IMTRAM PTY. LTD.

ROLLING STOCK CONSULTING & EQUIPMENT SUPPLY

TECNOGAMMA
laser and vision systems

WheelCheck: Wheel profile and wear measurement system.

The train wheels and interaction with rail represent a key factor of the risk, so it's necessary to detect with high accuracy and frequency the different parameters of the wheels, and in particular the contact profile.

After years of research and consultation with engineers and maintenance professionals in China and Europe, TECNOGAMMA has developed the worlds leading wheel measurement technology. Some key factors associated with the development w ere; Operational Safety, Accuracy, Reliability, and Maintainability.

TECNOGAMMA engineering has studied and determined that wheel system installations under the track would be hazardous and unsafe, so an alternative configuration was developed to eliminate the need to alter track infrastructure and ensure safe operations. This unique design provides quick installations without interfering with railway operations. The installation and configuration of the system make maintenance operations simple and safe.

Example of Installation

The system has been designed to be installed in an existing structure or it can be connected to sleepers in case of installation on the ballast without modifications to the line. It can be installed in any kind of railway line and it is compatible with any kind of rolling stock. Camera and laser boxes can be easily removed from trackside and examined away from the track, and in a safe environment.

IMTRAM PT Y. LTD.
ABN 16 006 830 119

OFFICE LOCATION:
37 Bond Street
Ringwood, Victoria
3134, Australia

MAILING ADDRESS:
P.O. Box 4460
Ringwood, Victoria
3134, Australia

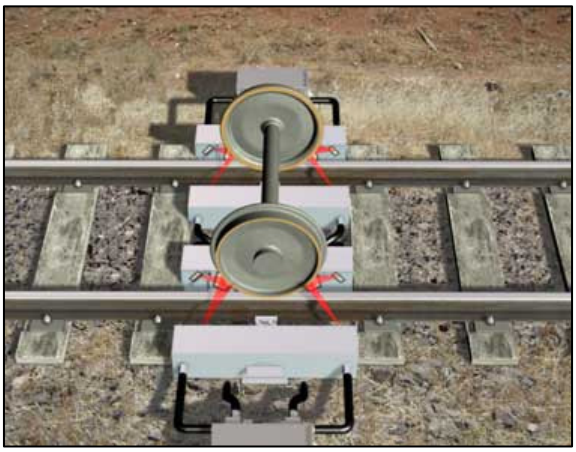
Telephone: +613 9879 5200
Facsimile: +613 9879 5250
Email: imtram@imtram.com
Web: www.imtram.com

Example of Installation

System Configuration

The WheelCheck© system is composed of:

- Detection System
- Processing System



Measurement Speed	
Standard system	up to 20 Km/h
High speed system	up to 120 Km/h
Measurement Accuracy	
Wheel Profile	± 0.2 mm
Wheel wear	± 0.2 mm
Wheel diameter	± 0.4 mm
Flange thickness	± 0.2 mm
Flange height	± 0.2 mm
Back-to-back distance	± 0.4 mm
Wheel selected quotes	± 0.4 mm

Main Features

The system detects the following parameters:

- Wheel full profile and wear
- Wheel diameters
- Height and thickness of the flange
- Back-to-back distance
- Wheel selected quotes
- Wheel inclination
- Equivalent conicity

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WCMS : Wayside condition monitoring system.

Tecnogamma WCMS is capable to monitor rolling stock parameters on daily basis in automatic mode, without human intervention, so that unusual values can be detected and alarms sent to the maintainer and the signalling control posts.

The proposed WCMS is a modular system. It can be easily integrated with other (future) measurement systems to support further requirements.

The key features of Tecnogamma WCMS are:

- Proven Technology
- High accuracy and measurement repeatability
- Simple installation
- Robustness and System Reliability
- Mechanical Design

The TECNOGAMMA WCMS system, installed along the transit railway line, allows the checking of any type of trainset at transit speed, including:

- Locomotives
- Passenger coaches
- Freight wagons
- Composite trainsets

By detecting the following parameters for each train:

- Train speed
- Hot Axle Bearings
- Flat spots and Out-of-round Wheels
- Load unbalance (within axis and bogies)
- Train Profile Clearance at given sampling intervals
- Trains exceeding the given clearance gauge
- Wheel full profile and wear
- Wheel diameters
- Height and thickness of the flange
- Any other wheel geometry quotes
- Brakes pad wear
- Train critical temperatures

Wheel Monitoring and Brake Pad Wear Measurement

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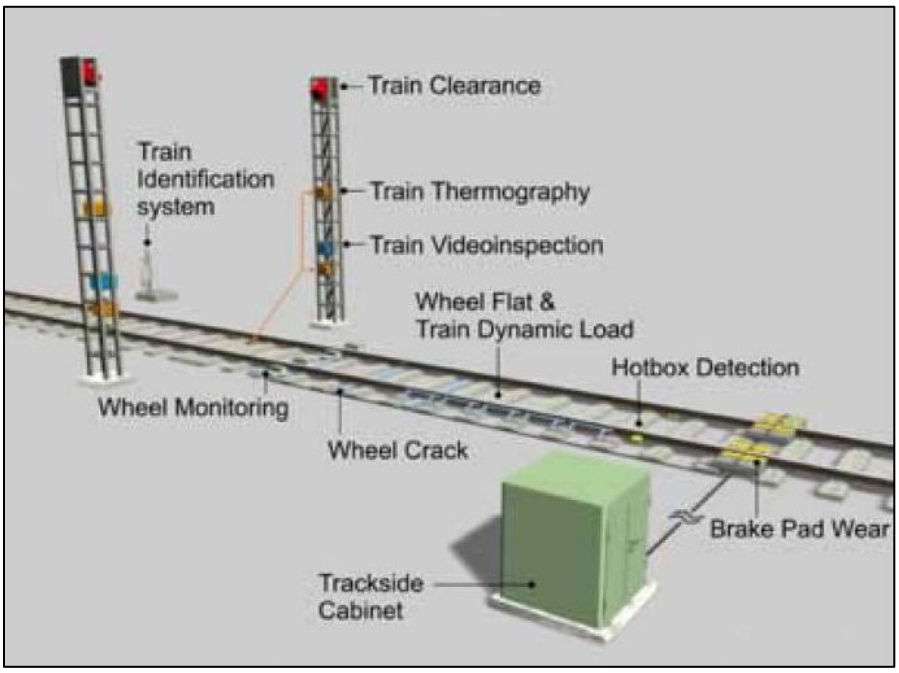
As indicated in the following picture, the base WCMS system is composed by the following subsystems:

- Automatic Train Identification Module
- Hot Axle Bearing Detection Module
- Flat and Out-of-round Wheel Detection Module
- Clearance Gauge Checking System
- Wheel Profile and Diameter Measurement Module
- Train Video Inspection
- Thermography
- Wheel ultrasound system (EMAT)
- Brake pad measurement system

Hotbox Detection



Safety Gate

Processing features:

- The Real Time Acquisition and Processing.
- Data Storing and Post Processing.
- Automatic comparison of measured values with theoretical values, or to previous acquisitions.
- Integration with Line Video Inspection System for the complete vehicle check.

Rolling stock static and dynamic load measurement system

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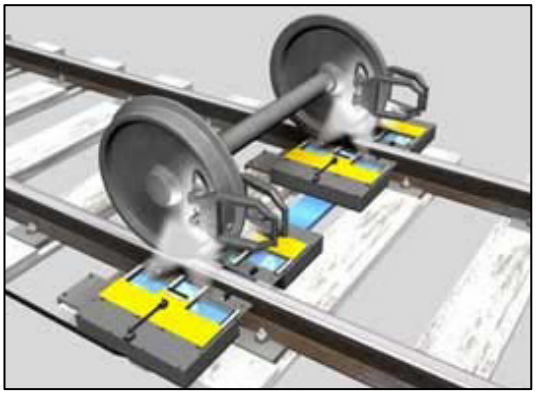
BrakesCheck : Brake pad wear monitoring system

The constant increase of the traffic and of transit speed of railway vehicles and the higher and higher safety standards impose a constant and accurate control of the various factors of risk.

The railway wheel and in particular the brake and its interaction with the wheel represents a decisive factor in the sphere of safety and quality of railway transport. There is the necessity to check systematically the decisive factors of risk and especially the brake status.

The purpose of the equipment is to provide a check gate to detect brake pad wear of trains when they are in their way or returning back to the depot. Parameter to be detected for each brake pad is:

- **Brake Pad Thickness**



Brake Pad Thickness is detected by contact-less technology in a single measurement step.

The analysis of the measured parameter and its comparison to defined tolerances thresholds allows understanding of the status of the running vehicles, and provides the base information to run an appropriate maintenance plan, to maintain vehicles within appropriate quality standards.

Brake Pad Wear Monitoring system (BWM) has been designed for monitoring brake pad wear of a vehicle on in the way or when returning to the depot.

It is capable to monitor brake pad wear on a daily basis, without human intervention, so that unusual wear can be detected and an alarm is sent to the maintainer.
The overall measurement system is mainly composed by:

- Detection System
- Processing System

Detection System is normally installed on the sleeper under rails while processing system is located in a trackside cabinet. Remote processing system can be installed in a remote location for post processing Brake Pad Wear Monitoring System.

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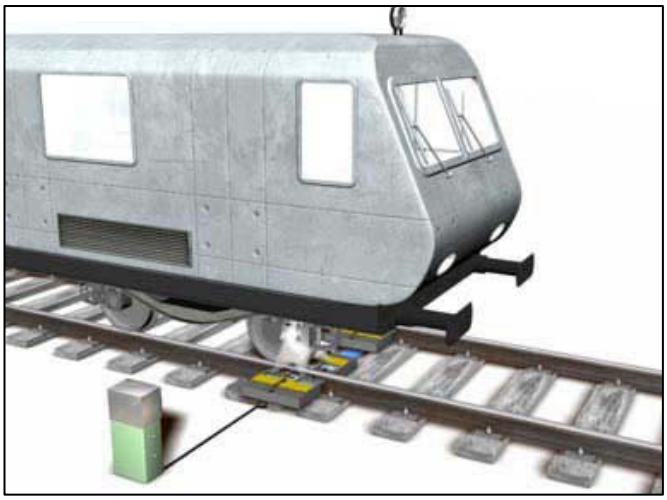
This figure shows a typical application:

View of the complete BWM Brake Pad Wear Monitoring System.

The BWM is designed for operation in outdoor environment.

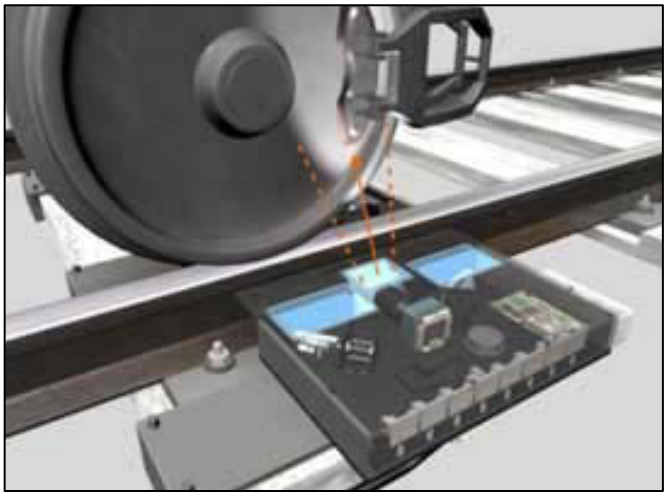


Measurements Concept

The detection of brake pad wear is performed by means of the optical digital acquisitions.

A special camera installed on the side of the rail looks at the Brake and Pad subsets to detect images of them.

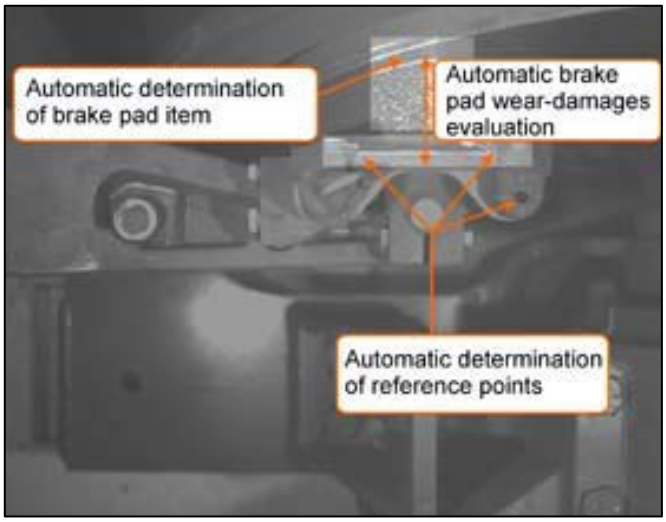
This figure shows the details of the camera system is used to detect the image of the brake.



The configuration of the measurement system is dependent to the brakes typology.
It is composed by:

- Two measurement heads on the two sides of the rail (4 in the total) for disk brakes
- Two measurement heads at the two lateral sides of the track (2 in total) for pad brakes

Each measurement heads is composed by camera and light.



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