



HELIX

ENHANCING SAFETY,
PRODUCTIVITY, AND
AUTOMATION FOR
UNDERGROUND
MINING OPERATIONS

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OVERVIEW

MST Global's HELIX enterprise software platform is an innovative solution for modern mining operations. HELIX offers 3D visualisation, real-time data capture, integrated automation, and extensive customisation options via a geospatial digital twin of your mine's surface and underground operations. Enhance safety, increase productivity, and reduce costs with HELIX's modules, empowering informed decision-making and optimising your operations. Join the forefront of mining digitalisation technology and revolutionise your operations.



HELIX PLATFORM OVERVIEW

MODULAR SOLUTIONS FOR MINING OPERATIONS

The HELIX platform is a comprehensive and versatile solution designed to enhance mining operations through its modular capabilities. Each module, including HELIX Core, Automation, Sentinel, Telemetry, Sustainability, IoT, 3D Connect, BI, Dispatch, and Safety, provides specialised functionalities to optimise different aspects of mining. From real-time data capture and advanced automation to environmental monitoring and fleet management, HELIX integrates cutting-edge technology to streamline processes, improve safety, and drive efficiency. Its flexible architecture allows for seamless integration and customisation, making HELIX a powerful tool for modern mining operations.



3D CONNECT

INTERACTIVE SPATIAL INSIGHTS

HELIX 3D Connect is a real-time RTLS (Real-Time Location System) solution enabling communication with personnel and assets within the mine environment.



AUTOMATION

MINE-WIDE AUTOMATION

HELIX Automation enables the "intelligent mine", enhancing efficiency and safety using personnel and asset location intelligence for controlling fans, pumps, doors, and traffic lights



SENTINEL

ENHANCED SAFETY MONITORING

HELIX Sentinel, integrated into the HELIX platform, is an electronic tag-board system that visualizes the location of underground personnel.



DISPATCH

OPTIMIZE FLEET MANAGEMENT

HELIX Dispatch delivers unparalleled fleet management from the production face to surface and all points in between



IOT

SMART SENSOR NETWORK

HELIX IoT enables large-scale deployments for remote monitoring and automation use-cases across vast areas.



TELEMETRY

TRACK EQUIPMENT HEALTH

HELIX Telemetry reduces machine downtime and maintenance costs through real-time tracking and analysis, enabling informed decision-making and optimised performance.



BI*

DATA-DRIVEN DECISIONS

Business intelligence solution leveraging Komatsu mining analytics platform (KMAP) providing reports and predictive insights for your operations.



SUSTAINABILITY*

ECO-FRIENDLY MINING

HELIX Sustainability is an advanced module within the HELIX platform designed to promote and manage sustainable practices in mining operations.



SAFETY*

ENSURE WORKPLACE SECURITY

Safety module improves operational awareness for equipment personal, mobile workers and supervisory and management staff.

*** COMING SOON**



GEOSPATIAL DIGITAL-TWIN

Data is captured geospatially by real-time sensors, cameras, smart and edge devices, and wearables, all collected by a high-bandwidth, low-latency IP network. This network is agnostic to wireless solutions and features interoperability capability through MQTT. The HELIX platform provides an enterprise-level 3D visualization system that acts on this information, leveraging artificial and operational intelligence to improve safety and productivity in real-time.

HELIX offers comprehensive digital monitoring, automation, and control for mining and tunneling, covering the entire mine. It includes next-generation precision tracking, proximity detection, and collision avoidance, all unified by Ultra-Wide Band (UWB) technology with V2X data capability. This ensures enhanced operational safety and efficiency throughout the mining process.

How can HELIX address and solve the unique operational challenges faced by mining companies?

Our goal is to provide a scalable digital platform that enhances comprehensive mine safety and optimises productivity.

01

Key Challenges in Mining Operations

Safety Risks: Ensuring the safety of workers in hazardous conditions, managing real-time emergency response, and adhering to stringent safety regulations.

Operational Efficiency: Optimising resource allocation, maintaining equipment, and managing workflows to ensure continuous and cost-effective operations.

Environmental Impact: Minimising the environmental footprint of mining activities, managing waste, and ensuring compliance with environmental regulations.

Data Management: Handling large volumes of data from various sources, ensuring data accuracy, and utilising data effectively for decision-making.

Cost Control: Managing operational and capital expenses, reducing downtime, and implementing cost-saving technologies.

02

Need for Real-time Data and Automation

Real-time Operational Awareness: Eliminate data latency and gain a holistic view of the mining environment through real-time data capture and visualisation. This empowers faster response times to critical events and informed decision-making based on current conditions.

Enhanced Situational Intelligence: Leverage real-time data streams to generate actionable insights and predictive analytics. This enables proactive maintenance, optimised resource allocation based on dynamic needs, and improved safety protocols through risk anticipation.

Reduced Operational Friction: Implement automated workflows and machine-to-machine communication to streamline processes, minimise human error, and optimise resource utilisation. This translates to increased efficiency, reduced downtime, and improved overall production flow.

03

Safety and Productivity Concerns

Limited Environmental Awareness: Underground environments present inherent risks like gas leaks, equipment failure, and cave-ins. Real-time monitoring and location tracking are crucial for mitigating these risks and ensuring worker safety.

Data Silos and Delayed Insights: Fragmented data sources and delayed information hinder proactive safety measures and timely response to emergencies.

Inefficient Resource Allocation: Manual resource allocation processes can lead to underutilised assets and bottlenecks in production flow. Real-time data and analytics can optimise resource allocation based on dynamic needs and workload demands.

Limited Operational Visibility: Lack of real-time visibility into equipment health, asset location, and task completion can hinder proactive maintenance and timely intervention, leading to inefficiencies and production delays.

3D REPRESENTATION GIVES CONTEXT AT A GLANCE

HELIX 3D

GEOSPATIAL DIGITAL TWIN AND REAL-TIME LOCATION TRACKING SYSTEM

HELIX 3D Connect is a real-time RTLS (Real-Time Location System) solution enabling communication with personnel and assets within the mine environment.

Real-time Oversight: Gain real-time visibility across multiple mine sites for improved decision-making.

Multi-Positioning Technology: Utilise various positioning technologies like Wi-Fi, UWB, BLE, and GNSS with varying Quality of Positioning (QoP) options.

Customisable Insights: Create tailored dashboards and reports with relevant data for various user needs.

Scalable Tracking Views: Adjust the tracking view to match your specific requirements.

Direct Messaging: Streamline communication through in-app messaging directly on the tracking map.

Surface & Underground Visibility: Gain a comprehensive perspective by including surface maps alongside underground activities.
3D Visualisation: Experience a 3D representation of your entire mining environment (surface & underground) with support for different geospatial coordinate systems.
2D & 3D Views: Choose between 2D or 3D visualisations for surface and underground environments.

Real-time Tracking & Reverse Tracking: Track assets in real-time and reconstruct their historical movement outside communication range (reverse tracking).

Geofencing: Implement extensive geofencing capabilities with support zones and beacons.

Curious about the cutting-edge tracking technologies supported by HELIX 3D?

Enhance safety, optimize operations, and gain comprehensive visibility across your entire mining site with HELIX 3D.

HELIX 3D supports four advanced tracking technologies:

Wi-Fi Positioning

Leveraging existing Wi-Fi infrastructure, HELIX Wi-Fi Positioning enables real-time tracking of personnel and equipment. By calculating signal strength from strategically placed access points, it determines precise locations, enhancing both safety and operational efficiency.

Ultra-Wideband (UWB) Positioning

HELIX UWB Positioning provides highly accurate position tracking by measuring signal travel times between tags and anchors. This makes it ideal for complex underground environments where traditional tracking methods may falter. UWB's minimal interference with physical obstacles ensures reliable performance, which is particularly crucial for safety applications such as proximity detection and collision avoidance.

Bluetooth Low Energy (BLE) Positioning

HELIX BLE Positioning uses energy-efficient beacons with extended battery life, making them ideal for continuous use in mining environments. This technology is perfect for offering a scalable and cost-effective solution. Numerous beacons can be deployed to track personnel and assets with precision.

Global Navigation Satellite System (GNSS) Positioning

HELIX GNSS Positioning delivers accurate tracking for surface and near-surface operations, particularly for vehicles and heavy equipment. It covers large areas and provides precise position data, making it ideal for integration with fleet management systems.

THE CORE OF CONNECTED MINING

HELIX core

UNIFYING YOUR MINE'S OPERATIONS WITH CENTRALIZED CONTROL, SEAMLESS INTEGRATION, AND REAL-TIME INSIGHTS

HELIX Core is a vital module within the HELIX platform, acting as the engine that supports various critical functionalities. These include Wi-Fi tracking for tracking tags, Mine Phone, and VIP personnel, as well as network device management. Additionally, HELIX Core facilitates telephony services, including Push-to-Talk (PTT) and Session Initiation Protocol (SIP) communications.

Key Features:

Network Management: HELIX Core ensures the smooth operation and performance of the network infrastructure that underpins the HELIX platform. This includes tasks like device configuration, network monitoring, and troubleshooting.

Wi-Fi Tracking Engine: It processes and interprets Wi-Fi signals from tagged personnel and equipment, enabling real-time location tracking within the geospatial digital twin created by HELIX 3D.

Voice and Message Management: This functionality facilitates communication between personnel underground through functionalities like voice calls and text messaging. It integrates with the real-time location data, allowing for targeted communication based on location.

HELIX Core acts as the behind-the-scenes control center for the HELIX platform, ensuring

the network runs smoothly and supports features like Wi-Fi tracking and communication for a more efficient and connected underground mining operation.

Key Benefits:

Enhanced Operational Efficiency: Improves productivity through real-time data and automation.

Optimized Decision-Making: Facilitates informed decisions with comprehensive visualization.

Scalability and Adaptability: Adapts to varying operational scales and requirements.

Cost Efficiency: Reduces operational costs with tailored solutions and efficient data handling.

Improved Safety: Enables proactive monitoring and control for safer mining operations.

User-Friendly Interface: Enhances user experience with intuitive navigation and management.

Integrated Management: Centralizes software control and operational oversight for enhanced efficiency.

REAL-TIME FLEET MANAGEMENT AND PRODUCTIVITY TRACKING

HELIX dispatch

THE FLEET MANAGEMENT MODULE OF THE HELIX ENTERPRISE PLATFORM

HELIX Dispatch delivers unparalleled fleet management from the production face to surface and all points in between.

With its advanced automation features, HELIX Dispatch empowers dispatchers and supervisors to oversee shift plans, monitor performance, and address issues promptly. This integrated solution enhances equipment utilization, improves operational efficiency, and ensures timely material extraction, ultimately driving better decision-making and increased safety in mining operations.

Key Features:

Real-Time, Automated Production Tracking: Capture material movements without operator input and maintain material inventories in real-time.

Task Management: Enables identification of mining cycle inefficiencies and real-time monitoring of progress to production targets.

Time Tracking: Provides tools to manage time effectively, empowering dispatchers and supervisors to easily identify constraints and delays.

Single Source of Truth: Streamlines task lists for the entire fleet, increasing equipment utilization and maximizing material extraction.

Safety Check Lists: Enhances equipment operator safety with digitized pre-start checks and location safety checklists.

Extensive Feature Set: Includes both Core and Optional features to tailor the solution to specific operational needs.

HELIX Dispatch features essential modules for Production Tracking, Fleet Management, Material Management, and Safety Management, all designed to optimize efficiency, ensure safety, and streamline operations. These components work in unison to enhance productivity and resource management across your mining operations.

Production Tracking	Fleet Management	Material Management	Safety Management
Production Cycles	Short Interval Control	Material Inventory	Hazard Detection
Drilling	Equipment Status Tracking	Grade Tracking	Operator Qualifications
Consumables	Operator Messaging	Dump Assignments	Equipment Prestart
	Machine Hours	Draw Cards	Location Checklist
	Location Status Tracking		
	Crew Line-Up		

SEAMLESS INTEGRATION, PRECISION CONTROL

HELIX automation

TRACKING OF PROCESSES AND ALARM CONDITIONS – REAL TIME AND HISTORICAL

HELIX Automation solution boosts efficiency by automating manual tasks, freeing resources and enhancing productivity. Integration with third-party sensors and control tech boosts system capabilities, and customisable rules tailor automation to specific needs. Multiple control units centralise management, ensuring efficient operations. Pre-written sensor templates streamline setup, saving time and effort during implementation.

Key Features:

Drools Integration: Leverage Drools for rule-based automation programming.

Geospatial & Multi-Controller Rule

Management: Script and manage rules that consider spatial context and operate across multiple controllers.

Customisable Dashboards: Design dashboards to visualise critical process variables and sensor data.

Optional Manual Control: Implement “soft buttons” for manual control of outputs.

Flexible Reporting: Generate and export in-depth reports from historical data.

MQTT and Modbus: These protocols enable seamless integration with various IoT systems and facilitate Machine-to-Machine (M2M) communication, supporting applications using compatible end devices (e.g., Fans for Ventilation on Demand, Door Control).

HELIX Automation is the HELIX application that delivers the full functionality of AXON Control.

Key Benefits:

Enhanced Automation Control: Full functionality of AXON Control for precise automation.

Simplified Rule Management: Easy scripting and management of complex automation rules.

Seamless IoT Integration: Smooth integration with IoT systems and devices for advanced monitoring and control.

Flexible Deployment: AXON Core and Dock provide versatile setup options for various applications.

Comprehensive Monitoring: Real-time and historical data for proactive management.

Advanced Wireless Connectivity: Access emerging wireless technologies for extensive monitoring and control capabilities.

Safe and Efficient Operations: Improve operational safety and efficiency through robust automation and monitoring solutions.

HELIX AUTOMATION & AXON CONTROL

INTELLIGENT INTEGRATION, ENHANCED EFFICIENCY

HELIX Automation seamlessly integrates with AXON Control, providing a robust solution for managing and automating mining operations. This interaction enables the creation and execution of complex Boolean logic and geospatial rules through an intuitive interface. AXON Control units receive and process these rules, facilitating real-time adjustments and automation of critical tasks. The system supports flexible dashboards for monitoring process variables, sensor values, and manual control of outputs. By leveraging the combined capabilities of HELIX Automation and AXON Control, mining operations can achieve heightened efficiency, precise control, and improved safety across all activities.



TRANSFORMING MINE SAFETY AND EFFICIENCY

HELIX sentinel

ELECTRONIC TAG- BOARD SOLUTION: KNOW PERSONNEL LOCATIONS UNDERGROUND

Digitally manage personnel location and well-being with HELIX Sentinel.

HELIX Sentinel, integrated into the HELIX platform, is an electronic tag-board system that visualizes the location of underground personnel. With access to a digital dashboard, users can easily track individuals within specific zones. Deploy multiple tag-boards on flat screens in key areas for real-time awareness. Sentinel provides intuitive, customisable visual cues for proactive personnel management and optimised mining operations, delivering tangible benefits.

Key Features:

Digital Tagboard: HELIX Sentinel replaces traditional physical tagboards with a digital solution. Easily track the location and status of equipment and personnel in real-time using the HELIX 3D geospatial digital twin.

Enhanced Communication: Facilitating communication between personnel by integrating with other HELIX modules, potentially allowing features like location-based messaging or real-time alerts.

Improved Visibility: By visualising the location and status of personnel and equipment on the geospatial digital twin, HELIX Sentinel provides a clear picture of underground activities, enhancing overall situational awareness for better decision-making and faster response times.

Streamlined Workflow Management: With real-time location data and improved communication, HELIX Sentinel can potentially automate tasks related to dispatching personnel and equipment, optimising workflow management.



ENSURING SAFETY THROUGH REAL-TIME TRACKING

HELIX Sentinel prioritises both safety and operational efficiency by combining real-time personnel location and activity tracking, with automated zone monitoring, streamline operations and resource allocation. Proactive alerts for safety protocol violations and incident response are facilitated by continuous monitoring, while automated data analysis empowers data-driven decision-making, ultimately enhancing productivity and worker safety.

Key Benefits:

Enhanced Safety Monitoring: Provides real-time tracking of personnel and equipment to ensure safety in mining operations.

Proactive Incident Response: Alerts and notifications for immediate action in case of safety breaches or emergencies.

Comprehensive Environmental Monitoring: Tracks environmental conditions such as gas levels, temperature, and humidity to maintain a safe working environment.

Improved Operational Efficiency: Optimizes resource allocation and operational processes through detailed monitoring and data analysis.

Seamless Integration: Easily integrates with existing systems and IoT devices for a unified monitoring solution.

User-Friendly Interface: Intuitive dashboards and reports for easy access to critical information.

Scalability and Flexibility: Adapts to the unique needs of various mining operations, from small-scale projects to large, complex mines.

SMART, SCALABLE, REAL-TIME MONITORING

HELIX IoT

IMPROVE PRODUCTIVITY AND MITIGATE RISK WITH A SCALABLE IOT SOLUTION

HELIX IoT empowers large-scale deployments of battery-powered IoT devices across vast areas. Its long-range, low-power communication capabilities ensure seamless operation, while its scalable architecture effortlessly integrates diverse sensor fleets from multiple vendors. This interoperability and user-friendly plug-and-play experience make HELIX IoT ideal for a wide range of applications, enabling valuable operational insights from expansive networks.

Key Features:

Scalable IoT Sensor Network: Supports a wide range of LoRa sensors for diverse mining operational use cases.

End-to-End LoRAWAN Solution: Complete sensor monitoring solution integrated through AXON Gateway and HELIX platform.

Individual Sensor Dashboards: Displays processed sensor data on customized dashboards.

Threshold-Based Notifications: Configurable alerts for critical situations based on sensor data thresholds.

Long-Range Communication: Impressive communication range with minimal power consumption for battery-operated IoT devices.

Interoperability: Seamless communication

across devices from different manufacturers.

Plug-and-Play Experience: Preconfigured sensors and dashboards for easy deployment and use.

Key Benefits:

Enhanced Productivity: Improves operational efficiency by providing real-time insights and proactive monitoring.

Risk Mitigation: Early detection and response to critical situations through configurable notifications.

Scalability and Flexibility: Accommodates large sensor fleets and various IoT devices as your network expands.

Cost Efficiency: Minimizes downtime and maintenance costs with proactive monitoring.

Interoperable Ecosystem: Freedom to mix and match devices, ensuring flexibility in building your IoT infrastructure.

Streamlined Deployment: Plug-and-play setup with preconfigured sensors for quick implementation.

Versatile Applications: Supports a wide range of applications including water management, ventilation monitoring, fluid monitoring, and environmental monitoring in mining operations.

POWERING OPERATIONAL INTELLIGENCE

HELIX telemetry

**MINIMISE
DOWNTIME AND
MAINTENANCE
COSTS WITH
REAL-TIME
DATA TRACKING
FOR SMARTER,
MORE EFFICIENT
OPERATIONS.**

Designed for advanced data collection and monitoring.

HELIX Telemetry enables the real-time tracking and analysis of various operational metrics, facilitating informed decision-making and optimised performance.

Key Features:

Informed Decision-Making: Facilitates real-time tracking and analysis for optimized performance.

Enhanced Efficiency: Improves operational efficiency through comprehensive telemetry solutions.

Proactive Alarm Management: Immediate response capabilities for critical alarms.

Operational Continuity: Ensures data availability even outside communication range.

Comprehensive Data Analysis: Enables thorough analysis with visualization and export tools.

Seamless Integration: Supports multiple OEM interfaces and combines data seamlessly.

Improved Safety and Performance: Empowers mining personnel with timely information and notifications.

Geo-tagging: Provides visualisation of sensor and alarm events on the HELIX 3D map for added operational context.

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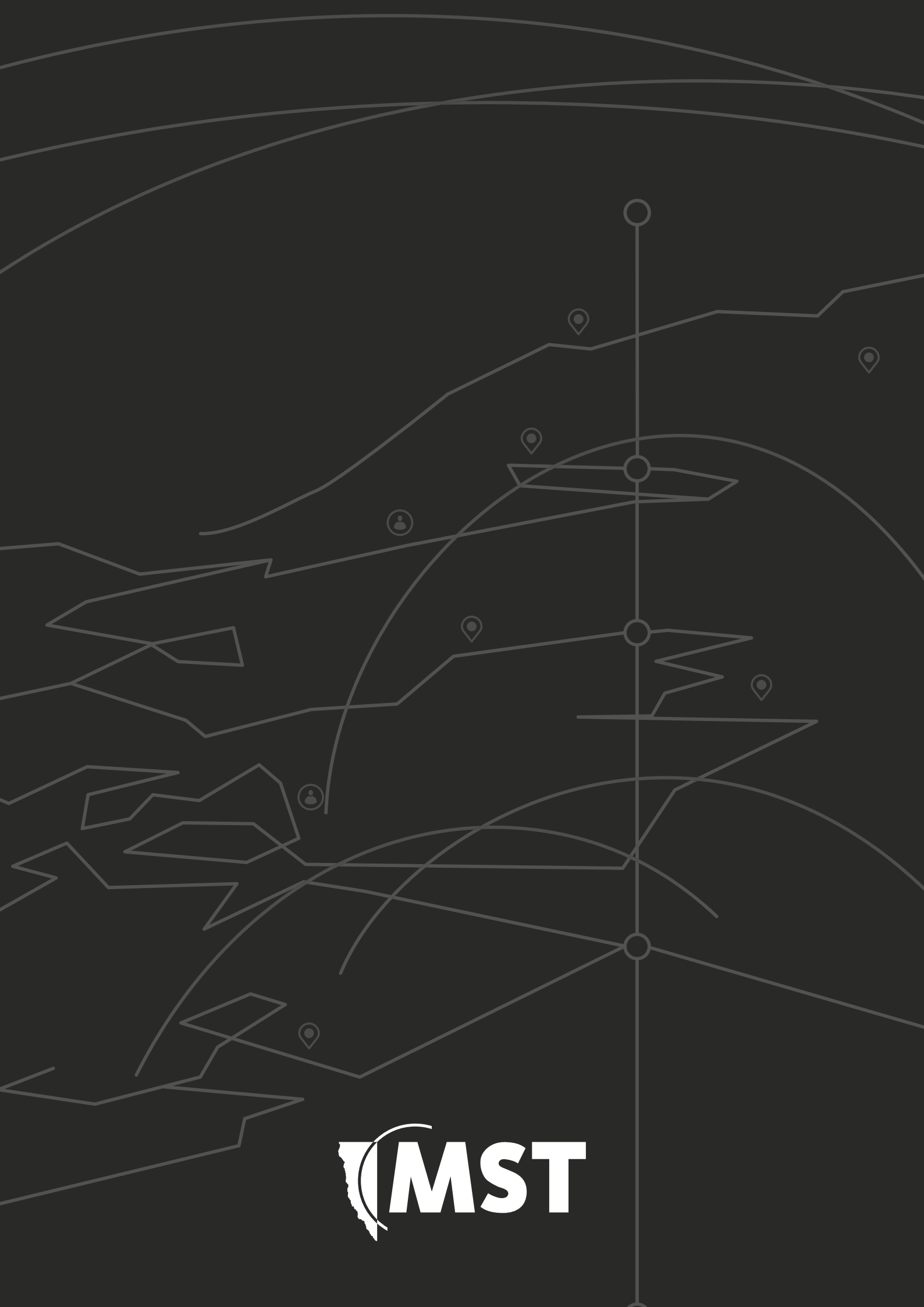
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