

Mining Business Explanatory Meeting

August 31, 2018

HITACHI

Reliable solutions



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Ⓢ Hitachi Construction Machinery Co., Ltd.

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Mining Business Explanatory Meeting

Contents

- ▶ 1. HCM Mining Business
- 2. Efforts Related to Mining Products
- 3. Expanding the Solution Business and the Parts and Services System

History of HCM (1910-1987)

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1910
Establishment
of Hitachi, Ltd.



Founder
Namihei
Odaira

1949
Development of U05, the first
cable-operated excavator model
1950- Start of mass production

1957
Development of U106
cable-operated excavator

Development of Japan's first electric motor
(5 horsepower)



1965
Development of UH03
model, the first
hydraulic excavator
developed using
Japanese technology

1970
Establishment of Hitachi
Construction Machinery
Co., Ltd.

1979
Development of UH801
ultra-large hydraulic
excavator (for US market)

1987
Development of
EX3500 ultra-large
hydraulic excavator



* Separation from
Construction Machinery
Division of Hitachi, Ltd.



History of HCM (1989 and later)

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1989

Listed in First
Section of Tokyo
Stock Exchange



1998

Acquisition of controlling
interest in Euclid-Hitachi Heavy
Equipment, Inc.



2004

Development of EX8000,
one of the world's
largest hydraulic
excavators



2008

Completed construction
of Hitachinaka-Rinko
Works



2008

Development and launch
of EH3500ACII rigid
dump truck
manufactured in Japan



2009

Acquisition of Wenco
International Mining Systems
Ltd.



2013

Development of
EH5000AC-3 rigid
dump truck
manufactured in Japan



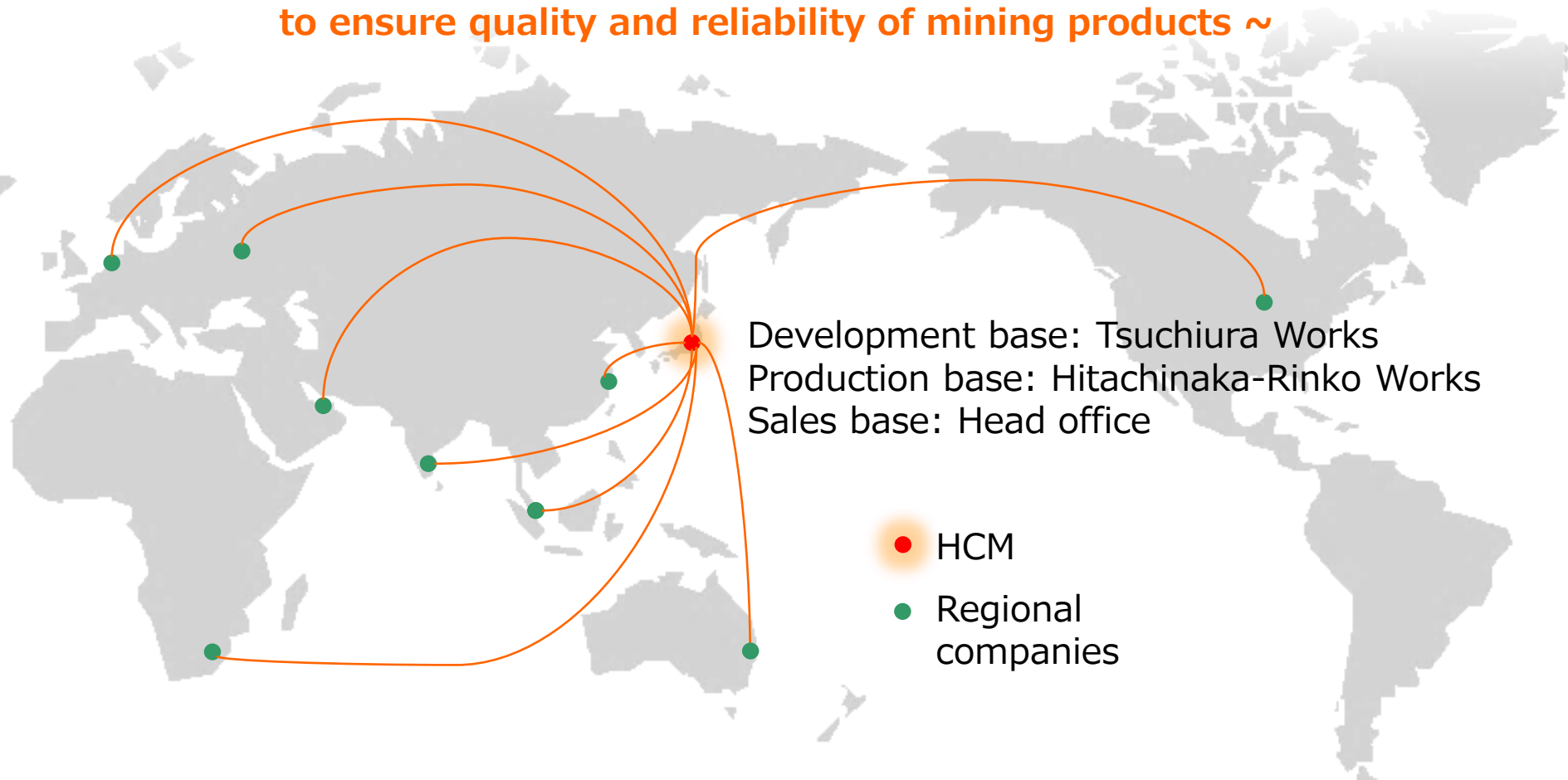
2016-2017

Acquisition of Bradken
and
H-E Parts



Development and production are concentrated in Japan, and sales and services are conducted from bases in each region around the world

~ Development and production are performed concurrently to ensure quality and reliability of mining products ~



AC drive control



AC drive system



Trolley system

Information and communications



GPS system



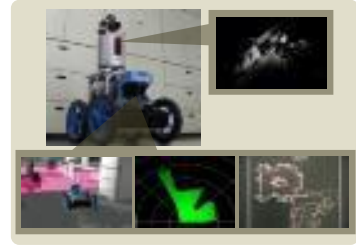
Wireless telecommunications



Ultra-large Hydraulic Excavators and rigid dump trucks



Fleet management



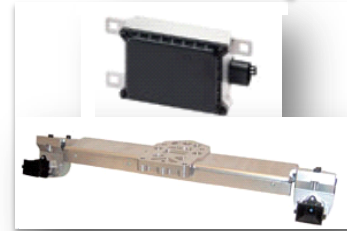
3D modeling/mapping



Traffic management



Autonomous haulage



Object detection



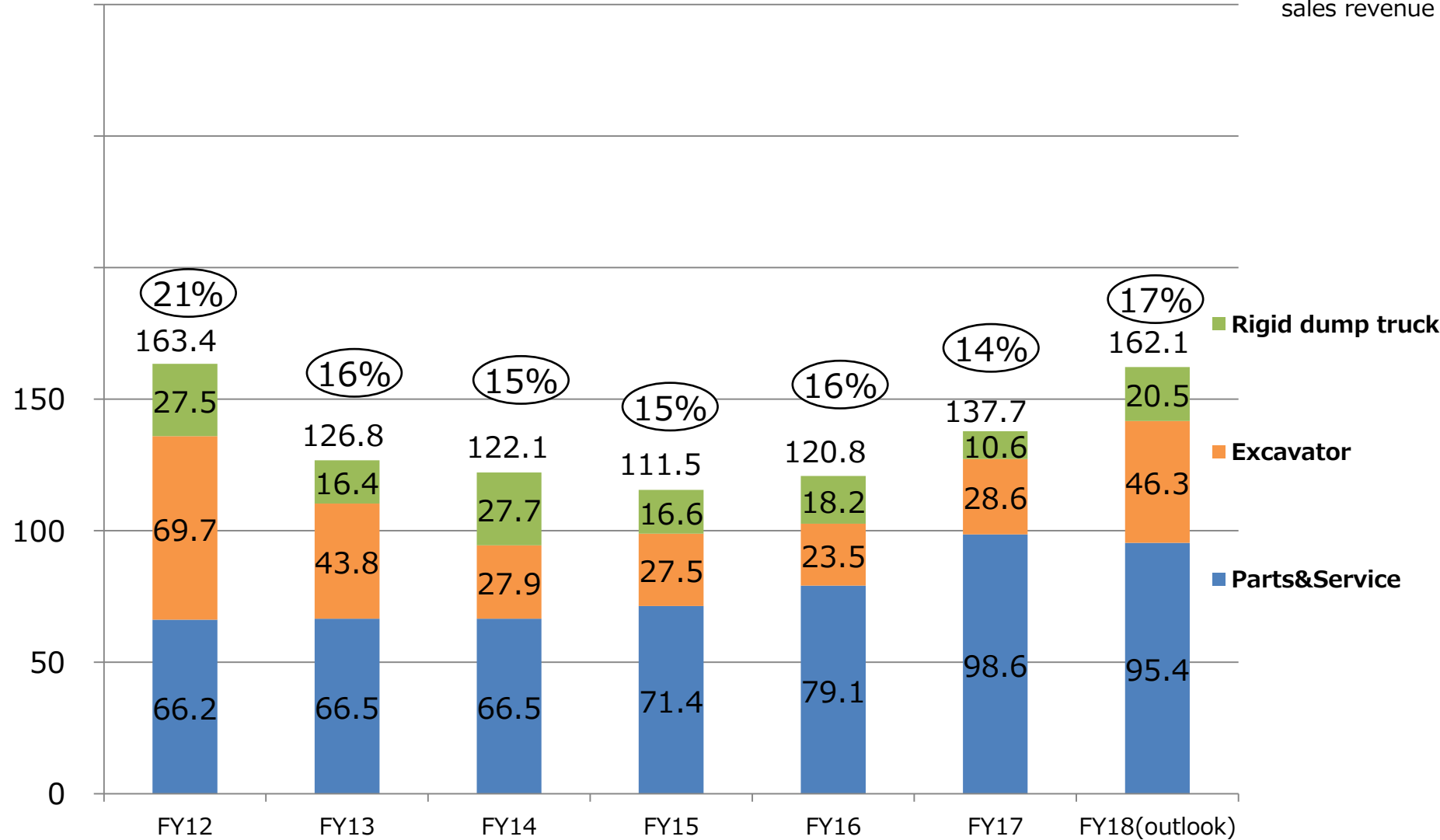
Image processing

Remote operation/management

Detection/image processing

(Unit: billion yen)

Ⓢ Percentage of total company sales revenue



Mining Business Sales Revenue ⁸ (Including Solution Business)

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(Unit: billion yen)

100

0

150

100

50

0

FY12

FY13

FY14

FY15

FY16

FY17

FY18(outlook)

17%
Total: 127.5

24%
230.0

27%
256.8

% Percentage of total company sales revenue

Solution Business
(Bradken, H-E Parts)

Rigid dump truck

Excavator

Parts&Service

21%

163.4

27.5

69.7

66.2

16%

126.8

16.4

43.8

66.5

15%

122.1

27.7

27.9

66.5

15%

111.5

16.6

27.5

71.4

16%

120.8

18.2

23.5

79.1

14%

137.7

10.6

28.6

98.6

17%

162.1

20.5

46.3

95.4

6.7

92.3

94.7

Products

Strive to strengthen hydraulic excavators and utilize the collective power of Hitachi Group for rigid dump trucks

Develop ultra-large hydraulic excavators

Expand sales of AC rigid dump trucks

Differentiate trolleys

ICT application

Resolve customer issues

Commercialize autonomous haulage system (AHS) technology

Enhance FMS
- Wenco -

Value chain

Embrace challenge to enter new business areas

Solution business
- Bradken and H-E Parts -

Strengthen the parts and services business

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Ultra-large hydraulic excavators that boast top-class share in world market



120 to 180 ton class

EX1200 EX1900 EX2600

EX3600 EX5600 EX8000



High operational performance

- ✓ Operation monitoring
- ✓ Workload monitoring

High operation rate

- ✓ Improved reliability/durability
- ✓ Improved maintenance ability
- ✓ Failure prediction

Optimal maintenance

- ✓ Thorough services and support
- ✓ Failure prediction
- ✓ Operation data sharing

Ultra-large Hydraulic Excavators (Efforts for EX7 Next-generation Model)

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Maintaining the previously established high reliability while aiming for further evolution

~ Pursuing further "Customer Interest First" (CIF) through the EX7 model ~

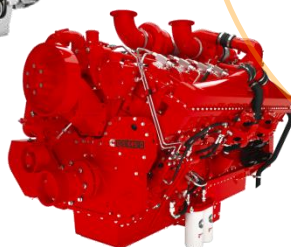
Fuel consumption reduction

EX7 fuel consumption is at least 10% lower than that of EX6

Engine selection (2 types of engines)



MTU



Cummins



Hitachi electric motor



Safety improvements



Inclinometer



Electric cut-off switch

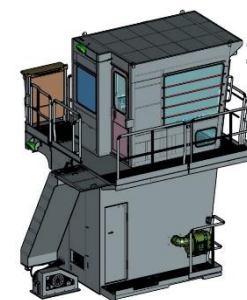


Escape chute

Reliability



Slit-less electric wiring



Dust entry prevention measures



Stroke end control

**ConSite OIL
is available
for EX7**

Development of next-generation machines and progress of rigid dump truck autonomous haulage system (AHS)

Control cabinet

Hitachi, Ltd. Research & Development Group
Electrical Systems Division

Trolley compatibility
Hitachi Power Solutions Co., Ltd.

Grid box

Hitachi, Ltd.
Electrical Systems Division

Alternator

Hitachi, Ltd.
Electrical Systems Division

AC wheel motor

Hitachi, Ltd.
Electrical Systems Division.

Features

- Excellent operational performance, high-efficiency cycle time, and lower maintenance costs
- Class-leading retarder (electric brake) performance



EH tuning package

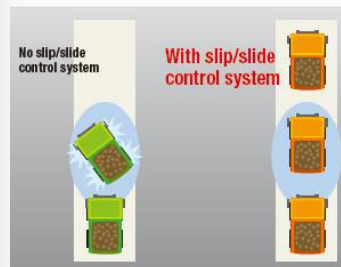
Reduce fuel consumption by tuning for each mine site



- ✓ Lower fuel consumption!
- ✓ Lower lifecycle costs!

Vehicle stability control

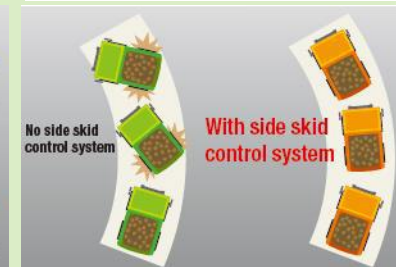
1. Slip/slide control



2. Pitch control



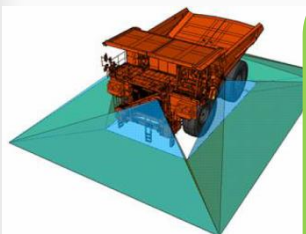
3. Side skid control



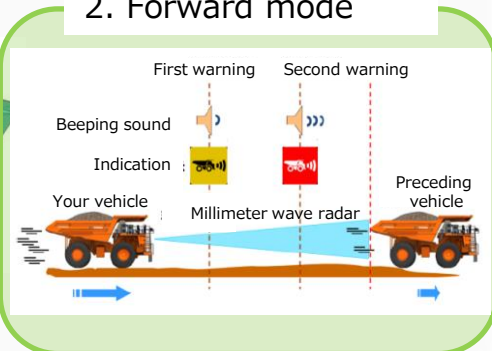
- ✓ Excellent control and stability!

Aerial Angle

1. Stationary mode



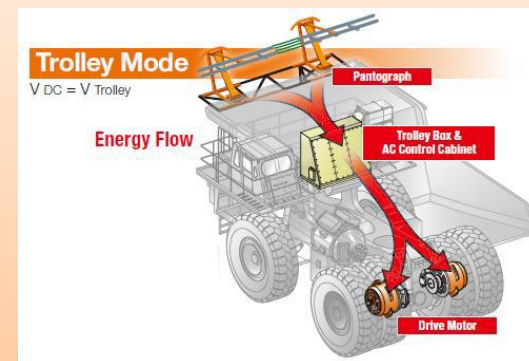
2. Forward mode



- ✓ Excellent safety!

Trolley

Industry-leading AC electric powered trolley equipped with IGBT inverter



- ✓ Higher productivity!
- ✓ Lower lifecycle costs!

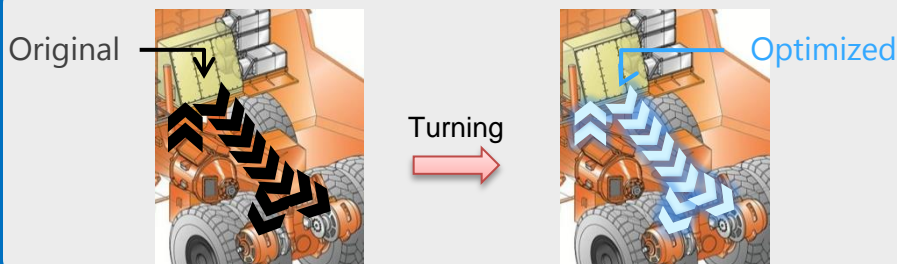
Unique technology for tuning AC drive and alternator power generation

Meet customer demands for **reduced lifecycle costs!**

Aiming to reduce fuel consumption by optimizing the machine settings based on an understanding of the operating conditions at each site

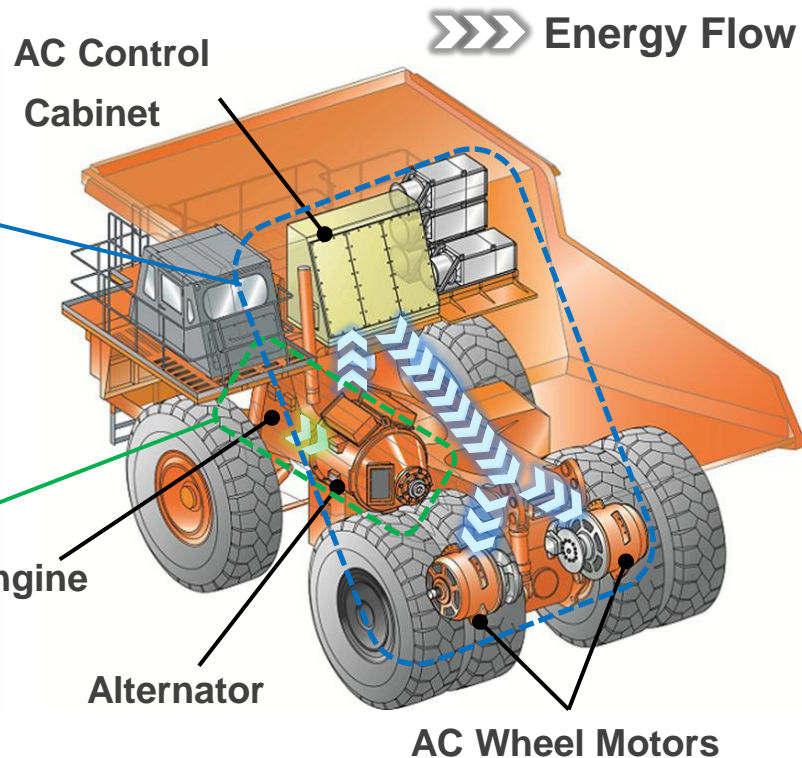
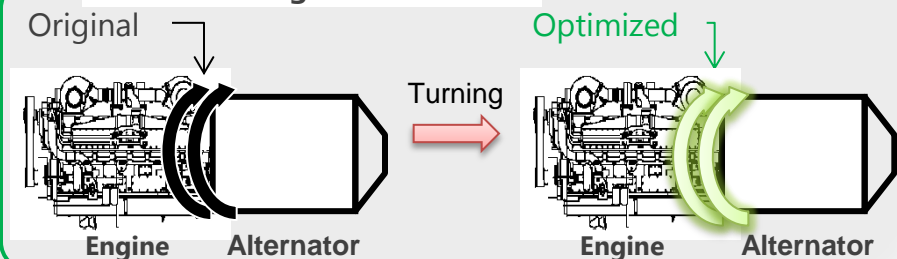
- ◆ Output characteristics of AC drive
→ Optimization of drive power, speed, etc.

Tuning results



- ◆ Output characteristics of alternator power generation
→ Optimization of engine speed and output

Tuning results

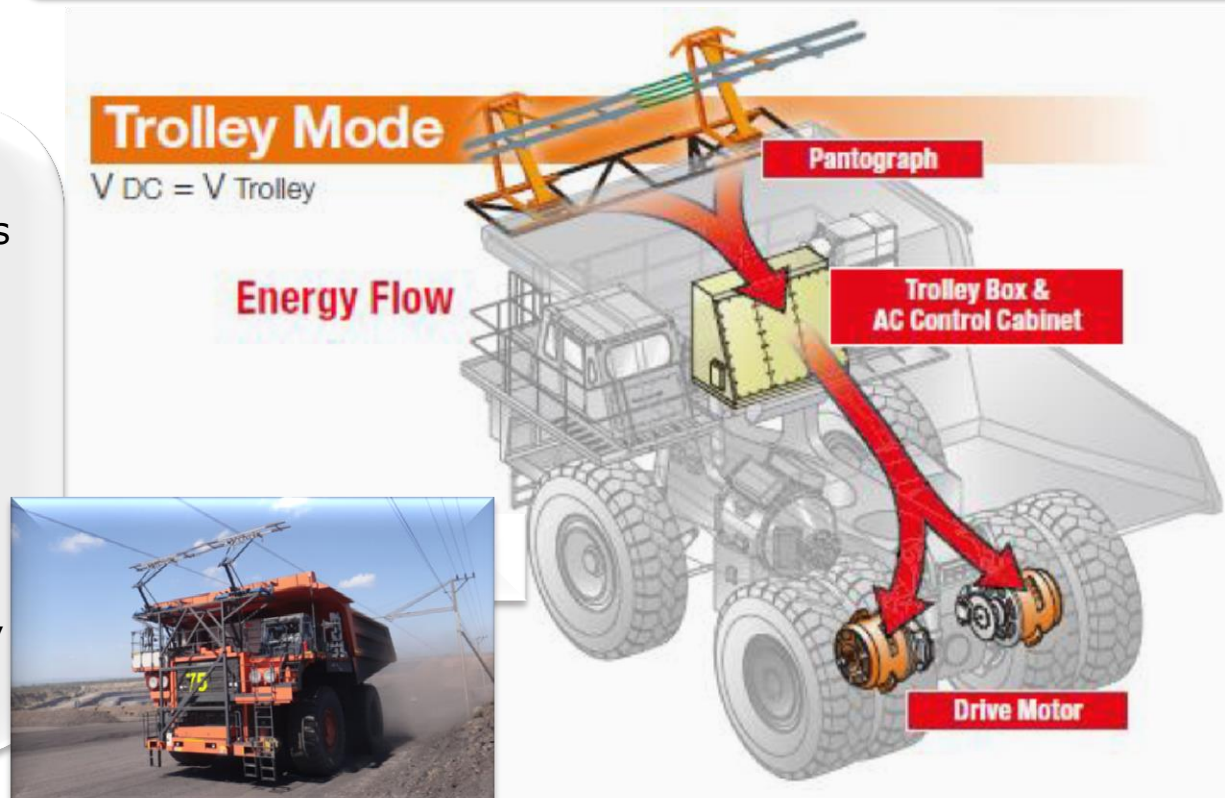


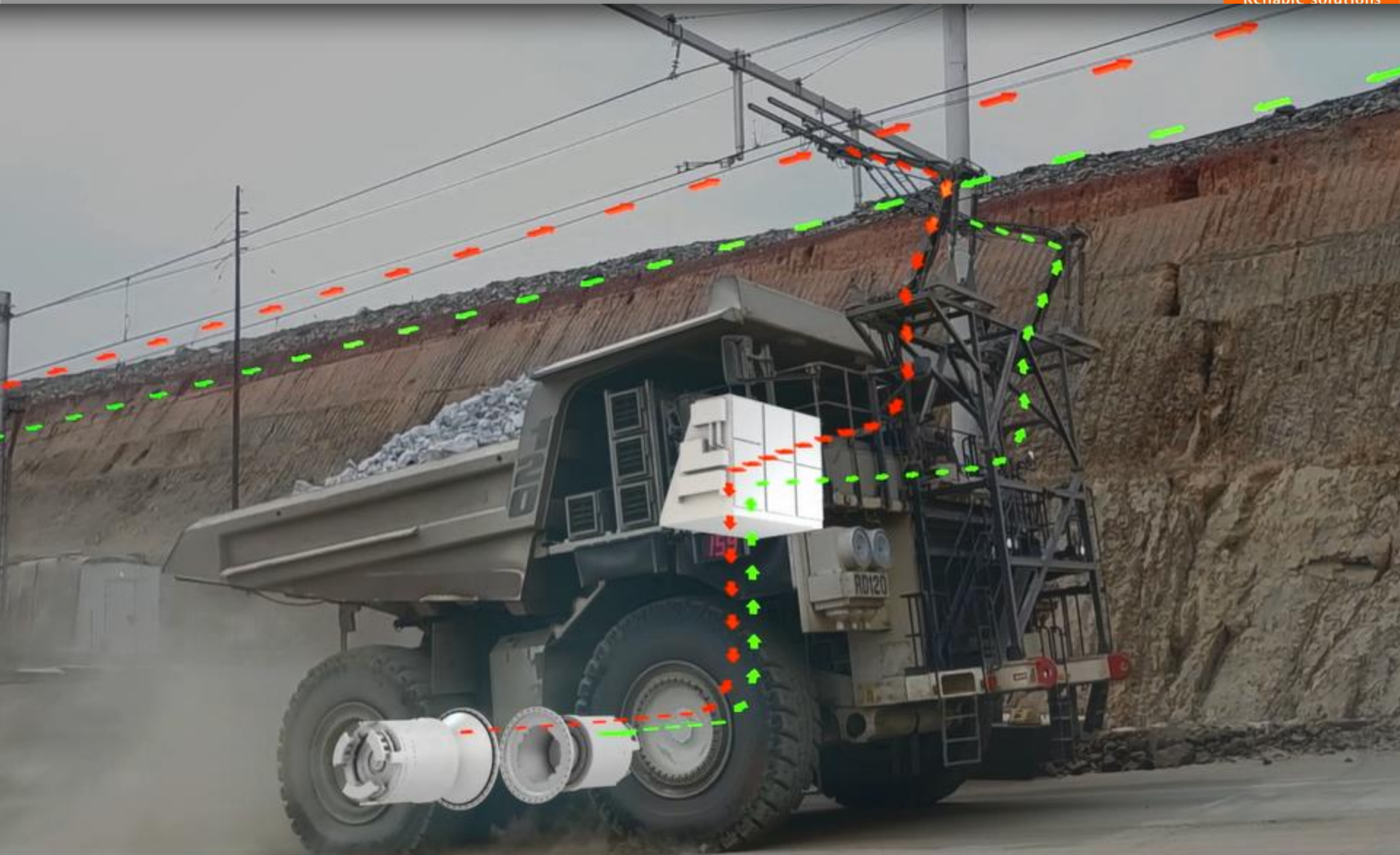
Industry-leading AC electric powered trolley equipped with IGBT inverter

Meet customer demands for **reduced lifecycle costs!**

Faster climbing and reduced fuel consumption contribute to higher productivity and lower CO₂ emissions

- ◆ Enables travel speeds that are approx. twice as fast as driving with engine and generator
- ◆ Hitachi's unique pantograph features a high level of durability
- ◆ **Completed series** of AC-3 models with trolley system compatibility



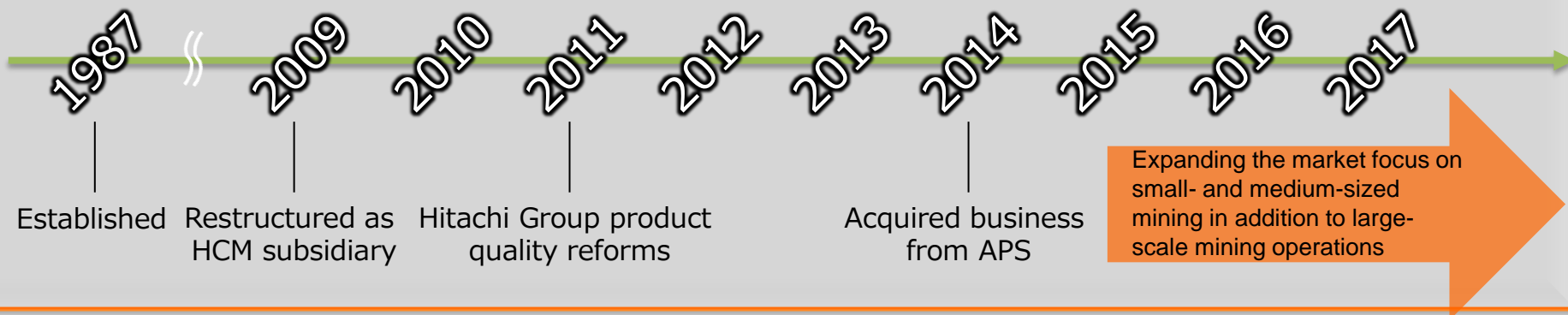


[Overview of Wenco]



Photo : Wenco Office Building
(Richmond, BC, Canada)

- 1987: Company established
- 2009: Restructured as subsidiary of HCM
- Track record of FMS implementation is in the top class of the industry
- Wenco FMS has been implemented at approximately 150 sites around the world, mainly in surface mining operations



[Products of Wenco]

Wencomine

<Features>

- System aimed at large-scale mining operations, designed to appropriately dispatch dump trucks on the scale of several tens of vehicles
- Facilities such as wireless network equipment must be installed at mining sites, so appropriate installation and maintenance costs are required

<Key points>

- Currently in operation at large-scale mines around the world (such as Australia, Canada, and South Africa)
- Ranked 2nd in world in terms of number of systems in operation (according to research by Wenco)

Wencolite

<Features>

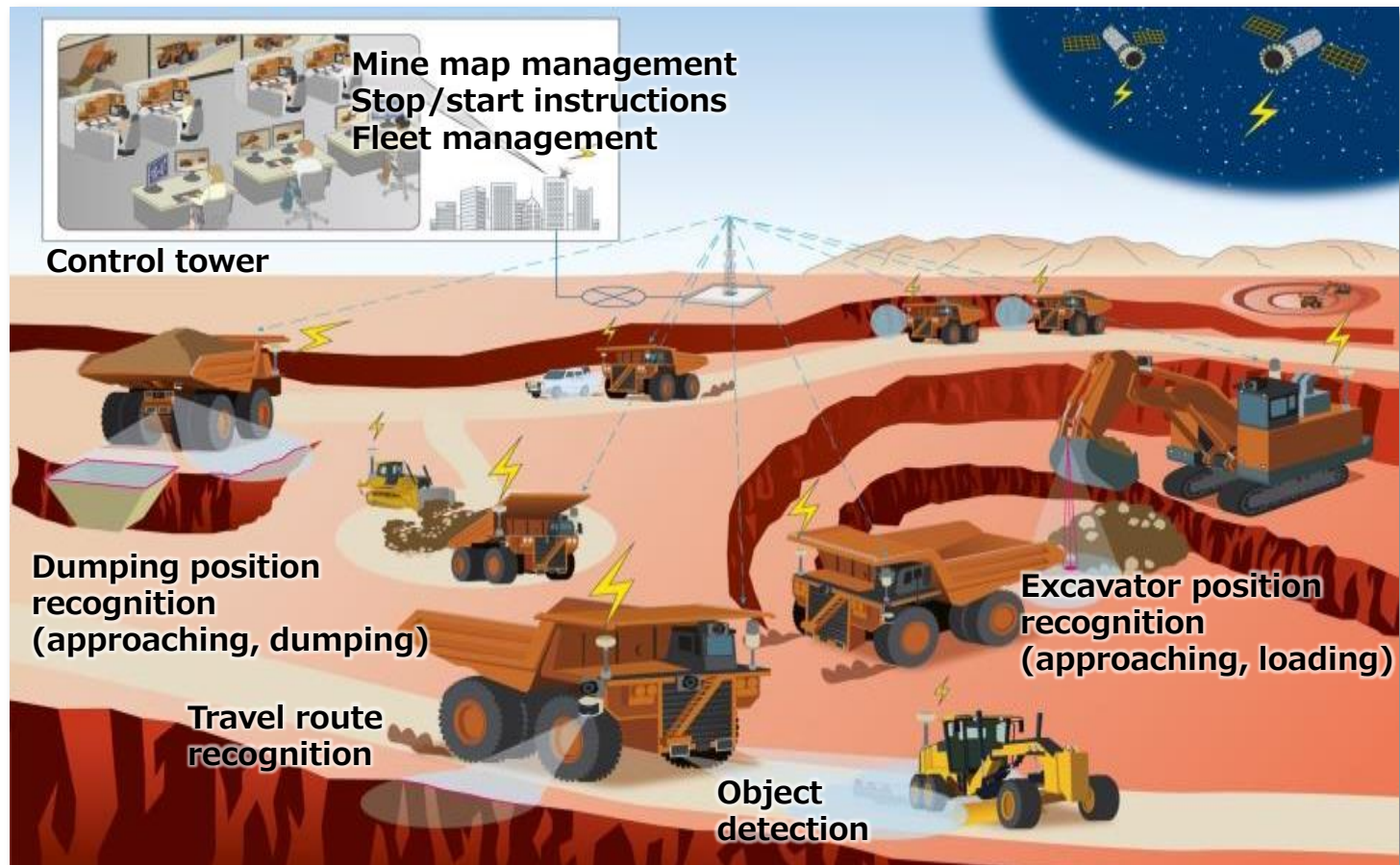
- System developed for relatively small-scale mining operations, with limited functions such as vehicle asset management
- Provides capabilities such as operational support for vehicle operators, transmission of information from vehicles to the control room, and communication between vehicles
- Installation and maintenance costs are lower than those of Wencomine

<Key points>

- Currently in operation at small- and medium-sized mines, construction sites, etc. around the world (such as in Australia, USA, and Russia)

AHS = Autonomous Haulage System

System that contributes to safety, productivity, and cost optimization by enabling rigid dump trucks to perform autonomous haulage at mining sites according to specified plan

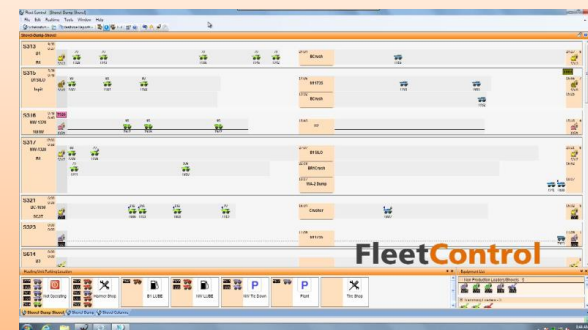


Advanced Wenco FMS functions serve as the basis for Hitachi AHS

Fleet management system/Dispatch system



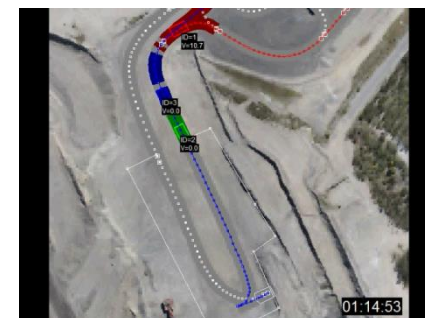
- Rigid dump truck dispatch system
- Automatic and manual dispatch enables maximization of productivity



Traffic control system



- Link to FMS
- Specify travel intervals for rigid dump trucks
- Manage multiple loading & dumping points



Rigid dump truck autonomous haulage system



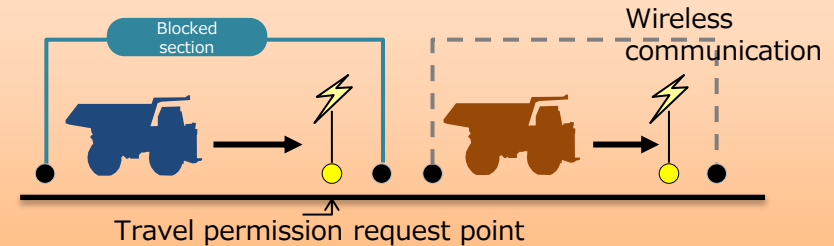
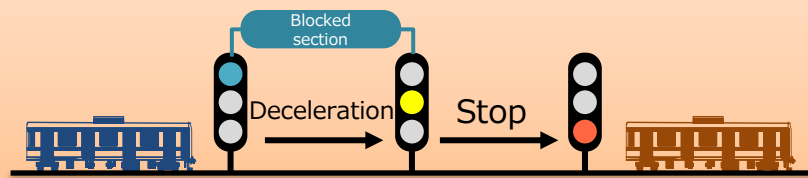
- Use traffic control system instructions
- Perform autonomous position detection
- Recognize surrounding environment
- Travel autonomously within intervals, even if wireless communications are interrupted



Hitachi AHS development concept

Scalability

Hitachi's railway traffic management system keeps data traffic per unit under control and can handle about a hundred fleets



Flexibility

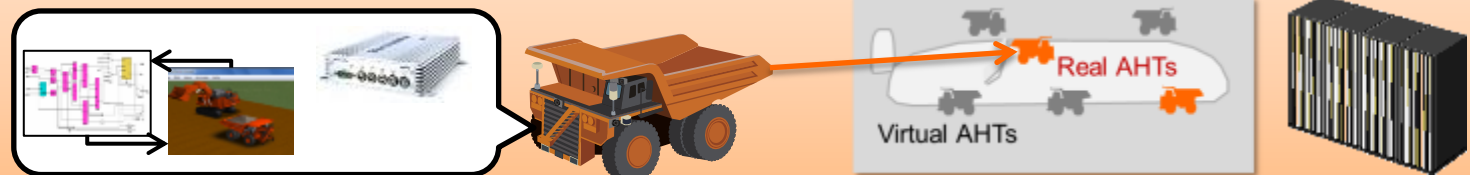
Rigid dump trucks equipped with Hitachi's automobile electric control technology and AC motor control technology can be converted into AHS model after delivery



AHS Add on

Agility

Realized fast system improvement meeting customers' needs due to state-of-the-art model-based development and simulation technology



Progress toward commercialization of Hitachi AHS

2017

Testing of completely driverless operations at Australia test site



June 2018

Conclusion of agreement between Whitehaven Coal (WHC) and HCM regarding AHS collaboration and implementation



During FY2018

Start of WHC testing operations (planned)



FY2019

Start of WHC commercial operations (planned)



<Topic>

AHS project room opened at WHC-Maules Creek Mine
(May 2018)

* HCM site staff began operations on same floor as WHC-AHS project, to strengthen the partnership

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Aiming to deepen the value chain of the mining business

Bradken

- ✓ 1922: Company established
- ✓ March 2017: Restructured as subsidiary of HCM
- ✓ Expanded to Australia, USA, Africa, Europe, Asia, China, and other areas
- ✓ **Main strength: Technical capabilities in molding and casting**

H-E Parts

- ✓ 2006: Company established
- ✓ December 2016: Restructured as subsidiary of HCM
- ✓ Expanded to Australia, USA, Chile, Canada, and other areas
- ✓ **Main strength: Comprehensive after-market solutions**

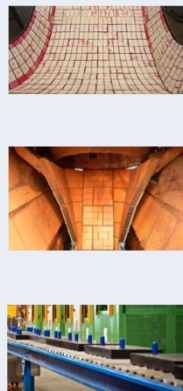
GET* , etc.



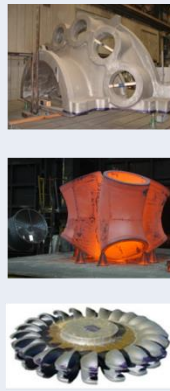
Liners for crushers and mills, etc.



Castings for fixed plant mining equipment, etc.



Specialty castings, etc.



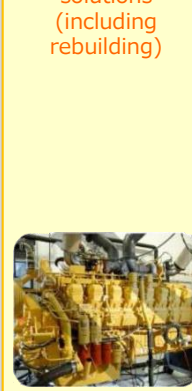
Comprehensive solutions for mobile mining equipment



Services & parts for crushing equipment as well as on-site and off-site services & repairs



Comprehensive, high-horsepower diesel engine remanufacturing solutions (including rebuilding)

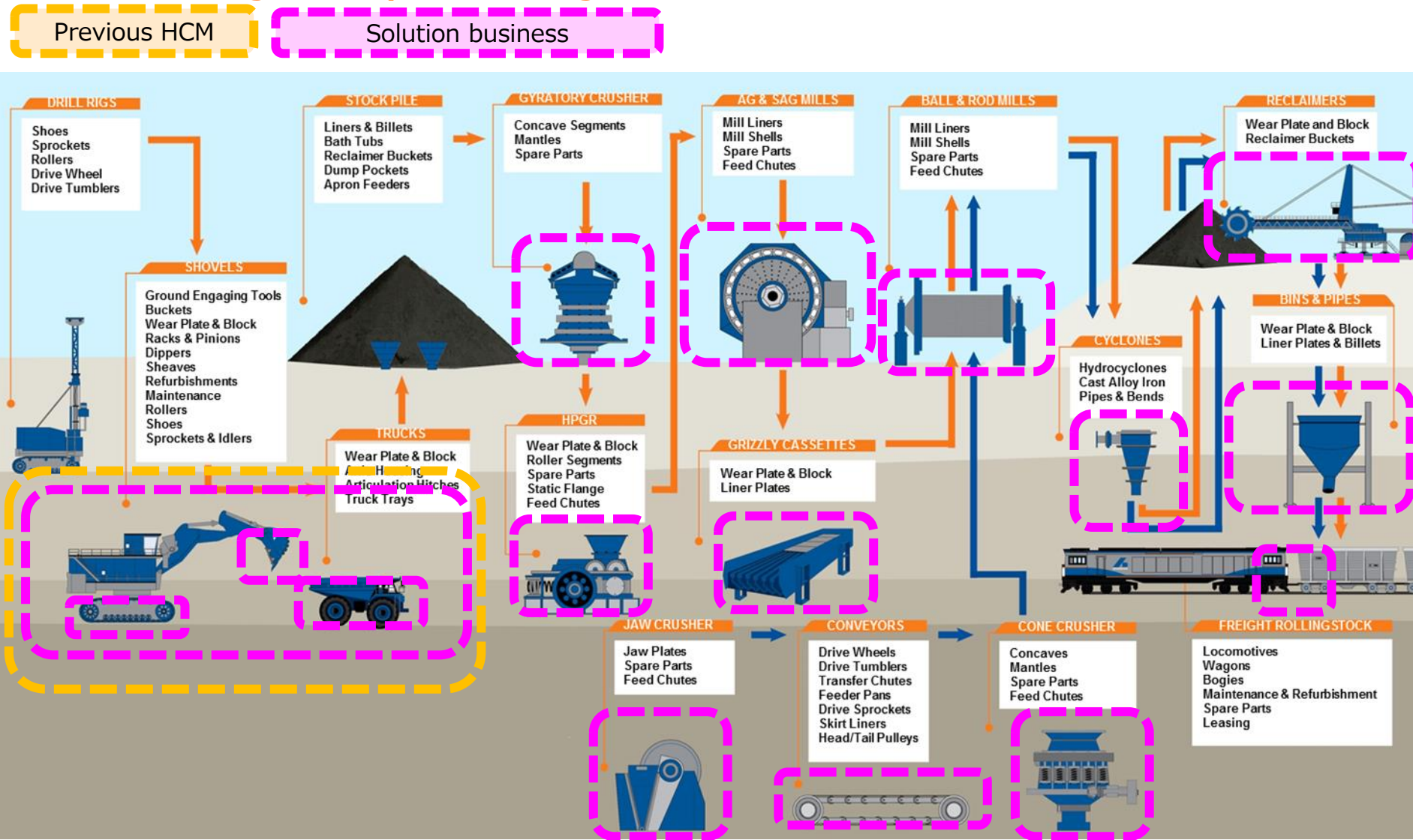


Comprehensive undercarriage parts and GET for mobile construction equipment



*Ground Engaging Tools

Coverage expanded to include consumable parts for excavators and rigid dump trucks in general, as well as mills and crushers

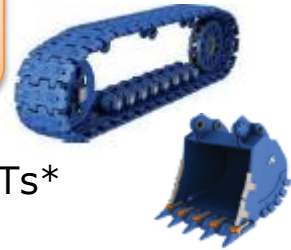


Expansion of solution business

- ✓ Incorporation of parts and services businesses to cover all machinery at customer sites
- ✓ Expansion of procurement system



- Expand sales channels by utilizing each other's networks
 - Expand sales of Bradken's undercarriage parts and GETs* for mining equipment (consumables)
 - Utilizing GETs for wheel loaders procured by Bradken

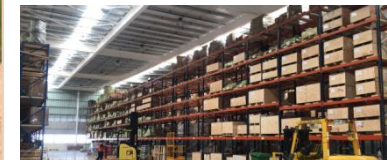


*Ground Engaging Tools

- Newly promote parts remanufacturing business of H-E Parts by collaborating with HCM Zambia



- Establish an operating base of parts remanufacturing business of H-E Parts in Chile



Expansion of parts and services system to reduce customer lifecycle costs

- ✓ Using machine information from each vehicle to determine optimal replacement periods and select items for recommendation
Building upon the results achieved in Australia to expand to other regions and provide parts and services
- ✓ System of setting up parts remanufacturing plants near customer sites to provide support
- ✓ Utilizing bases established by H-E Parts and Bradken



Aiming for further evolution of the mining business, 10 years after the full-scale launch of rigid dump truck sales

Quick and agile development and production

**Striving toward new heights in the pursuit of greater reliability for
hydraulic excavators**

**Taking the next step forward with implementation of AHS in rigid dump
trucks**

Aiming for further customer penetration through the expansion of new business areas

**Working toward the establishment of a value chain that provides optimal
solutions to customer issues**

[Explanatory note on this document]

This document contains information that corresponds to our company's "statements on the forecast for the future". The future expectations, plans, outlooks, etc. described in this document are those that the company has judged to be rational based on currently available information.

The actual situation may differ greatly from the forecasts, plans and outlooks described in this document due to changes in various factors. Such factors may include changes in economic conditions and demand for products in major markets, fluctuations in exchange rates, changes in domestic and overseas regulations, as well as in standards and practices of accounting.

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