throughout the world.

Engineering and manufacturing staff currently on hand has been involved with our rail grinding program for over 20 years.

Our rail grinding continuous improvement technology reflects expertise gained from the operations of our own rail grinding fleet.

Annually we grind approximately 10,000 pass miles with our Production / Mainline Grinders.

### Harsco Rail is meeting environmental requirements by using:

- Tier III Engines that meet new emission standards
- Enhanced noise abatement capabilities
- Improved dust collection
- Improved spark control
- Ability to use foam fire suppression



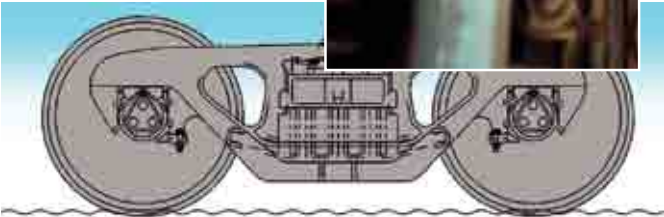


# Why Grind?

## Safety and Extended Rail Life

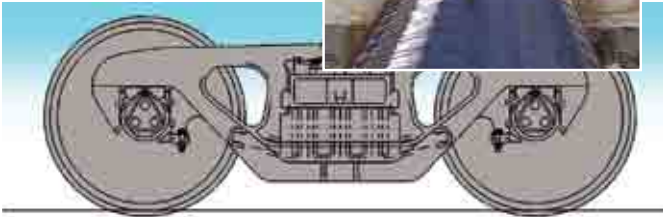
Before

- Incorrect Interface
- Excessive Wheel Wear
- Shorten Rail Life
- Noise



After

- Correct Interface
- Extended Wheel Life
- Maximum Rail Life
- Quiet Rail



## Control of Rail Fatigue Defects

**Rail grinding has been used to control several classes of rail fatigue defects**

- Rail surface fatigue defects
- Spalling
- Corrugations
- Surface shelling
- Rail internal defects
- Detail fracture (from shells)
- Vertical slit heads
- Other rail head defects

**Control of fatigue defects through grinding**

- Rail profile grinding has been found to be effective in not only controlling the above classes of surface defects but also in reducing the occurrence of internal fatigue defects such as detail fractures from shells
- Profile grinding incorporates more frequent, less intensive, grinding intervals to control and maintain of the shape of the rail head (i.e. the "profile")

**Rail profile grinding has been used to address three different areas of rail maintenance**

1. Control of gauge face wear and lateral wheel / rail curving forces
2. Control of rail fatigue defects
3. Control of Corrugations



Gauge corner wheel to rail contact before grinding



Catastrophic result of gauge corner cracking



Correct head shape and proper wheel to rail contact after grinding

# Production Rail Gringing

RMS Grinder in the 120-Stone Configuration



Spraying Foam



Spraying Water



PTG Grinder in the 16-Stone Configuration



PGM Grinder in the 48-Stone Configuration



# Production Rail Grinding

## PGM Models



Magnum 48



Magnum 32



Magnum 16



Magnum 32

## PGM Options Available

- Rail Corrugation
- 2-Camera Laser Profile Measurement Systems
- Dust Collection
- 4-Camera Laser Profile Measurement Systems
- Fire Suppression

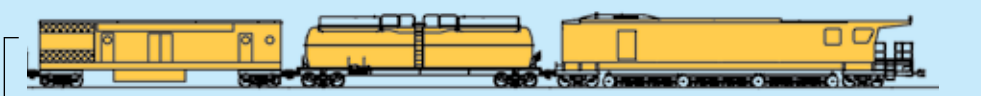
## RMS Models



RMS 48



RMS 48-120



RMS 96-120

# Jupiter II Control System

Jupiter II is a distributed I/O Control System developed by Harsco Rail as a state-of-the-art highly successful control system. The system's ruggedness, speed, simplicity, and diagnostic capability meet the demanding controls requirements of today's and tomorrow's railway maintenance equipment.

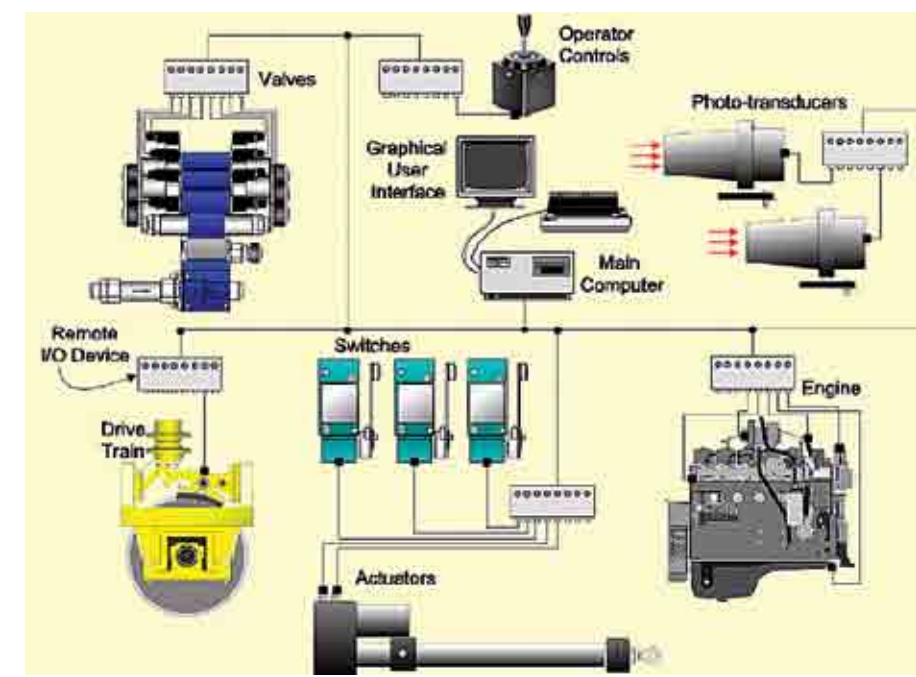
## Features

- Control Area Network (CAN) industrial communication scheme to communicated with full-intelligence I/O modules
- Modules are placed in strategically close proximity to the devices with which they interact
- Designed for exposure to harsh environmental conditions
- Fully potted to provide a high degree of vibration tolerance that allows direct mounting to almost any part of the machine
- Rail grinder modules are often directly mounted to the grinding carriages

Jupiter II goes beyond other distributed I/O systems by genuinely distributing application intelligence and processing to the nodes of its control network that completely sidesteps issues of network bandwidth. This capability

also enables application aware fallback functionality that provides an unprecedented level of reliability and fault tolerance. All of this is provided while maintaining complete interchangeability of a small set of component parts with plug and play operation. The fully scalable nature of Jupiter II makes

it possible to apply this powerful system to the largest and smallest of a wide range of products. This squarely aligns the performance of these products with one of Harsco Rail's greatest strengths: excellence in machine control software.



Jupiter II Control System uses remote I/O devices to simplify railway maintenance equipment's electrical control systems



Network Hardware



# Jupiter II Control System

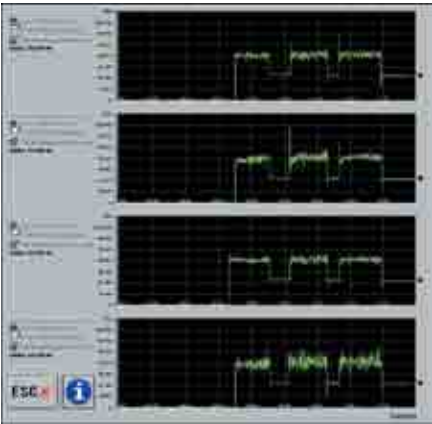
The “plug and play” capability of Jupiter II allows modules to be replaced or exchanged between completely different machines with ease. Installation of a new or moved module results in automatic network addressing and installation of module software at the press of a button. The majority of devices that connect to the Jupiter II system incorporate connectors to facilitate rapid field replacement. Many of the cables in the system are identical and vary only in length. Therefore, only a few spare cables (equal in length to the longest in actual use) need be carried to make it possible to replace any cable on a machine.

### The Jupiter II system:

- Combines digital input and output control into a common module type, resulting in only a digital I/O and an analog input as the 2 basic module types for most I/O
- Provides all module connectivity through easy to use and inexpensive M12 quick-disconnects
- Includes high-performance capabilities such as high-frequency digital output PWM, high-speed digital input collection rates, and analog input channel conversion rates, and intelligent modules capable of autonomous operation
- Is compact and scalable, resulting in convenient module placement on machines and commonality across Harsco Rail equipment
- Features industry-leading, on-board and in-office diagnostic, and data-logging capabilities
- Help screens in various languages available



Module Diagnostics Detail View Digital Module shown

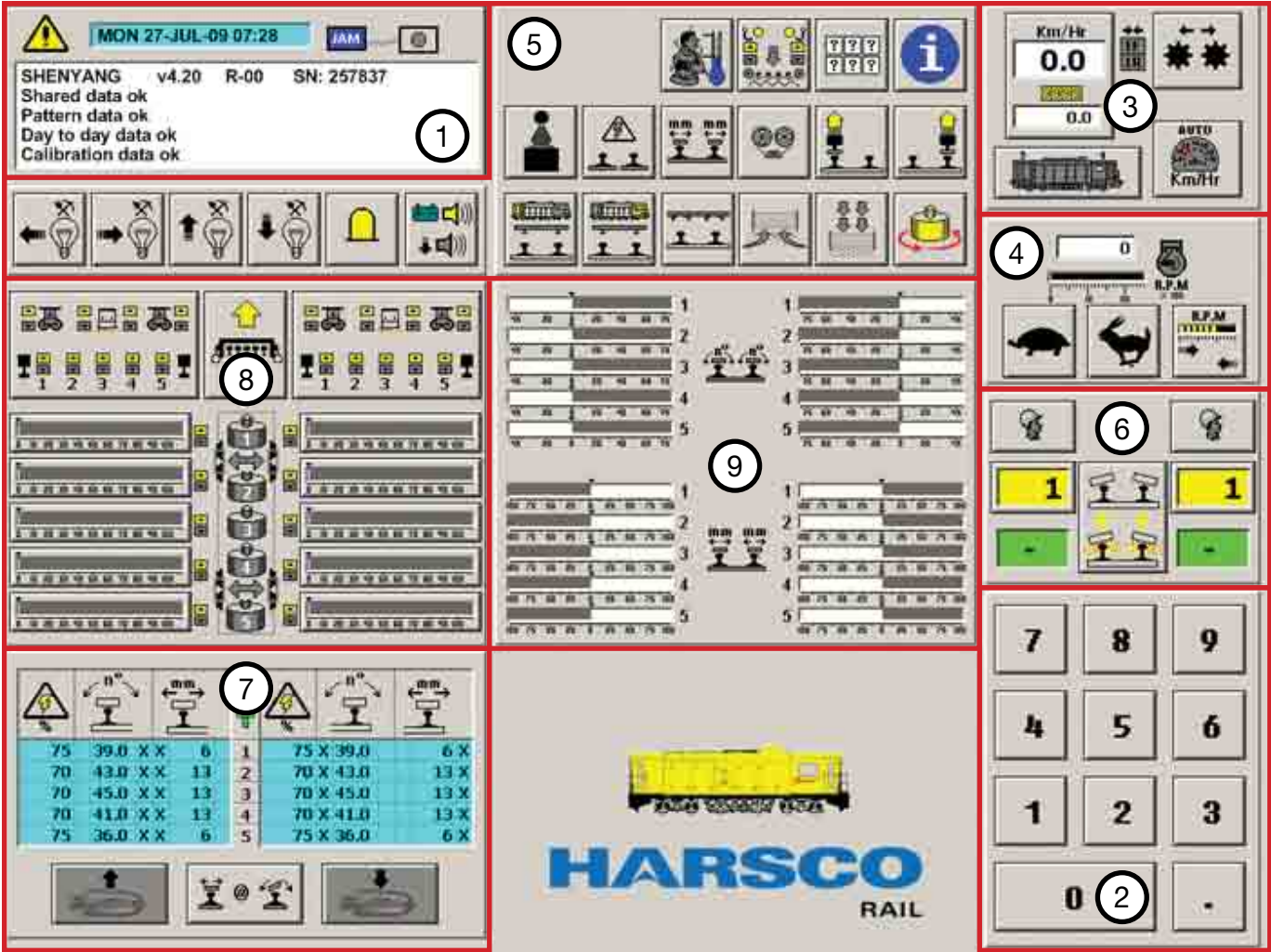


Advanced Diagnostics

### Diagnostic Graphing Feature

- Ability to simultaneously monitor any of the I/O channels on the machine (up to four at a time)
- Adjustable graph axes
- Ability to display anywhere between the previous 3 minutes to the previous 3 hours of data for a selected channel
- Numerous channel properties can be viewed in terms of engineering units (as opposed to raw signals)
- All network message data can be logged, retrieved, and viewed for analysis at a later date

Advanced module diagnostics provide the operator with an in-depth view of channel information, including voltage or current readings, channel active and error status, and hardware reference information. The screen also provides the ability to manually activate or deactivate output channels.



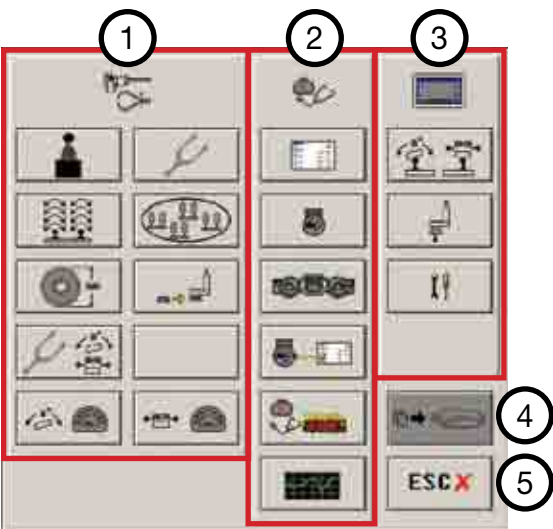
Main Screen - Cab Front

### The Main Screen on the Jupiter monitor of the front Cab displays the following:

1. Alarm Panel
2. Numeric Panel
3. Speed / Shift Panel
4. Engine Speed Panel
5. Tool Bar Buttons
6. Pattern Control Panel
7. Pattern Information Panel
8. Carriage Control Panel
9. Angle and Lateral Shift Information Panel

Note: The Panels are shown outlined in red on the Main Screen for identification only. The Grinding Heads on the panels are labeled #1 thru #5 from left to right and/or from top to bottom.

# Jupiter II Control System

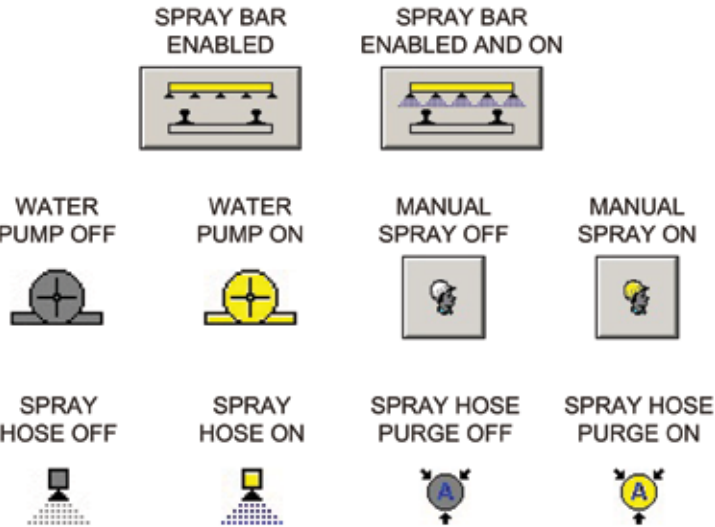
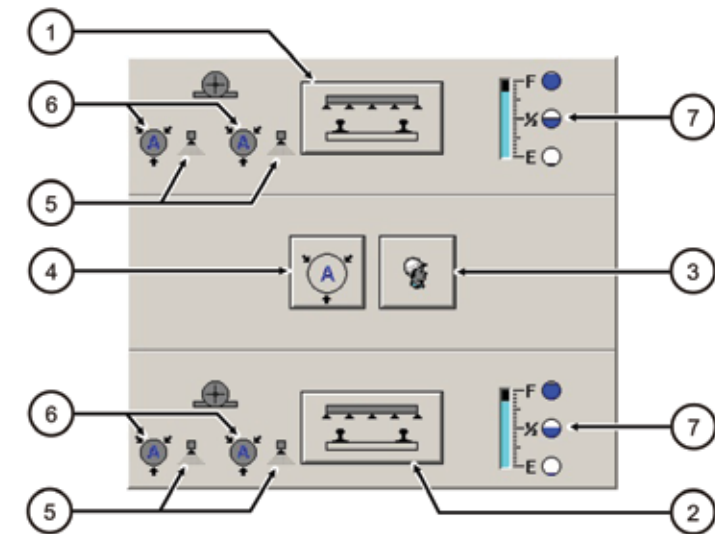


Miscellaneous Control Panel

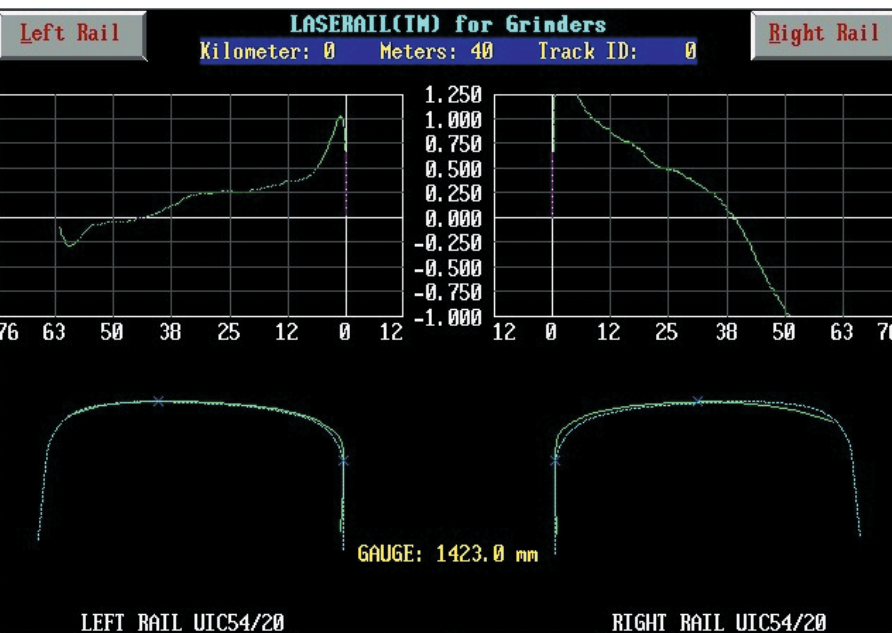
1. Calibration Sub-Panel
2. Diagnostic Sub-Panel
3. Q-Term Sub-Panel
4. File Transfer Button
5. Escape Button

Water Spray Control Panel

1. Forward End Spray Enable / Disable
2. Rearward End Spray Enable / Disable
3. Manual Spray Mode On / Off
4. Air Purge Button
5. Front / Rear and Left / Right Spray Hose Indicators
6. Front / Rear and Left / Right Spray Hose Purge Indicators
7. Water Level Indicators



# Laser Profile Measurement System

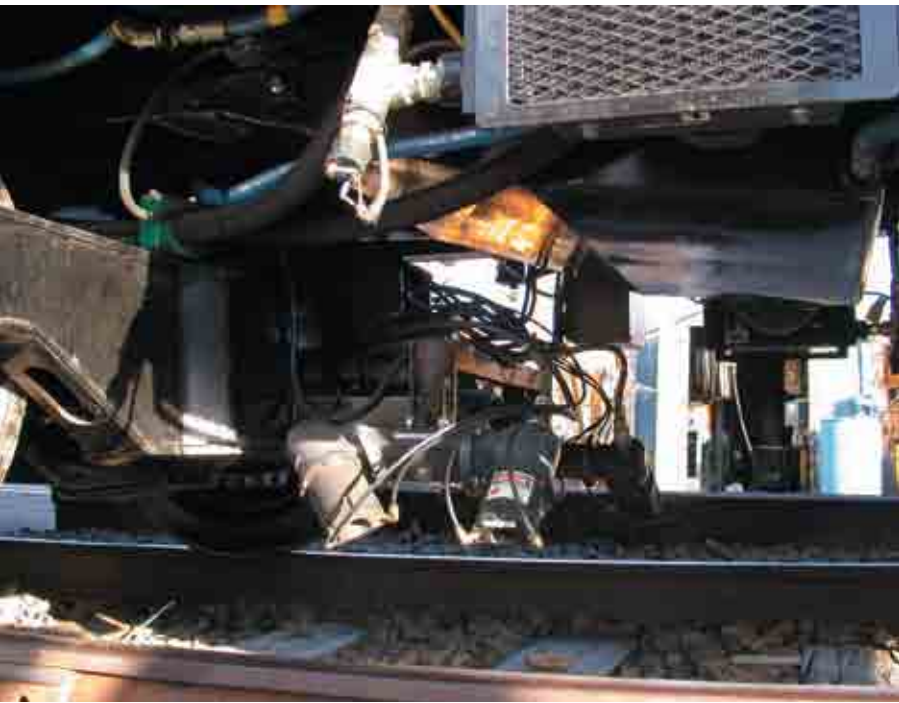


Features

- Laser-based system
- Accuracy  $\pm .1$  mm
- Measurements taken once per meter
- Top measurement speed: 18 km/h (11 mph)
- Provides real-time display of both left and right rail profiles plus track gauge
- Each profile generated with 600 data points storage of profiles for records and planning

The Laser Profile Measurement System (LPMS) is a rail cross section measuring device. Its function is to provide accurate and reliable measurement of rail profiles in real time. The system is designed to function on board a grinding train with minimum operator intervention. Difference between the standard reference profile and the measured rail head shape can be calculated from the profile data.

Also available: Corrugation Measurement



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**HARSCO**  
RAIL



AREMA



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