SMARTCONSTRUCTION

SMARTCONSTRUCTION

Work Smarter. Not Harder.

KOMATSU

Driven by your success

INTRODUCING SMARTCONSTRUCTION

TO TAKE MAXIMUM ADVANTAGE OF ICT CONSTRUCTION MACHINERY, WE ENABLE VISUALISATION THROUGH 3D DATA, FROM THE SURVEY UP TO THE CONSTRUCTION AND FINISHED LAND FORM MEASUREMENTS.

"Smart Construction" is a service that incorporates the worksite into the IoT (Internet of Things), organically connecting everything present on the site, and enabling its "visualisation" in 3D.

We believe construction machinery manufacturers must not only provide worksites with construction machinery equipped with the latest technology, but must also provide the systems to make maximum use of this construction machinery.

From the point of view of the customer, we not only provide construction using ICT construction machinery, but also provide the solutions to issues in relation to following construction process, management and on-site daily data collection.

Construction site surveys

- **INVESTIGATION SURVEY**
- **DESIGN**
- **PLAN**
- **CONSTRUCTION**
- **INTELLIGENT MACHINE CONTROL**
- **UNMANNED AERIAL VEHICLE (UAV) DRONES**

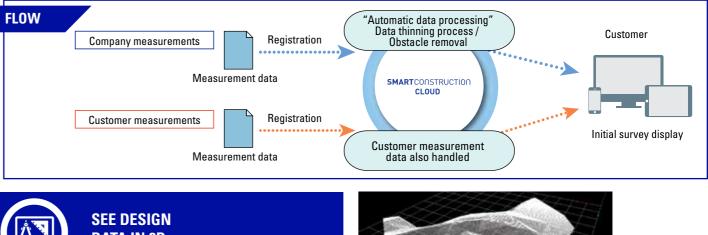SMARTCONSTRUCTION

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INVESTIGATION SURVEY

HIGH PRECISION WORKSITE SURVEYS MODEL CURRENT TOPOGRAPHY IN 3D DATA.

By automatically removing obstacles such as man-made objects and trees from the point cloud data measured by unmanned aerial vehicles (drones etc.), or 3D laser survey scanners, the current land topography can be seen with high precision 3D data.
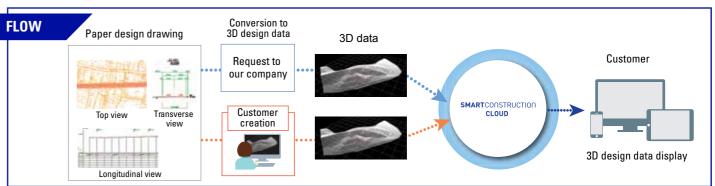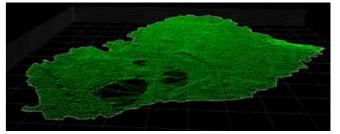
Drone   3D laser scanner

Current 3D topography display

Automatic removal of obstacles from point cloud data

FLOW

Company measurements → Registration → Measurement data

Customer measurements → Registration → Measurement data

"Automatic data processing" Data thinning process / Obstacle removal

SMARTCONSTRUCTION CLOUD

Customer measurement data also handled

Customer

Initial survey display
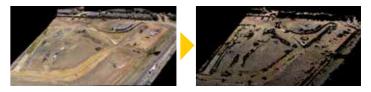
DESIGN

SEE DESIGN DATA IN 3D

It is also possible to see 3D design data using PCs, smartphones and tablets, which have no CAD software installed. Even when the customer cannot make their design drawings in 3D (top view, transverse view, longitudinal view), they can create 3D data and then register it with the Smart Construction Cloud.

Note: Design changes can also be implemented by the customer survey or engineering team and upload to the construction machinery.

Customers are assured that unexpected changes are also immediately updated into the latest design data by the support centre, and the data is then transferred to the construction machinery.

FLOW

Paper design drawing

Top view   Transverse view

Longitudinal view

Conversion to 3D design data

Request to our company

Customer creation

3D data

SMARTCONSTRUCTION CLOUD
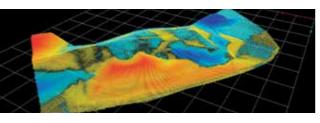
Customer

3D design data display

ACCURATELY UNDERSTAND THE CONSTRUCTION AREA, SHAPE AND SOIL VOLUME
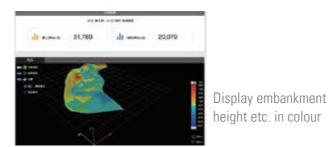
PLAN

Calculate precise construction areas using the difference between the initial survey data and the 3D design data. In addition to checking embankment and excavation areas in 3D, their respective soil volumes can also be checked.
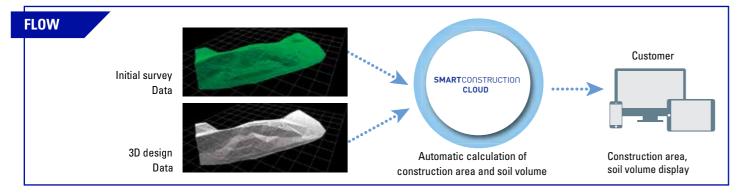

Automatic calculation of embankment and excavation soil volumes (soil volume calculation is by mesh method)
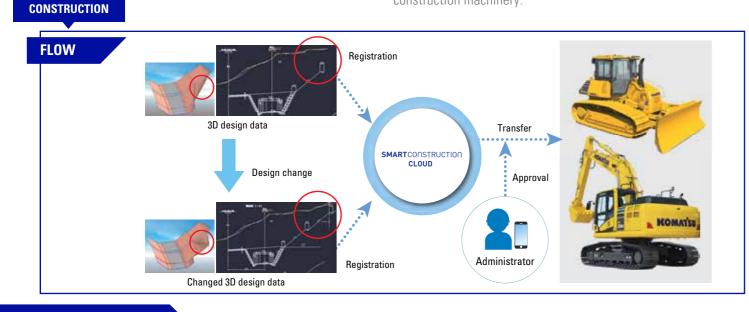
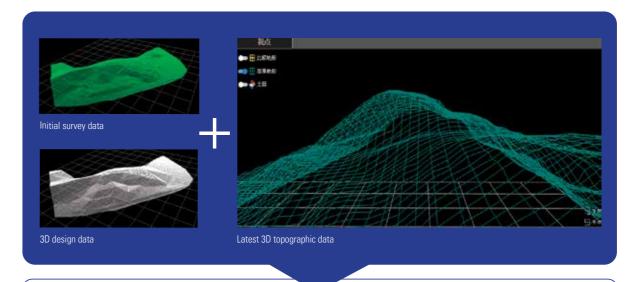Display the construction area in 3D (yellow: embankment, blue: excavation)

Display embankment height etc. in colour

FLOW

Initial survey Data

3D design Data

SMARTCONSTRUCTION CLOUD

Automatic calculation of construction area and soil volume

Customer

Construction area, soil volume display

TRANSFER DESIGN DATA TO ICT CONSTRUCTION MACHINERY FOR IMMEDIATE START TO CONSTRUCTION

CONSTRUCTION

3D design data can be transferred from the Smart Construction Cloud to ICT construction machinery. Even if there are unexpected design changes, instant update is possible by registering the latest data and transferring it to the ICT construction machinery.
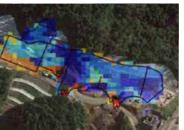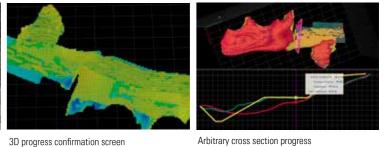
FLOW

3D design data

Registration

Design change

Changed 3D design data

Registration

SMARTCONSTRUCTION CLOUD

Transfer

Approval

Administrator

REFLECT CHANGING WORKSITE TOPOGRAPHY IN REAL TIME

CONSTRUCTION

3D point cloud data, measured using the "coordinate data from cutting edges", and "stereo cameras" mounted on operating ICT construction machinery, generates the latest topographical data for display in 3D.

Initial survey data

3D design data

Latest 3D topographic data

Operational data from ICT construction machinery is transferred to the Smartconstruction Cloud in real time, reflecting the daily progress of construction. Progress charts show earth-cut parts and embankment parts in different colours, for 2D or 3D displays, and it is possible to confirm progress along arbitrary cross sections.

2D progress confirmation screen

3D progress confirmation screen

Arbitrary cross section progress confirmation screen

customer

By checking the latest 3D topographic data against the initial survey data and the 3D design data, you can confirm the state of the construction progress "visually".

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MATERIAL YIELD CALCULATIONS

CONSTRUCTION

It is possible to calculate yields by maintaining and managing unified initial survey data, 3D design data, mid-construction topographical data, and finished form data.
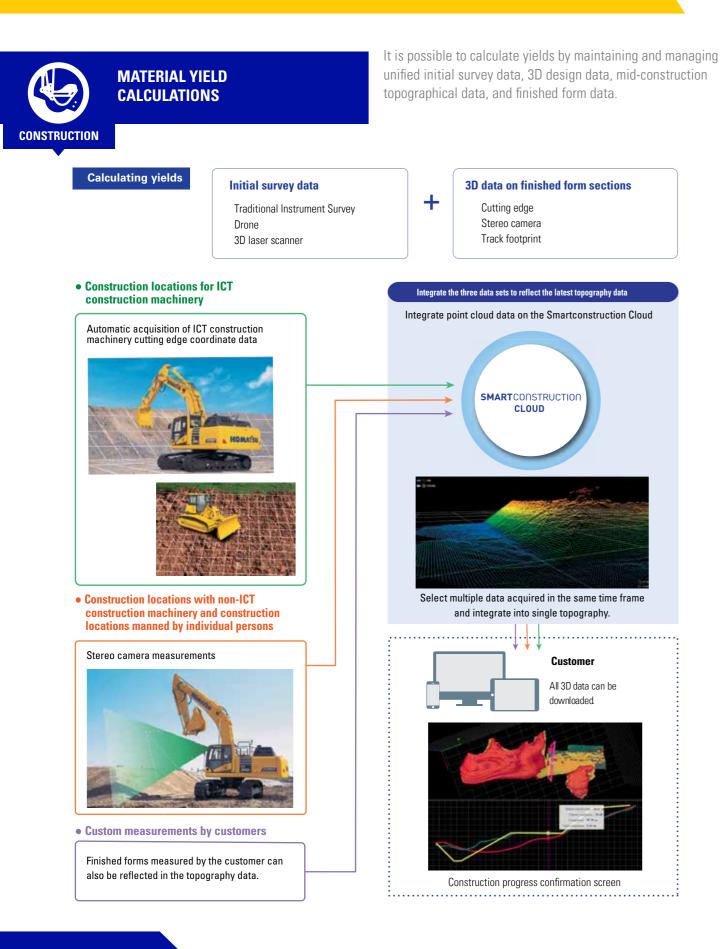
Calculating yields

Initial survey data		3D data on finished form sections
Traditional Instrument Survey Drone 3D laser scanner	**+**	Cutting edge Stereo camera Track footprint

● **Construction locations for ICT construction machinery**

Automatic acquisition of ICT construction machinery cutting edge coordinate data

Integrate the three data sets to reflect the latest topography data

Integrate point cloud data on the Smartconstruction Cloud

SMARTCONSTRUCTION **CLOUD**

Select multiple data acquired in the same time frame and integrate into single topography.

● **Construction locations with non-ICT construction machinery and construction locations manned by individual persons**

Stereo camera measurements

Customer

All 3D data can be downloaded.

Construction progress confirmation screen

● **Custom measurements by customers**

Finished forms measured by the customer can also be reflected in the topography data.

SUPPORT

FULL SUPPORT OF CONSTRUCTION USING ICT CONSTRUCTION MACHINERY SMART CONSTRUCTION SUPPORT CENTRE

Please contact the "Smart Construction Support Centre" if you have any questions or inquiries regarding construction with ICT construction machinery. Experienced operators will provide prompt and in-depth customer support.

For example, when. . .

Operation of Smart Construction
- Viewing not possible
- File upload not possible
- Account unlocking not possible

ICT construction machinery in operation
- Monitor operation not understood
- Cutting edge coordinates do not match

Changing design data
- When making design changes, complete drawing data cannot be modified
- Cannot upload changed data to the Smart Construction cloud

GNSS connection
- Cannot connect to satellite
- Connection breaks off easily

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Support Centre | **+61 2 9795 8755**

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INTELLIGENT MACHINE CONTROL

INTRODUCING… iNTELLIGENT MACHINE CONTROL

Komatsu's innovative iNTELLIGENT MACHINE CONTROL (iMC) technology solutions are making our customers more productive today… and into the future. Adding Komatsu iMC machines and solutions to your fleet is a formula for unmatched productivity improvement.

WHY iNTELLIGENT MACHINE CONTROL?

At Komatsu, we have a long history of introducing market-leading technology and Innovation to the industries we serve. Understanding the needs of our customers, we are constantly working towards enhancing and improving their productivity – including meeting the challenge of the ever-growing demand for skilled machine operators. Skills shortages, along with demands for increased construction site productivity, finite resources and project management pressures are key factors behind the development of Komatsu's iMC technology, which is driving our SMARTCONSTRUCTION philosophy.

iMC – NEXT GENERATION MACHINE CONTROL

Komatsu's exclusive iMC concept is designed to let operators focus on moving material efficiently – from bulk excavation to final trim – without having to worry about over-excavation or damaging the target surface – and resulting in significant improvements in efficiency and productivity compared with conventional construction processes.

Currently covering a range of four dozers and one excavator, each model in Komatsu's iMC range incorporates as standard a factory-installed fully integrated 3D GNSS (Global Navigation Satellite System) machine control system.

NEXT GENERATION INTELLIGENCE

» **Innovative** Automated blade/bucket control, from bulk excavation to final grades
» **Integrated** Fully factory installed Komatsu machine control system, with all components highly secure from damage, vandalism and theft
» **Intelligent** Multiple automated dozing modes as well as auto grade assist, auto stop control and minimum distance control for the excavator, so jobs are finished faster, more accurately and with minimal rework

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iNTELLIGENT MACHINE CONTROL OVERVIEW

GNSS antenna
GNSS receiver
Control box
Control box
GNSS antennas
Stroke sensing hydraulic cylinders
Inertial measurement unit (IMU)
GNSS receiver
Enhanced inertial measuring unit (IMU+)
Stroke sensing hydraulic cylinders

FACTORY-INTEGRATED SENSOR PACKAGE

Conventional "bolt-on" machine control components are replaced with fully integrated factory-installed GNSS antennas, enhanced inertial measuring unit (IMU+) and stroke sensing hydraulic cylinders. This assures Komatsu reliability, durability and quality.

GNSS ANTENNAS

Komatsu's exclusive cab-top (iDozer) and handrail mounted (excavator) GNSS antennas greatly reduces the risk of damage, theft or vandalism associated with conventional blade and counterweight mounted antennas and cables – and ensures greater accuracy through more stable GNSS antenna positioning.

ENHANCED INERTIAL MEASURING UNIT

Komatsu's chassis-mounted enhanced inertial measuring unit (IMU+) measures machine pitch and roll to enable precision work equipment control, even when working on slopes.

STROKE-SENSING CYLINDERS

Another Komatsu exclusive, robust stroke sensing hydraulic cylinders use proven sensor technologies for accurate finish grade performance. Stroke-sensing cylinders allow the iMC system to constantly track the angle and location of the blade or bucket edge.

BENEFITS:

» Complete bulk dozing and excavation, along with grading and final trim operations faster and to closer tolerances
» Fewer passes to finish grade or excavation profiles
» More efficient machine use: Less rework – dig or grade it once and move on
» Greatly decrease times for staking, survey and even final inspection through having 3D design data held within machine
» Complete multiple tasks with one machine
» Lower machine operating costs and whole-of-life costs
» Better material yields
» Reduced fuel consumption
» Improved operator performance
» Greater machine availability and uptime
» Simple operation for all operators and experience levels

iNTELLIGENT DOZERS

OPERATING WEIGHTS

D61EXi-23: 19,647kg/D61PXi-23: 20,527kg	Includes Rippers
D61EXi-24: 20,397kg/D61PXi-24: 21,337kg	Includes Rippers
D65EXi-18: 22,730kg/D65PXi-18: 24,980kg	Includes Rippers
D85EXi-18: 33,420kg/D85PXi-18: 29,910kg	Rippers EXi only
D155AXi-8: 44,560kg	Includes Rippers

ENGINE

D61EXi/PXi-23: 125kW (168HP) @2200rpm	Tier 4 Interim
D61EXi/PXi-24: 127kW (170HP) @ 2200rpm	Tier 4 Final
D65EXi/PXi-18: 162kW (217HP) @1950rpm	Tier 4 Final
D85EXi/PXi-18: 197kW (264HP) @1900rpm	Tier 4 Final
D155AXi-8: 264kW (354HP) @1900rpm	Tier 4 Final

FACTORY INTEGRATED iMC COMPONENTS

GNSS Receiver	UHF Digital II
Enhanced Inertial Measuring	IMU+
Cab Mounted GNSS Antenna	Integrated (Roof)
Machine Control Monitor	Komatsu GX-60
Stroke Sensing Cylinders (with Reset Sensor)	Tilt/Lift/Angle

BLADE OPTIONS

D61EXi/PXi-23: Power Angle Tilt (PAT)
D61EXi/PXi-24: Power Angle Tilt (PAT)
D65EXi: Sigmadozer/D65PXi: PAT
D85EXi: Sigmadozer/D85PXi: Straight
D155AXi-8: Sigmadozer

Contact Komatsu for more detailed information

» **No cables** No coiled cables between machine and blade
» **No climbing** Integrated GNSS antenna and masts removed from blade
» **No connections** No daily connections required between machine and work implements

D61EXi-23/-24

D65EXi-18

D85EXi-18

D155AXi-8

iNTELLIGENT EXCAVATOR

OPERATING WEIGHTS

PC210LCi-10: 23,990kg	Heavy Counter Weight & OPG
PC360LCi-11: 36,960kg	Quick Hitch & SF Tilting Bucket

ARM BOOM SPECS

PC210LCi-10: ARM - 2900 BOOM - 5700
PC360LCi-11: ARM - 3200 BOOM - 6500

ENGINE

PC210LCi-10: 123kW (165HP)	Tier 4 Interim
PC360LCi-11: 202kW (271HP)	Tier 4 Final

FACTORY INTERGRATED iMC COMPONENTS

GNSS Receiver	UHF Digital II
Komatsu Enhanced Inertial Measuring Unit	IMU
Cab Mounted GNSS Antenna	Handrail Mounted
Machine Control Monitor	Komatsu HMI X-31
Stroke Sensing Cylinders (with Reset Sensors)	Boom/Arm/Bucket
Network Modem	T-Link /SL100
Tilting Attachment (Hitch/Bucket)	Option

BUCKET OPTIONS

PC210LCi-10: 450GP,600GP,1200GP, 1800 Tilting SF
PC360LCi-10: 650GP, 1300GP, 1500GP, 1700GP SF2200, SF Tilting 2000mm

Contact Komatsu for more detailed information

» **Projection** The work is automated to limit the bucket from digging beyond the target surface
» **Precision** Auto grade assist provides for finish grade accuracy with its ability to precisely trace the design surface
» **Performance** No worry digging means you can improve speed and cycle times due to our innovative auto stop feature that prevents operator over dig
» **Production** Protection, precision and performance is your formula for increased production versus conventional machine guidance
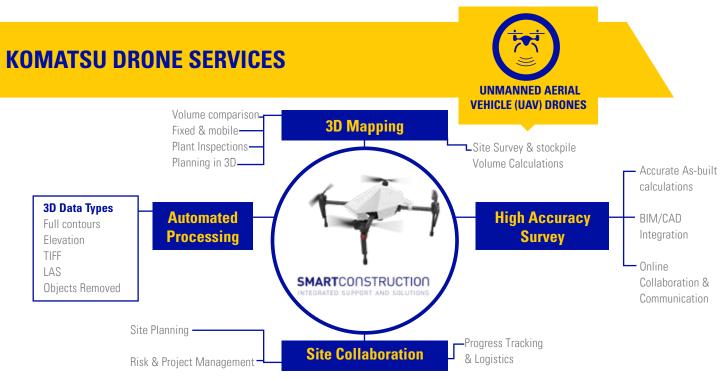
PC210LCi-10

PC360LCI-11

KOMATSU DRONE SERVICES

UNMANNED AERIAL VEHICLE (UAV) DRONES

Volume comparison
Fixed & mobile
Plant Inspections
Planning in 3D

3D Mapping

Site Survey & stockpile
Volume Calculations

3D Data Types
Full contours
Elevation
TIFF
LAS
Objects Removed

Automated Processing

SMARTCONSTRUCTION
INTEGRATED SUPPORT AND SOLUTIONS

High Accuracy Survey

Accurate As-built calculations

BIM/CAD Integration

Online Collaboration & Communication

Site Planning

Risk & Project Management

Site Collaboration

Progress Tracking & Logistics

EXPLORE 1 DRONE

High precision drone delivers centimetre-level accuracy and high resolution imagery for daily updates on constructions progress.

BENEFITS

- High precision without Ground Control Points
- Site coordinate localisation
- Dual camera (20MP high speed shutter mapping camera and gimballed inspection camera)
- 2x faster 3D mapping than other systems (2 photos/second)
- L1/L2 receiver GNSS rover

EDGE 1 BASE STATION

Process high accuracy point clouds in remote areas without internet connection Edge 1 gives you on the edge processing.

BENEFITS

- 3.2cm accurate 3D point clouds
- Automatic data offload from drone
- Local structure from motion processing
- Use either physical base station or connect to network

KEY FEATURES

- LTE-enabled data upload
- Local photogrammetry processing
- Direct data upload to cloud
- Advanced data port processing tools including automated
- DTM generation, and object detection
- Hosting deep learning model for AU
- L1/L2 receiver GNSS rover

FEATURES AND BENEFITS

» Drone capability enhances Komatsu Australia's total site solution business to our customers. It delivers quick, reliable and accurate survey for all earthmoving, quarry and mining applications, adding value to our integrated iMC operations
» Record current as-built data, plus cut and fill volume reporting
» Capable of working alongside Komatsu AHS (Autonomous Haulage Systems)
» Enhances Komatsu Australia's expert optimum fleet recommendation team in the field
» Total end to end solution for our customers now, tomorrow and in the future
» The Explore 1 and Edge 1 high precision package allows for both precision 3D mapping and on site point cloud data processing without the requirement of ground control points.

» Rugged hardware for all industrial work sites, operated by trained Komatsu RPAS/UAV CASA approved pilots
» Fully integrated with Skycatch cloud platform and user friendly dash board
» Complemented with class leading technologies such as terrain following, for increased accuracy on entire flight plan and improved end results
» Unprecedented visibility into work site progress
» Collaborate via a single platform, view data from any device
» Automatic DTM (Digital Terrain Models) generation (with vegetation objects removed)
» Overlay any PDF plans
» 2D and 3D map viewing
» PDF, TIF and LAS file export
» Save and export unlimited annotations

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