

Komatsu's Growth Strategies

Special Feature 2: Value Creation Story

KOMATSU offers SMARTCONSTRUCTION in the USA and four countries in Europe.

(United Kingdom, Germany, France, and Denmark)

A video of the presentation by Rod Schrader, Chairman & CEO of Komatsu America Corp., at CONEXPO-CON/AGG 2020, a construction equipment tradeshow held in Las Vegas in March 2020, can be found below.

<https://www.youtube.com/watch?v=dd7oeh6MkCM&t=23s>



Rodney Schrader
Senior Executive Officer
Chairman & CEO,
Komatsu America Corp.

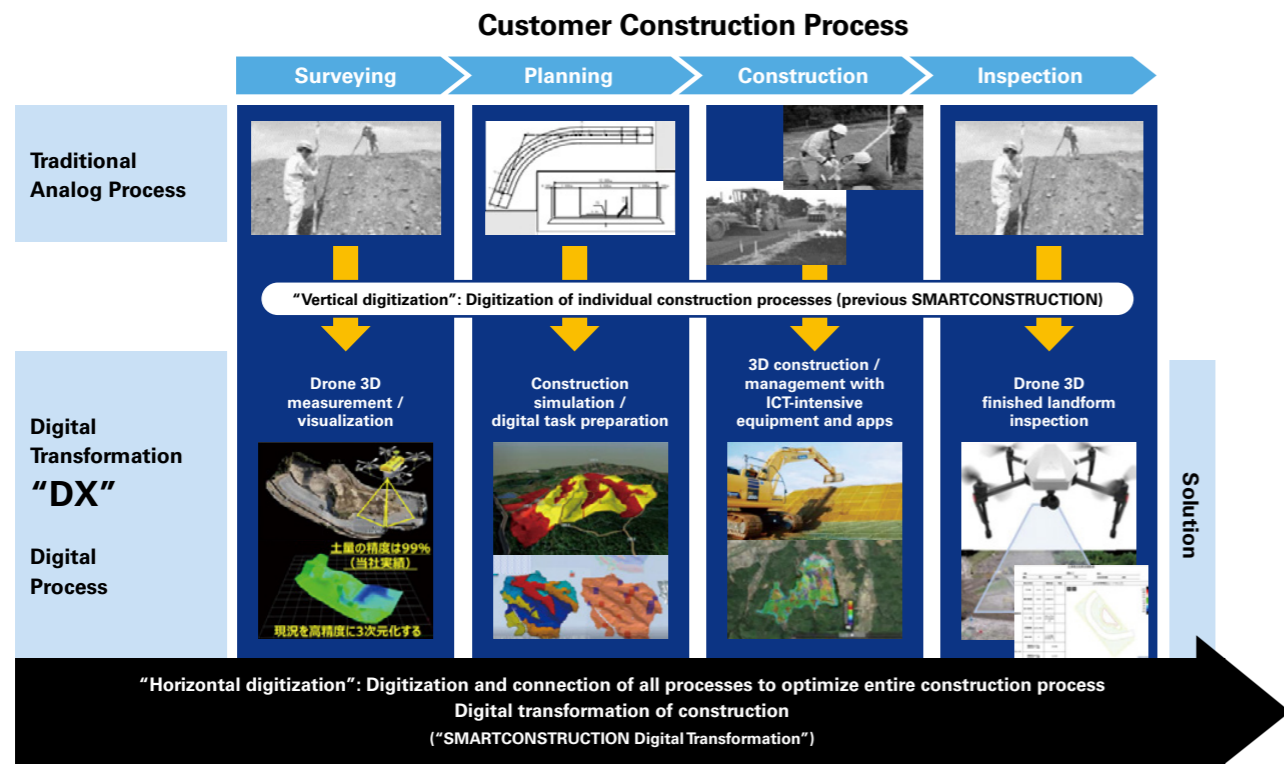
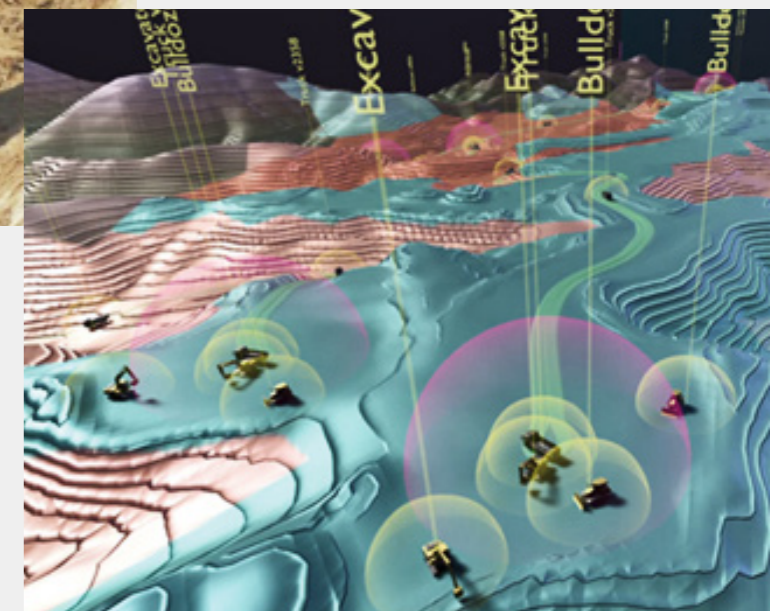
Realization of the Safe, Highly Productive, Smart, and Clean Workplaces of the Future

Launch of "SMARTCONSTRUCTION Digital Transformation"

Komatsu launched "SMARTCONSTRUCTION Digital Transformation," a solution comprising four new IoT devices and eight new applications that accelerate digital transformations through SMARTCONSTRUCTION, in April 2020.

While the previous version of SMARTCONSTRUCTION only digitized part of the construction process ("vertical digitization"), these new IoT devices and applications will allow for digitization of the entire process ("horizontal digitization"). This will enable worksite operations to be optimized by synchronizing the real workplace with its digital twin, thereby realizing drastic improvement in the safety, productivity, and environmental performance of the entire worksite.

Optimization of construction through synchronization between real workplace and its digital twin



01 SMART CONSTRUCTION

Since its introduction in February 2015, SMARTCONSTRUCTION has addressed the labor shortages facing the Japanese construction industry by realizing improved productivity and safety at customer worksites. This has been made possible by openly employing digital technologies in both Japan and overseas; domestically, these technologies have been introduced to more than 10,000 customer worksites. Komatsu is dedicated to contributing to the realization of the safe, highly productive, smart, and clean workplaces of the future by digitally transforming both products (automation and automation operation) and processes (optimization).

SMARTCONSTRUCTION promotional videos and introduction case studies can be found below.

SMARTCONSTRUCTION promotional videos (Japanese only)
<http://smartconstruction.komatsu/movie.html>



SMARTCONSTRUCTION introduction case studies (Japanese only)
<https://smartconstruction.komatsu/case/>



Strategic Directives

By accelerating the digital transformation of construction through both products (automation and automation operation) and processes (optimization), we will realize the workplaces of the future.

Processes: Optimization
 In addition to digitizing individual processes, such as condition surveys by drones ("vertical digitization"), we will link the 3D workplace information gained from such digitized processes with our LANDLOG platform ("horizontal digitization") to promote the automation and optimization of entire workplaces.

Products: Automation and Automation Operation
 Realizing the safe, highly productive, smart, and clean workplaces of the future will require all construction equipment to work autonomously while collaborating with other equipment at the workplace. At the same time, it will be crucial to enhance ICT-intensive equipment, specifically through increased automation and through autonomy achieved via communication and coordination among equipment. Komatsu is moving ahead with research and development on sophisticated automation and autonomy technologies with an eye to the introduction of 5G and other ultrahigh-speed mobile communications systems and the utilization of high-precision global navigation satellite system technologies.

Level 5 Optimization of Construction
 Level 4 Automation of Construction Planning
 Level 3 3-Dimensional Construction Planning
 Level 2 3-Dimensional Topographical Map
 Level 1 3-Dimensional Design Data

Workplaces of the future: Safe, highly productive, smart and clean



Digital Transformation of Construction

- Automatic generation of daily tasks from daily optimized construction plans
- Collaboration and autonomous operation of equipment on the workplace

ICT Construction

- ICT-intensive construction & machines
- Visualization of progress
- Utilization of topographical data

Introduction of advanced ICT-intensive models

Products (Level of Automation and Autonomous Operation)

Level 1	Level 2	Level 3	Level 4	Level 5
Limited Operation Support	Advanced Operation Support	Advanced Solo Automation	Advanced Collaborative Autonomous Operation	Advanced Decision-making Autonomous Operation



Profitability and Growth

Compared with other industries, the construction industry is lacking in terms of safety and productivity and has significant room for improvement via digitization.

SMARTCONSTRUCTION is still in the early stages of its introduction. Nonetheless, we have verified its significant benefits for contributing to improved safety and productivity at adopting workplaces. We therefore anticipate that the use of this solution will spread steadily against the backdrop of labor shortfalls and aging workplace operators. The global COVID-19 pandemic also presents an opportunity in the form of potential for the rapid digitization of construction workplaces.

Safety- and Productivity-Related Tasks

More dangerous than other industries
 • No. of deaths per 100,000 employees*1

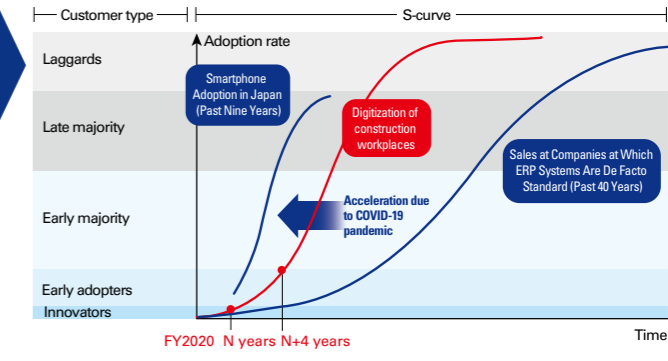
Financial	0.4
Information & communications	1.2
Retail	1.9
Manufacturing	2.2
Public utilities	2.6
Service	2.6
Construction	9.5
Mining	14.1

Lower than other industries
 • Nominal productivity by industry (¥1,000/hr.)*2

Public utilities	12.8
Finance & insurance	7.5
Information & communications	7.4
Manufacturing	5.6
Retail	4.0
Construction	3.1
Health	2.8
Agriculture, forestry & fisheries	1.5

Diffusion of Innovation Curve and Earnings Growth (as Projected by Komatsu)

- The digitization of construction workplaces is projected to advance more swiftly than the popularization of enterprise resource planning (ERP) systems, a similar solution launched in the 1980s, due to the current availability of sophisticated and affordable technologies.
- The global COVID-19 pandemic is expected to further accelerate this digitization trend.



*1 Source: National Census of Fatal Occupational Injuries in 2018, U.S. BUREAU OF LABOR STATISTICS
 *2 Source: Labor Productivity Trends in Major Industries, JAPAN PRODUCTIVITY CENTER





Contributions to Resolution of Environmental and Social Issues

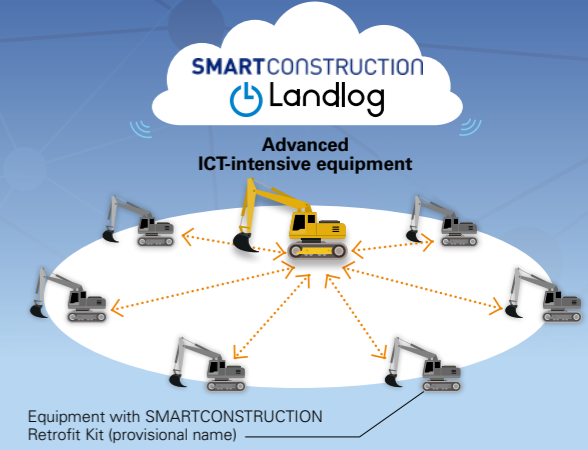
Launch of SMARTCONSTRUCTION Retrofit kit

Provision of ICT Capabilities for Conventional Construction Equipment

Komatsu launched SMARTCONSTRUCTION Retrofit kit, the add-on kit to offer ICT capabilities, such as 3D machine guidance and payload measurement, to conventional construction equipment in Japan in late April through LANDLOG Ltd. Currently, conventional construction equipment with no ICT capabilities accounts for over 98% of all construction equipment working at construction workplaces in Japan.

To accelerate the pace of achieving digital transformation of construction workplace operations, the SMARTCONSTRUCTION Retrofit kit can be added on not only Komatsu-made models but also other models as long as they are hydraulic excavators. With the SMARTCONSTRUCTION Retrofit kit, Komatsu is going to promote digitization of conventional construction equipment and digital transformation of construction in order to realize safe, highly productive, smart, and clean workplaces of the future soon.

	Non-ICT-intensive models	ICT-intensive models	SMARTCONSTRUCTION Retrofit kit
 3D construction based on 3D design data	3D construction: Impossible	3D construction: Possible	3D construction: Possible
 3D control	Impossible	Possible: Machine control	Impossible: Limited to machined guidance
 Staking & assistant workers	Necessary	Unnecessary	Unnecessary
 3D construction records	Impossible to obtain	High-precision 3D data: Possible to obtain	High-precision 3D data: Possible to obtain



02 Forestry Machinery Business

Sustainable forestry is an undertaking with the potential to contribute to the accomplishment of the Sustainable Development Goals (SDGs) advocated by the United Nations. These contributions include helping mitigate climate change by reducing the amount of CO₂ in the atmosphere and preserving biodiversity and water resources. Komatsu regards a forestry business as an important industry that contributes toward the achievement of the SDGs. In forestry, it is important to contribute to realizing the forest management cycle of planting, cultivating, and harvesting trees, and it is required to operate in a way that places due consideration on forest environments. Komatsu operates a wide-ranging forestry machine business on a global basis to help increase safety and productivity in forestry operation.

Videos on forest machines, including a look at a forestry project adopting ICT in Sweden, can be found here.

https://youtu.be/_D-EfqsGT0



Strategic Directives

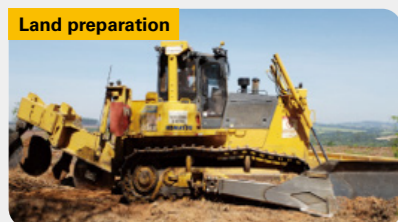
Komatsu is working to mechanize forestry operation, including planting, cultivating, and harvesting trees, to contribute to sustainable forestry. In the realm of planting, we have developed subsoiling machines and automated tree planters based on our bulldozers. These machines are currently being supplied to the Brazilian market.

Moreover, in the area of timber harvesting and extracting operations, where most forestry-related occupational accidents tend to occur, we are making progress in developing and selling forestry equipment that enables to harvest and extract trees in steep area without people having to descend to the forest floor.

● Introduction of New Tree Planting Products



D61EM-23M0 automated tree planter



D85EX subsoiling machine



● Improvement of Harvesting and Extracting Productivity and Safety



PC130F Harvester (forest machine based on hydraulic excavators)



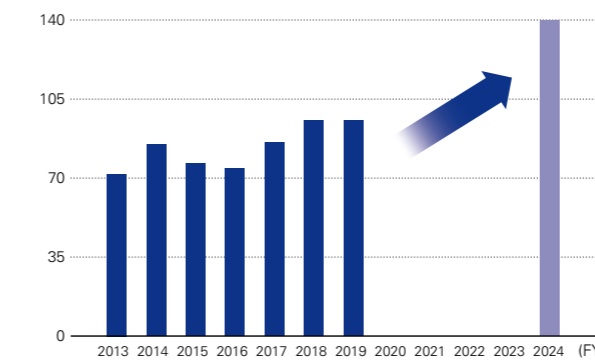
Forwarder 895 Forest Forwarder Usable on Slopes

Profitability and Growth

Komatsu's forest machine business has continued to grow smoothly since the 2004 acquisition of Partek Forest AB (currently, Komatsu Forest AB) of Sweden. Looking ahead, economic growth in emerging countries is expected to drive rises in housing starts and pulp demand. In addition, we anticipate stable growth in timber production volumes as a substitute for plastic amid rising environmental awareness.

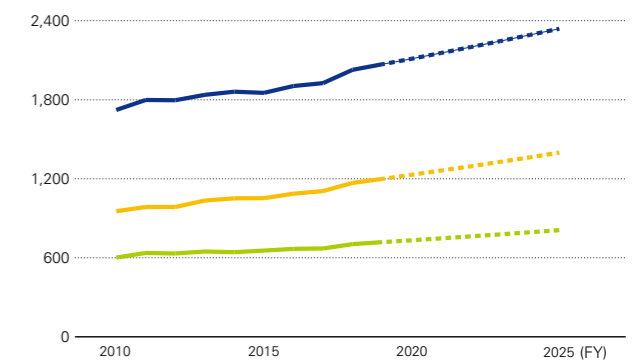
● Forest Machine Business Sales

(Billions of yen)



● Global Timber Production Volumes

(Millions of m³)



Source: Food and Agriculture Organization of the United Nations (Figures for 2019 forward are the Company's projections.)

Contributions to Resolution of Environmental and Social Issues

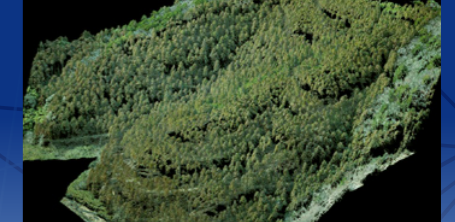
Smart Forestry Powered by ICT

We have been working on a smart forestry concept that makes it possible to visually monitor forestry supply chains. In Japan, we have been using drones to conduct tree planting and growth management surveys including forestry resource quantity estimates. This has enabled us to reduce the labor hours needed for surveys for felling from around five people per hectare per day to one person per hectare per day. Moreover, by using ICT-equipped harvesters for processing and sorting logs, we have been able to reduce the labor hours needed from about 13 people per hectare per day to about 0.5 people per hectare per day. We are also focusing our efforts on developing applications that are capable of drawing on the accumulated log processing and timber transport data of the LANDLOG open platform. We will thereby contribute to streamlining operations in the future by sharing information with forestry business operators on lumber markets as well as lumber consumers.

Going forward, we hope to help promote cyclical forestry around the world by facilitating further safety and productivity improvements in forestry.



3D image



Through Komatsu's smart forestry solutions, drone photography can be utilized to prepare 3D images of forests, which can be used to automatically estimate the number of trees, diameters of trees, and the volume of timber to be produced, thereby contributing to higher levels of efficiency in pre-felling forest resource surveys.

TOPICS