# Leica iCON alpine solution

## Snow management solution

leica-geosystems.com

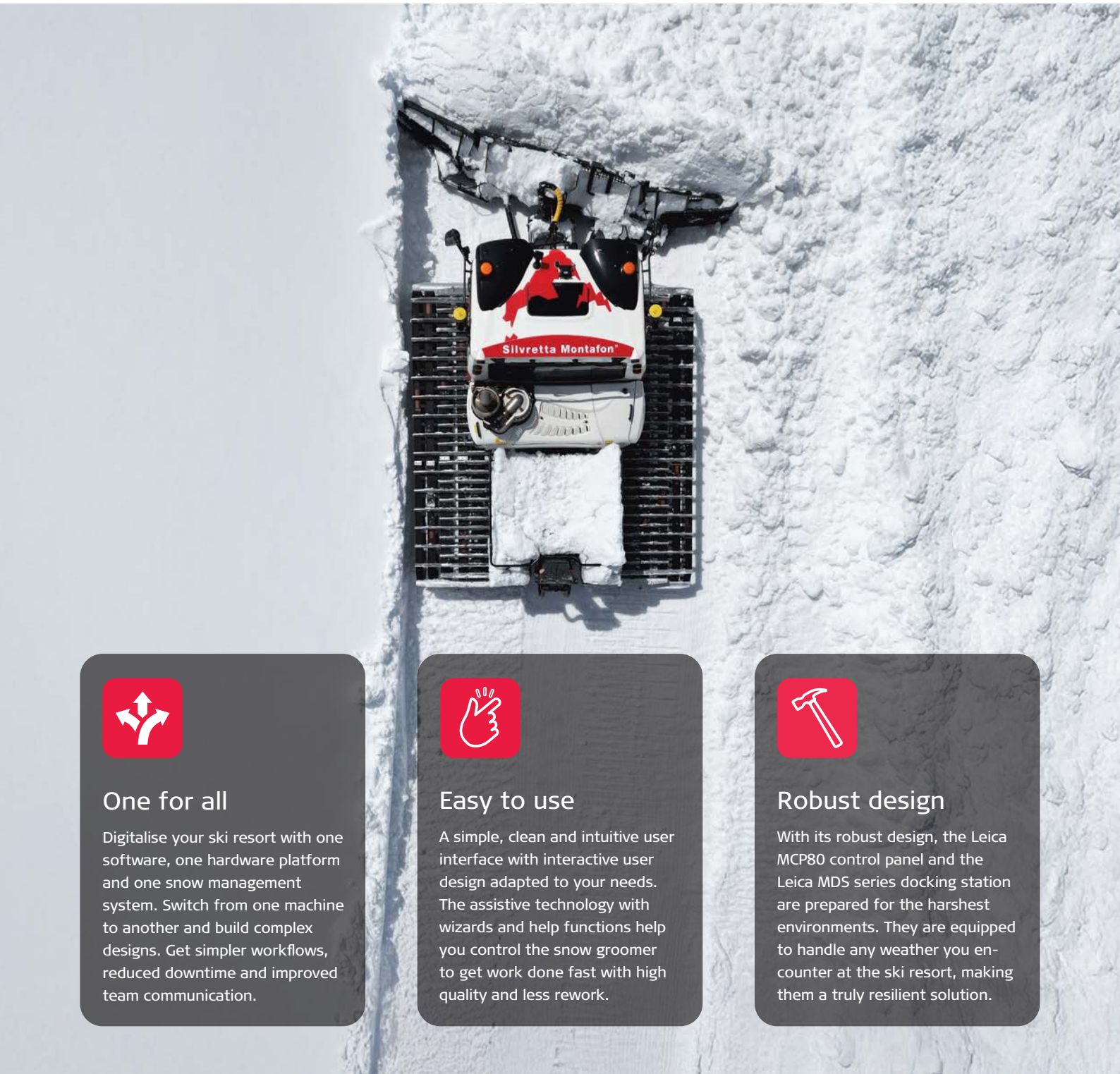
- when it has to be **right**

Leica Geosystems

# Snow, slope and infrastructure management
## – With only one system

Leica iCON alpine snow management is a comprehensive suite of tools to measure, aggregate, analyse and plan snow production and distribution. The 3D on-machine snow measurement solution delivers real-time data on the in-cabin display showing exact snow depths in front and under the blade. This enables the operator to respond to snow conditions immediately and perfectly prepare slopes according to a 3D terrain reference model.

By incorporating the Leica alpinePRO system, you get the complete alpine management package for the entire resort infrastructure. Leica alpinePRO provides real-time snow depth insights for precise snow production and maintenance. It enables fact-based decision-making, optimised team communication and accurate task planning, ensuring efficient use of available snow, labour and mindful water and energy consumption.




### One for all

Digitalise your ski resort with one software, one hardware platform and one snow management system. Switch from one machine to another and build complex designs. Get simpler workflows, reduced downtime and improved team communication.

### Easy to use

A simple, clean and intuitive user interface with interactive user design adapted to your needs. The assistive technology with wizards and help functions help you control the snow groomer to get work done fast with high quality and less rework.

### Robust design

With its robust design, the Leica MCP80 control panel and the Leica MDS series docking station are prepared for the harshest environments. They are equipped to handle any weather you encounter at the ski resort, making them a truly resilient solution.

# **The Leica iCON alpine suite** – Mastering snow management with a complete solution

Snow management begins with slope construction, influences the technical equipment and placement of the snow guns. With the need of precise snow depth and measurement and control during operations to ensure safe and perfect outdoor and indoor ski infrastructure. The Leica iCON alpine solution workflow is backed up by Leica MC1, Leica ConX, and the Leica alpinePRO system, empowering you with complete snow control.

**KEY BENEFITS**

- Effortless data transfer between machines, office, and cloud.
- Compatible with other snow production and forecasting tools.
- Synced management and communication on the entire resort

**COMPREHENSIVE SNOW MANAGEMENT SOLUTION**

Leica Geosystems offers a robust product portfolio supporting every aspect of snow management. Utilising drones and LiDAR scanners for terrain data collection, GNSS rovers and total stations for off-machine data gathering, and the Leica iCON office for data preparation. The system culminates in the renowned on-machine Leica iCON alpine solution for snow groomers. Combined with Leica alpinePRO cloud software and mobile app, this portfolio ensures a unified data flow from start to finish, catering to all snow management needs.

# **Personalised user interface** – Leica MC1 will fit your needs and tasks

The Leica iCON alpine solution ensures exceptional results with high-performing hardware and software. The in-cabin Leica MCP80 control panel includes backlit buttons and features a large multi-touch screen with two-finger gestures for zooming and panning. Achieve great visibility at any time of the day with the automatic brightness control, which allows the Leica MCP80 display to adapt to different lighting conditions.

The Leica MC1 software with wizards and help functions guarantees faster snow groomer operations, higher quality and fewer errors. Leica MC1 is optimised with customisability to fit your preferred needs and tasks when you are operating. The intuitive user interface has different themes, including Day and Night mode, to secure optimal readability – no matter when your work shift is on the slope.

### CUSTOMISE RUN SCREEN CONTENT

Split the interface screen in 1, 2 or 3 windows, in each window you are able to select between views like; Top, 3D, Side and Cross-section. When your settings are set, the userfriendly Leica MC1 ensures an easy switch between the different screens.

### CHANGE SNOW DEPTH

Set the snow depth colour scale as you wish. Customise your colours for your grooming progress by choosing the wanted number of colours, the limits and the actual colours you prefer to be shown on the display.

### ALIGNMENT OF BLADE

Select the Blade View run screen in MC1, with a focus on the three measuring points there are under the blade.
For example, when you are building ramps and snow parks. Align the blade on the snow groomer how you wish, regardless of the machine's position on-site.

# **Take full 3D control** of your snow groomer

## Available with total station for indoor operations

TPS

Radio Modem CR30s

# **Leica iCON alpine solution** – High performing technology for the ultimate accuracy

Snow is valuable as a raw material, especially technical snow. Whether it is natural or man-made, maintaining and utilising it in an optimal way throughout the entire ski season is a challenge that enables potential for great savings. This is why an increasing number of winter sport resorts are relying on modern GNSS technology for efficient management of their slopes. A high-performing GNSS receiver is the foundation for precise snow depth measurement, and with the Dual GNSS setup with two GNSS antennas on the roof of the snow groomer cabin, the position and direction of the machine is calculated with high accuracy.

## Leica iCON aps 200 together with Leica GNSS antenna CGA100

### Features

- Continuous GNSS signal availability
- Up to 60 Satellites simultaneously on two frequencies
- Supporting 2x555 channels
- Up to 100 Hz position update rate
- RTK signal via 3G/4G modem or 400/900MHz integrated dual frequency radio
- SmartLink Fill bridges RTK communication gaps up to 10 minutes

### Benefits

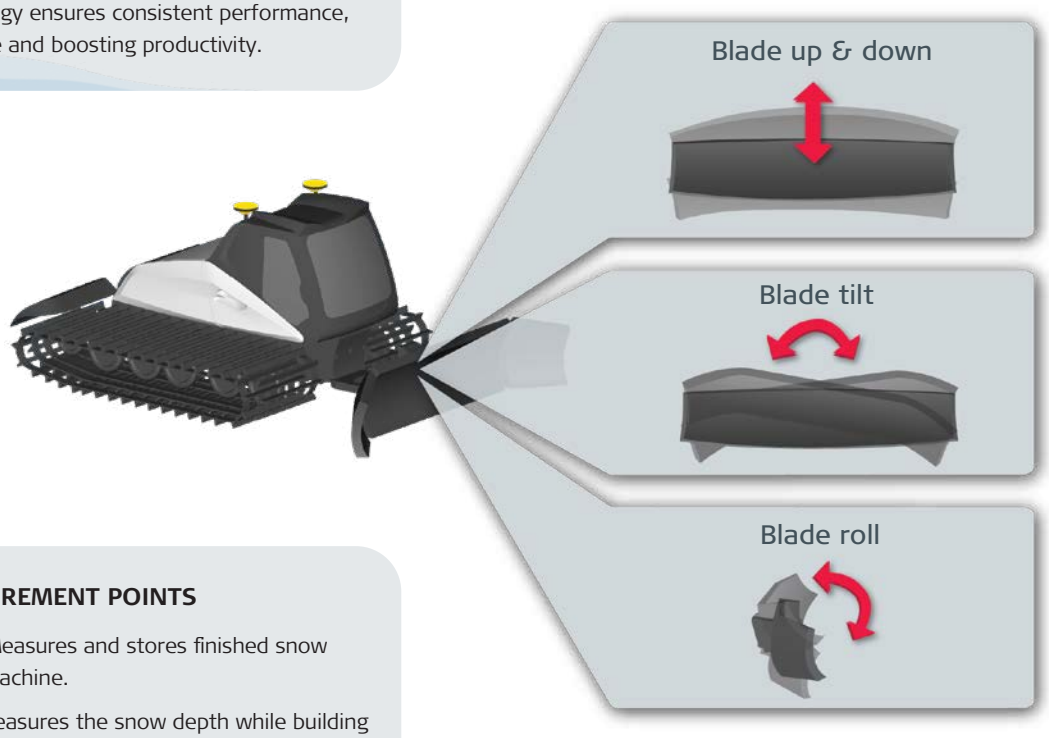
- Continuous GNSS signal availability, even when the primary antenna is blocked by obstacles on-site, ensuring continuous GNSS signal availability
- Powerful CPU allows for rapid processing of GNSS data, ensuring that position calculations and adjustments are made swiftly
- Seamless integration into Leica MC1
- Leica ConX and web interface for remote access to the machine for fast, reliable data transfer and support

# **Six-way blade compensation** – Expand your possibilities

The Leica iCON alpine solution revolutionises snow grooming with advanced measurement and compensation technologies. Designed to optimise snow management, this system ensures precision and efficiency, even in challenging conditions. By incorporating multiple measurement points and six-way blade compensation, the iCON alpine solution delivers unparalleled accuracy for snow grooming and park construction.

## KEY BENEFITS

- **Enhanced Accuracy:**
  Six-way blade compensation greatly improves snow depth measurements, regardless of blade movement.
- **Precision in Park Construction:**
  Blade roll compensation is ideal for building snow parks and competition courses.
- **Operational Efficiency:**
  Advanced technology ensures consistent performance, reducing downtime and boosting productivity.




## MULTIPLE MEASUREMENT POINTS

**Under the tracks:** Measures and stores finished snow depth beneath the machine.

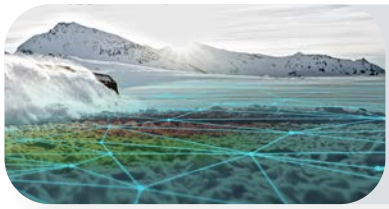
**Under the blade:** Measures the snow depth while building snow parks or pushing snow in snow-scarce areas.

**3-point blade measurement:** Measures snow height at the centre and at both the left and right wing tips.

- Ensures precise blade positioning according to the Leica MC1 design model
- Maintains accuracy with a tilted blade
- Reduces the risk of collision with the terrain

# **Leica iCON alpine** – From 3D model to real-time snow resort

The 3D alpine solution is far more than just a tool for measuring snow depth – it's the ultimate "digital Swiss-knife" for comprehensive snow management. With the right data, the system seamlessly handles diverse tasks on and off the slopes, ensuring precision and efficiency.



### TERRAIN MODELS

The Leica iCON alpine solution leverages triangulated 3D mesh models to create a digital twin of ski slopes. This approach offers superior terrain accuracy compared to square grids, while maintaining manageable file sizes. For park building, a triangulated model is a must to build the desired design.

### SLOPE EDGES

Seeing the slope edges in Leica MC1 on the in-cab control panel helps snow groomer operators work safely, especially in poor visibility or near cliff edges. The MC1 data can later be analysed in Leica alpinePRO, e.g., checking how much of the slope was groomed and how efficiently the machine was used.

### ROAD LINES

After winter, ski resorts must swiftly clear mountain roads for service vehicles and farmers. Using data on road centre lines and edges, operators can efficiently remove snow while minimising machine damage. Leica iCON alpine also optimises snow clearing from high-altitude public roads in spring after winter-closing.

### ANCHOR POINTS

If a winch anchor is buried under snow, the Leica MC1 software on the machine can guide operators to its exact location and depth. This feature saves time and effort by avoiding manual digging and enhances safety and efficiency in tough conditions.

### WATER HYDRANTS

Utilities like water hydrants can be logged and saved into Leica MC1, which will help operators avoid damage or locate buried lines. The software guides operators precisely, allowing them to use the blade tool effectively for locating the utilities.

### AVOIDANCE ZONES

If your ski resort has "no-go zones" like low-hanging cables or wildlife areas, these can be loaded into the Leica MC1 software. The system will alert operators with visual and audio warnings when the snow groomer gets too close, preventing collisions and incidents.

# **The perfect slopes** – Create snow parks and competition courses the intelligent way

The Leica iCON alpine solution saves you time and costs when preparing a fun park or a course for competitions. Use alpinePRO to accurately calculate the snow volumes for the fun park creation and the requirements for allocation of saved snow or technical snow. Import 3D files from snow park designers directly into the Leica iCON alpine solution and build the course precisely by measuring the exact heights of the jumps and turns while minimising the manual work.

1 **Measure**
Digital terrain models as a basis for all park construction

2 **Design**
Design complex courses in an easy, self-explaining way in real time

3 **Build**
Produce and allocate snow exactly where you need it, to avoid snow waste

4 **Maintain**
Guarantee high-quality slopes, jumps and slides throughout the entire ski season

**KEY BENEFITS**

- **Planning Efficiency:** Share, import and update 3D files designs in real-time.
- **Smart Resource Management:** Eliminate snow waste with precise volume calculations and optimal distribution.
- **Safety Enhancement:** Improve course safety through precise measurement.

# **Leica iCON alpine solution** – Snow depth measurements for indoor ski arenas

Unlike outdoor ski slopes, indoor ski arenas lack satellite reception, making traditional GNSS-based methods impossible. Leica Geosystems is the only company on the market that offers a precise alpine on-machine solution using total stations – a reliable technology from the construction industry. This system accurately tracks snow depth, ensuring safety and efficiency without risking damage to the cooling structure underneath. The on-machine system connects to the ski arena's Wi-Fi network, seamlessly transmitting comprehensive snow data to Leica alpinePRO for efficient management.

## KEY BENEFITS

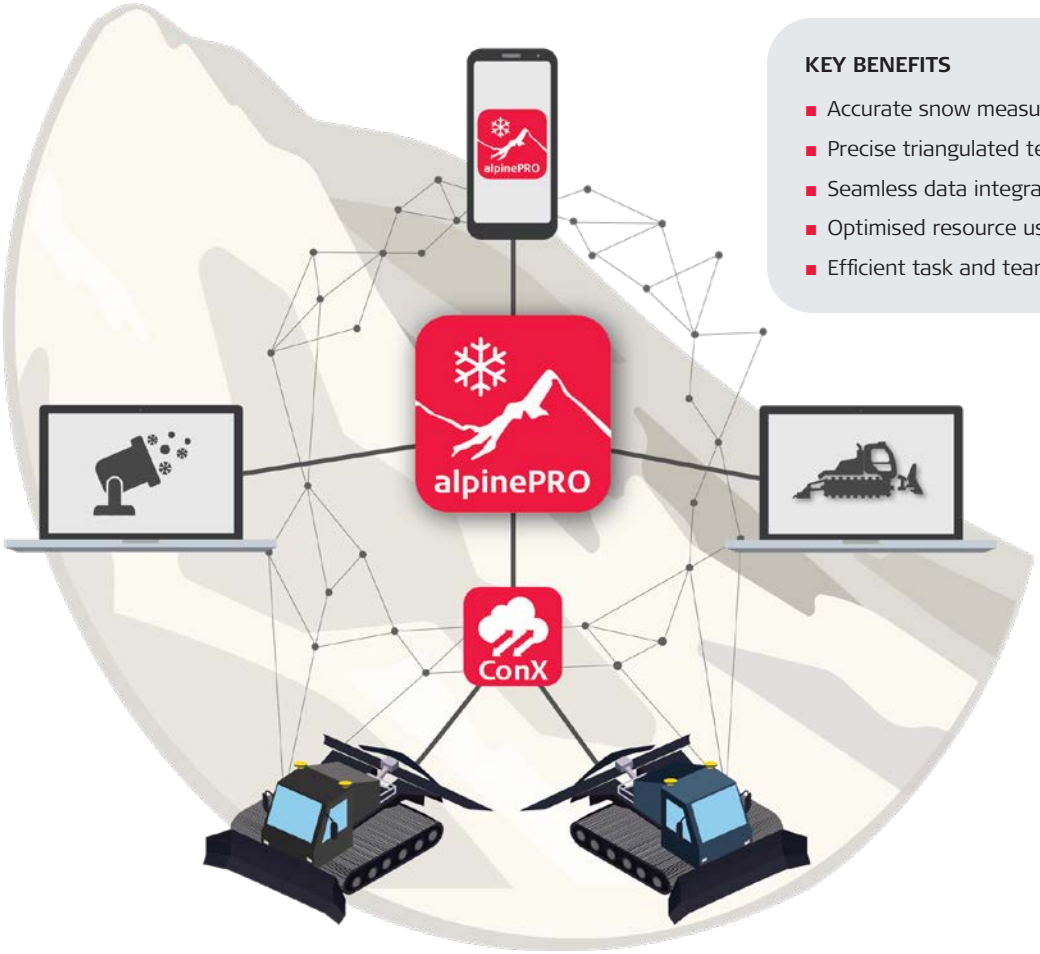
- **Precision Measurement:** Achieve higher accuracy than with GNSS antennas.
- **Efficient Management:** Seamlessly integrate with Leica alpinePRO for comprehensive snow data analysis.
- **Cost Savings:** Minimise the risk of costly defrosting and repairs by protecting the facility's cooling structure from damage.

## TOTAL STATIONS IN INDOOR ARENAS

Total stations and theodolites are used indoors to provide precise measurements by tracking a prism mounted on the snow groomer's roof. This setup allows for accurate snow depth data collection without relying on GNSS satellite signals, ensuring efficient and safe snow management in ski arenas. Allowing the operator to get the same support and guidance from Leica iCON alpine and Leica MC1 when grooming inside as well as outside on the slope.

# **Leica alpinePRO** – The optimal snow management system

Discover the future of snow management with Leica alpinePRO, the ultimate solution for ski resorts. From precise snow depth measurement and analysis to seamless integration with your existing systems, alpinePRO revolutionises and optimises how you manage snow, coordinate job site teams, and enhance communication. The system is built with advanced geo-tracking, real-time data sharing, and comprehensive task management tools, enabling fact-based decision-making and accurate task planning. This ensures efficient use of available snow and mindful water and energy consumption, making alpinePRO your central information hub for snow management.




**KEY BENEFITS**

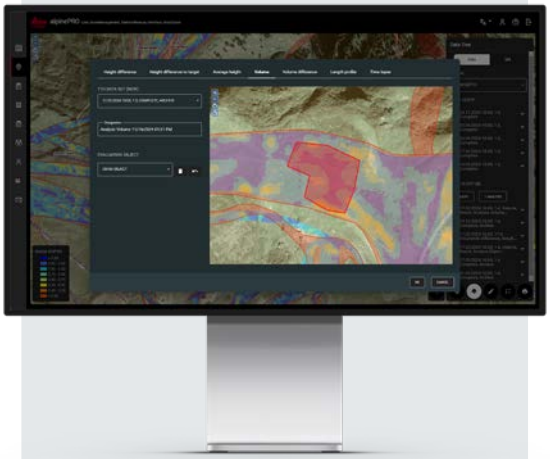
- Accurate snow measurements
- Precise triangulated terrain models
- Seamless data integration
- Optimised resource usage
- Efficient task and team management

**DATA SHARING AND VISUALISATION**

Stay informed and make data-driven decisions with Leica alpinePRO's data sharing and visualisation capabilities. The system integrates with the on-machine Leica iCON alpine, guiding operators using 3D models and Leica ConX to sync surface logging data and monitor work progress. Moreover, alpinePRO integrates with third-party programmes. Improve work efficiency by visualising alpinePRO data in your chosen snow forecast system. View snow gun status with water consumption, operating hours, and snow groomer data, all in one place.

# **Control the whole ski resort** – From a single reliable source

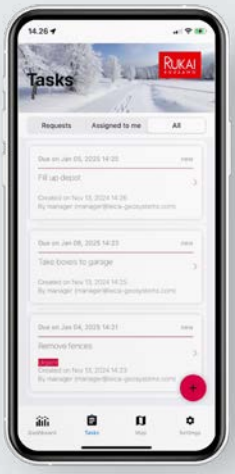
## Accurate Snow Measurements



**Features:** In Leica alpinePRO, users can analyse and create reports for a range of activities, including mapping resort areas used in the winter season, displaying areas per slope per machine, as well as providing volume calculation reports.

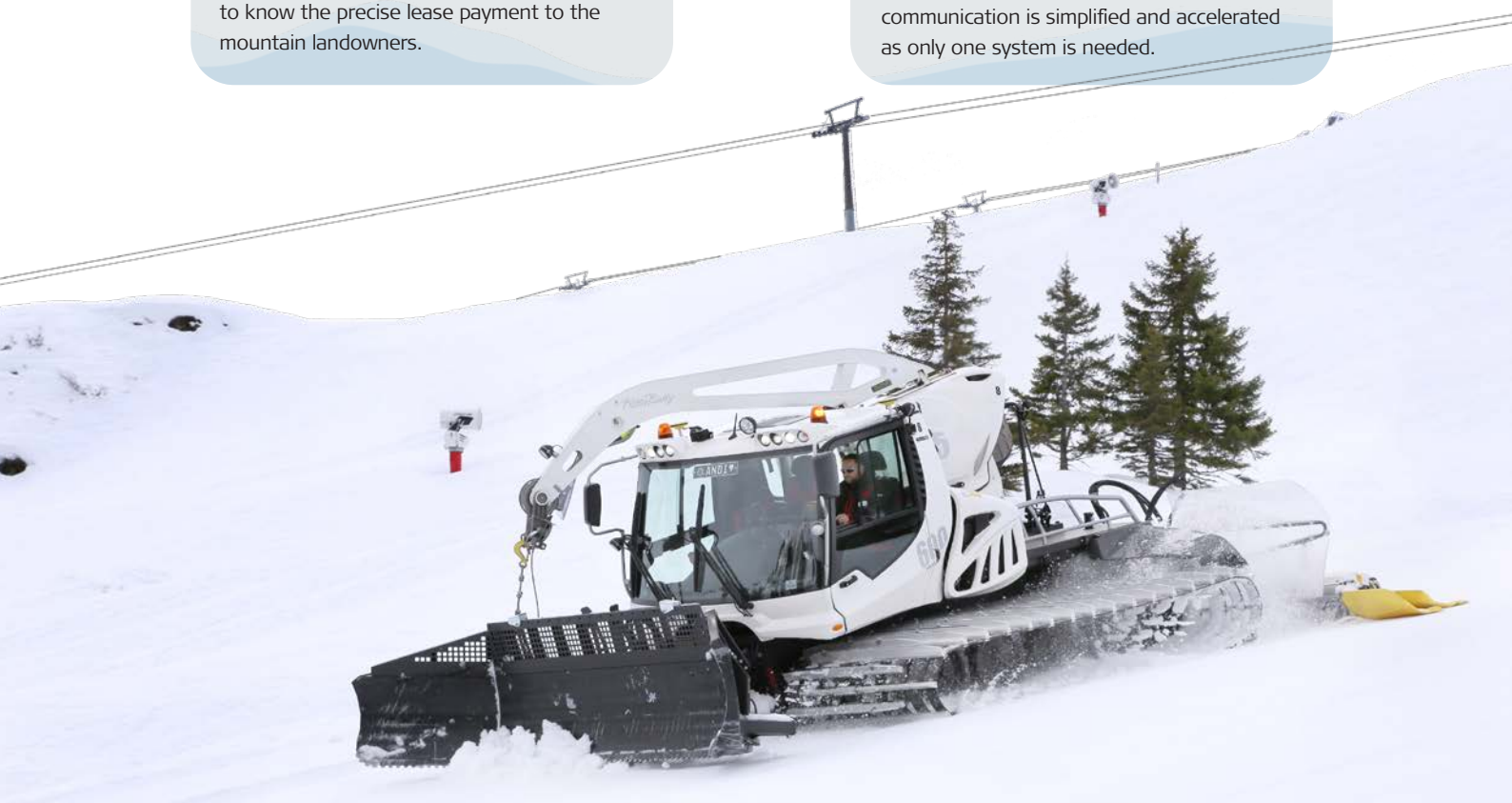
**Benefits:** Analysing snow data give more accurate snow production and grooming. The vehicle reports make users more aware of best practices for operator efficiency and the most productive usage of the machines, which can be tracked for future optimisation and fuel savings. Land usage reports allow resorts to know the precise lease payment to the mountain landowners.

## alpinePRO Phone App




**Features:** View the current and past snow depth when it's needed with the alpinePRO app. With the Task Manager, tasks can be assigned and managed directly on your phone. Employees can be notified quickly and respond to their tasks. Furthermore, reports can be created while you are out on the slope.

**Benefits:** No matter where you are in the resort, alpinePRO data can easily be displayed in the palm of your hand. The Task Manager provides a clear overview of team tasks, to ensure nothing is overlooked and maintaining a comprehensive history of past tasks. Team communication is simplified and accelerated as only one system is needed.



# **Leica iCON alpine** – Allocate snow exactly where you need it

## Sustainable

Implementing precise snow management practices ensures the efficient use of natural resources, reducing environmental impact and conserving energy.

- Minimises waste with optimised and precise snow planning and production
- Uses less energy through targeted snowmaking and grooming
- Predictive analytics plan for future snow needs, reducing reliance on technical snow
- Improve next seasons' material and energy utilisation by creating reports showcasing snow production, snow gun usage, snow groomer operation time and more

## Cost efficiency

Effective and targeted slope management extends the skiing season, significantly cuts operating costs, and promotes environmentally friendly practices.

- Lowers fuel consumption, vehicle hours and machine wear
- Track driving time and groomed area per slope per machine to optimise productivity and driving patterns, saving fuel and production time
- Prevents digging too deep, avoiding machine damage and surface utilities from costly repairs
- One solution for all, exploiting your investment – effortlessly transfer and use your Leica iCON alpine solution on your earthmoving machine for continuous off-season work

## Enhanced Safety

3D snow management offers a reliable solution for maintaining safe and optimal conditions on the slopes, ensuring both staff and visitor safety.

- Ensures precise snow distribution with even surface – likewise perfect when building complex competitive snow parks
- Reduces the risk of unexpected terrain changes, thus ensuring skier safety
- Maintains high standards and required safety for professional ski races
- Expand awareness on the resort by implementing the Leica Safety Awareness Solutions, avoiding collisions and preventing accidents on the slope

# Leica iCON alpine & alpinePRO
## Empowering People Behind the Perfect Slopes

*At the heart of every successful ski resort are the dedicated teams ensuring everything runs smoothly. With Leica iCON alpine and Leica alpinePRO, we are not just providing cutting-edge technology; we are transforming how people work.*
*With real-time insights and intuitive tools, your team can focus on what truly matters – creating unforgettable experiences for every skier.*

## Leica Geosystems – when it has to be right

With more than 200 years of history, Leica Geosystems, part of Hexagon, is the trusted supplier of premium sensors, software and services. Delivering value every day to professionals in surveying, construction, infrastructure, mining, mapping and other geospatial content-dependent industries, Leica Geosystems leads the industry with innovative solutions to empower our autonomous future.

Hexagon (Nasdaq Stockholm: HEXA B) has approximately 24,000 employees in 50 countries and net sales of approximately 5.2bn EUR. Learn more at hexagon.com and follow us @HexagonAB.

Swiss Technology
by Leica Geosystems

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**Leica alpinePRO flyer**

**Active Customer Care brochure**

**iCON gps 70/T flyer**

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