



# Tunnelling Asia' 2022

International Conference on  
Underground Space : The Need of the Day



ASSOCIATION  
INTERNATIONALE DES TUNNELS  
ET DE L'ESPACE SOUTERRAIN

AITES

ITA  
INTERNATIONAL TUNNELLING  
AND UNDERGROUND SPACE  
ASSOCIATION

## **NORMET**

### **TYPES OF MACHINES AND SUPPORT SYSTEMS**

by

**PUNEET NARULA- GENERAL MANAGER**

NORMET INDIA PRIVATE LIMITED

*puneet.narula@normet.com*

# SAFETY IS OUR PRIORITY

## With safety we:

- › Foster a safe, healthy and inspiring work environment for our employees and partners
- › Support the safety and environmental expectations of our customers and stake holders



# OUR MISSION AND VISION

## MISSION

To improve underground mining and tunnelling processes using our expertise and technology for the benefit of our clients and society.

## VISION

We help our mining and tunnelling partners to continuously improve their processes, increase the safety and productivity of their underground activities, and improve the sustainability of their operations.



# OUR CUSTOMERS



**MINING COMPANIES  
AND CONTRACTORS**

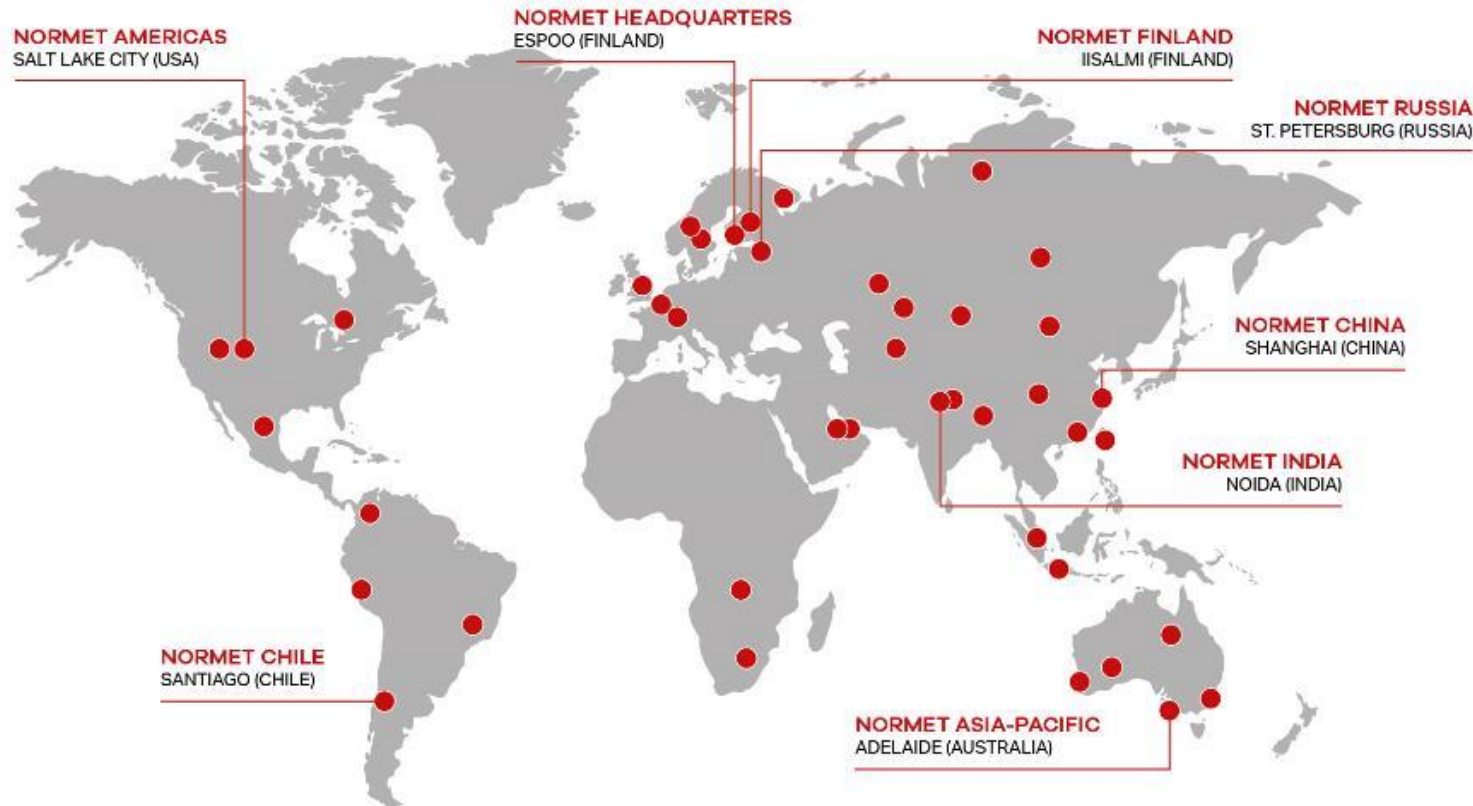


**TUNNELLING  
CONTRACTORS**



**CIVIL  
CONTRACTORS**

# AS GLOBAL AS POSSIBLE AS LOCAL AS NECESSARY



**NORTH AMERICA**  
Canada  
Mexico  
USA

**SOUTH AMERICA**  
Brazil  
Chile  
Colombia  
Peru

**EUROPE**  
Finland  
France  
Norway  
Russia  
Sweden  
Switzerland  
United Kingdom

**AFRICA**  
South Africa  
Zambia

**ASIA**  
China  
Hong Kong  
India  
Indonesia  
Kazakhstan  
Mongolia  
Qatar

Russia  
Singapore  
Taiwan  
United Arab Emirates  
Uzbekistan

**AUSTRALASIA**  
Australia

**Normet has manufacturing facilities in:**

- Finland (main)
- Norway
- Sweden
- United Kingdom
- Indonesia
- Taiwan
- India
- Australia
- USA
- Mexico
- Brazil
- Chile
- Mexico

# NORMET HISTORY

**normet**

1960

1970

1980

1990

2000

2010

2020



**1962**

Normet was founded  
(Peltosalmen  
Konopaja)

**1972**

Normet starts making  
mining machines and  
becomes Normet Oy



**~1975**

First explosives (anfo)  
charging machine  
PK1300



**~1979**

First dumper,  
PK 3000

**1983**

Normet's 1st  
spraying machine  
Normet RBY 800



**1985**

First emulsion  
charger

**1989**

First scaling machine



**1990**

Development of  
tunnelling equipment  
offering

**1991**

Multimec slide on and  
off cassette system



**1995**

Himec the lifting  
offering for tunnelling



**2005**

Normet Service

**2008**

NorSmart CAN  
control system



**2010**

Acquisition of TAM  
International  
Basis for the construction  
chemical business

**2013**

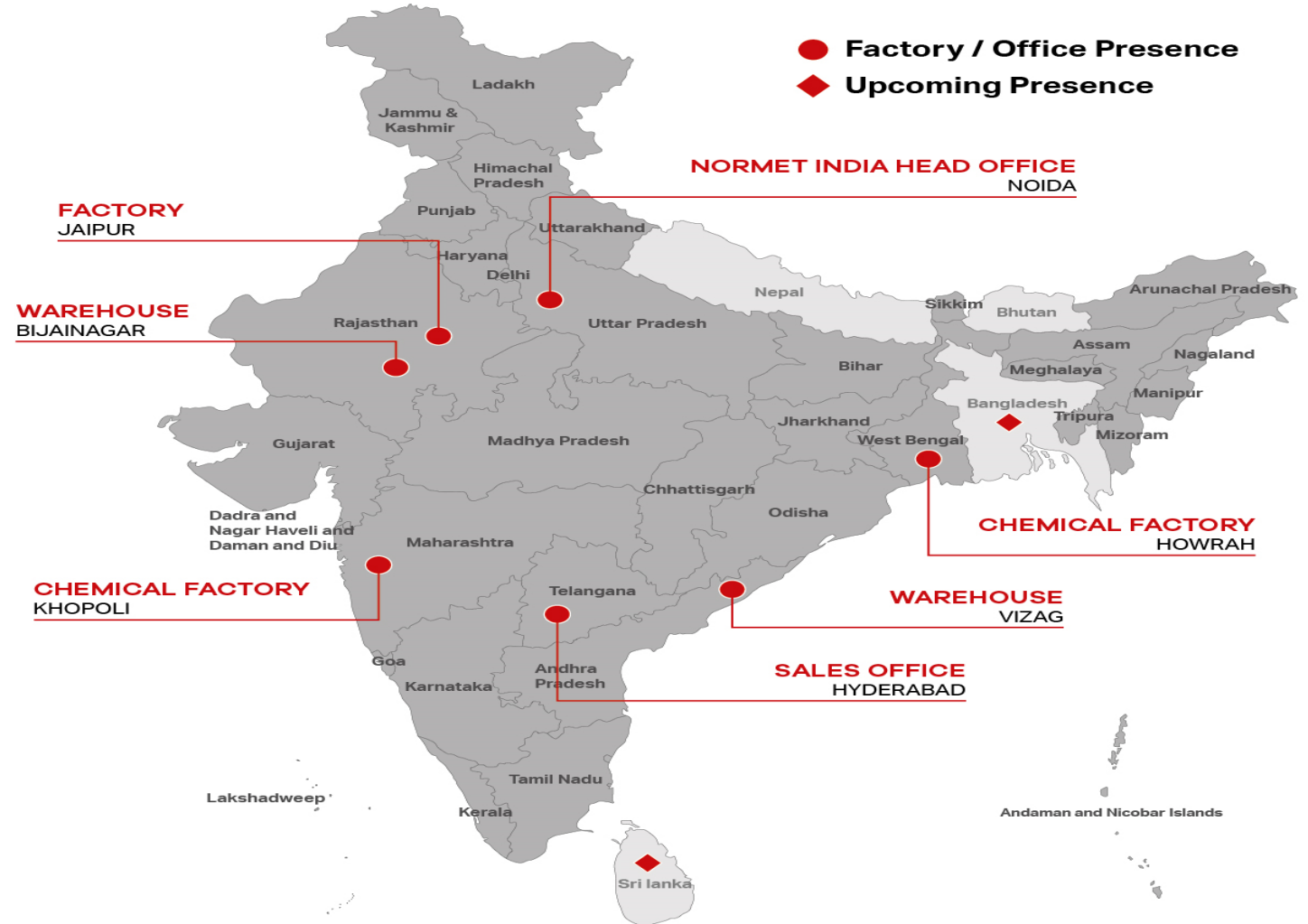
Acquisition of Dynamic  
Rock Support AS  
Basis for the rock reinforcement  
business



**2019**

SmartDrive & other  
new technologies  
launch at Bauma

# NORMET PRESENCE IN INDIA



**Active Fleet**  
Mining – 320+  
Tunnelling- 125+

# NEW FACILITY-COMING IN INDIA

**Project :- Normet Centre of Excellence**

**Address :- Plot No.DTA-02-01 & 01A, Domestic Tariff Area, Phase-II,**

**Mahindra World City, Sanganer, Jaipur, Rajasthan- 302037 INDIA**

**Distance from Jaipur International Airport :- 27.2KM**

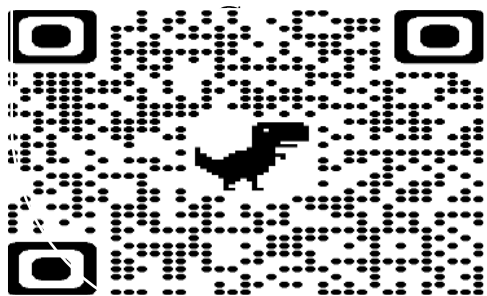
**Plot Area :- 9.92Acre [40,169 Sq-mtr]**

**Main Building of Factory :- 12,236 Sq-mtr**

**Office Building :- 1,755 Sq-mtr [G+1]**

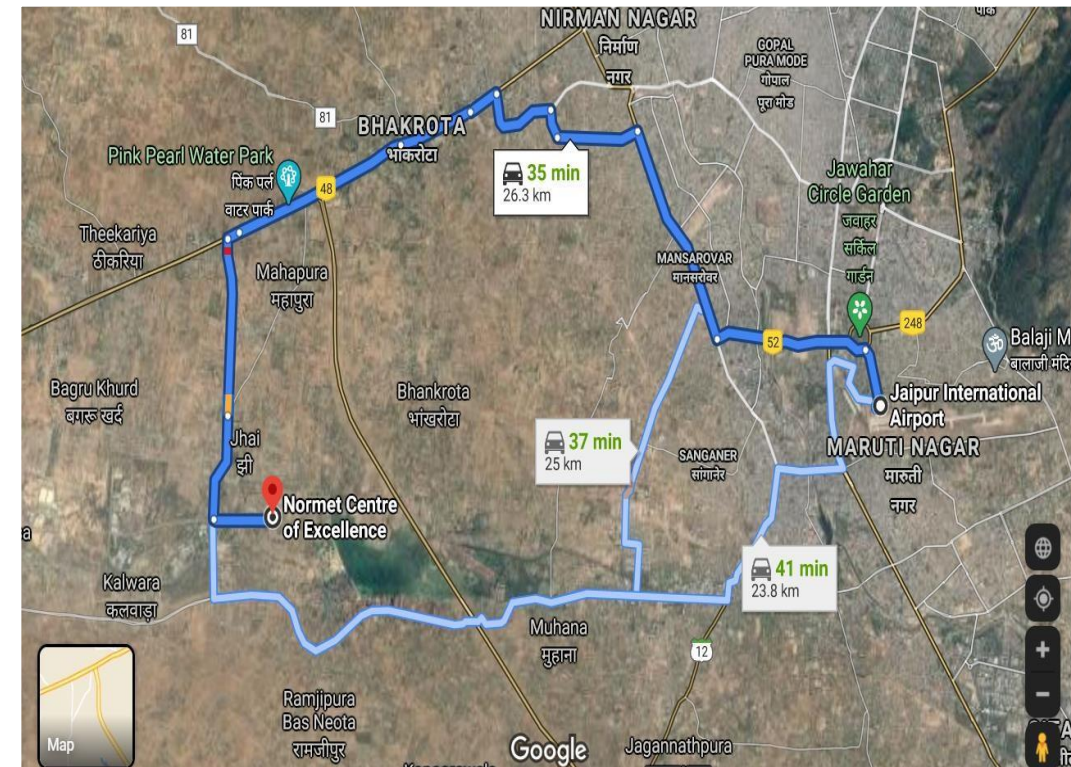
**Facilities :- a) Equipment Assembling b) Global R&D**

**c) Service-Rebuild d) Training**



*Scan QR code  
for location*

## Project Location

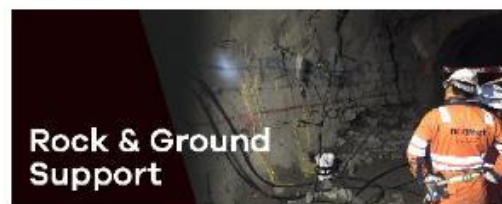




# CUSTOMER PROCESSES

In-depth customer application knowledge is the key to providing superior customer value added technological solutions.

**Normet provides advanced solutions for selected customer processes:**



# OUR BUSINESS LINES



## EQUIPMENT

- Concrete spraying
- Concrete transportation
- Charging
- Scaling
- Logistics
- Lifting and installations
- Used equipment



## SERVICES

- Spare parts and consumables
- Scheduled and preventive maintenance
- Training and expertise services
- Rebuilds
- Field services
- Upgrades
- Rental services
- Service agreements
- Process solutions
- Sprayed concrete batching plants



## GROUND CONTROL AND CONSTRUCTION CHEMICALS (GCCT)

### CONSTRUCTION CHEMICALS

#### Concrete admixtures

- Sprayed concrete
- Precast concrete
- Cast-in-place concrete

#### Waterproofing

- Spray-on lining
- Leak sealing

#### Injection

- Water control
- Ground consolidation

#### Tunnel boring machinery

- Soil conditioning
- Tail shield sealant

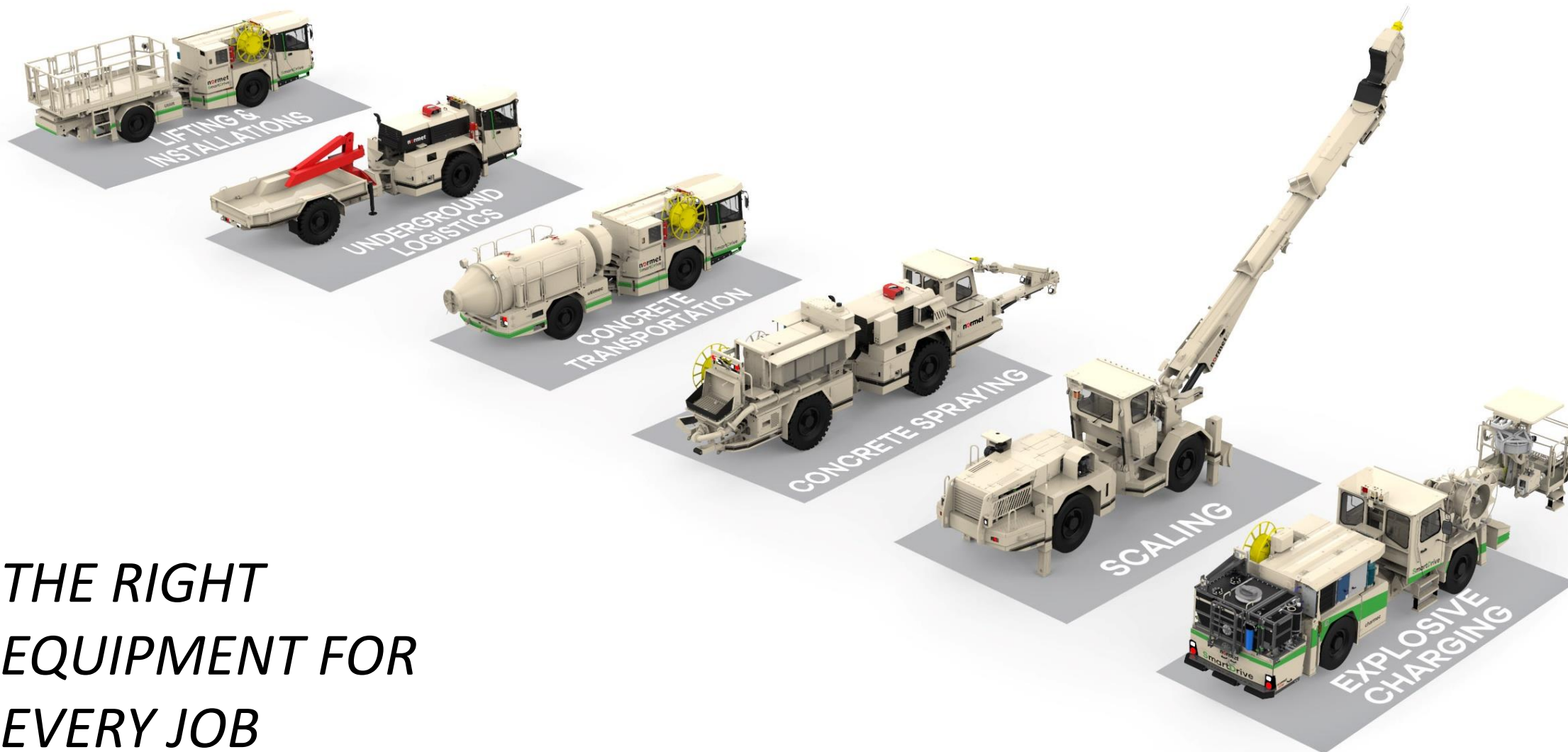
#### Spray-on support liner

#### Mine backfill

### ROCK REINFORCEMENT

- D-Bolt® rock reinforcement element
- Self-Drilling Anchor system

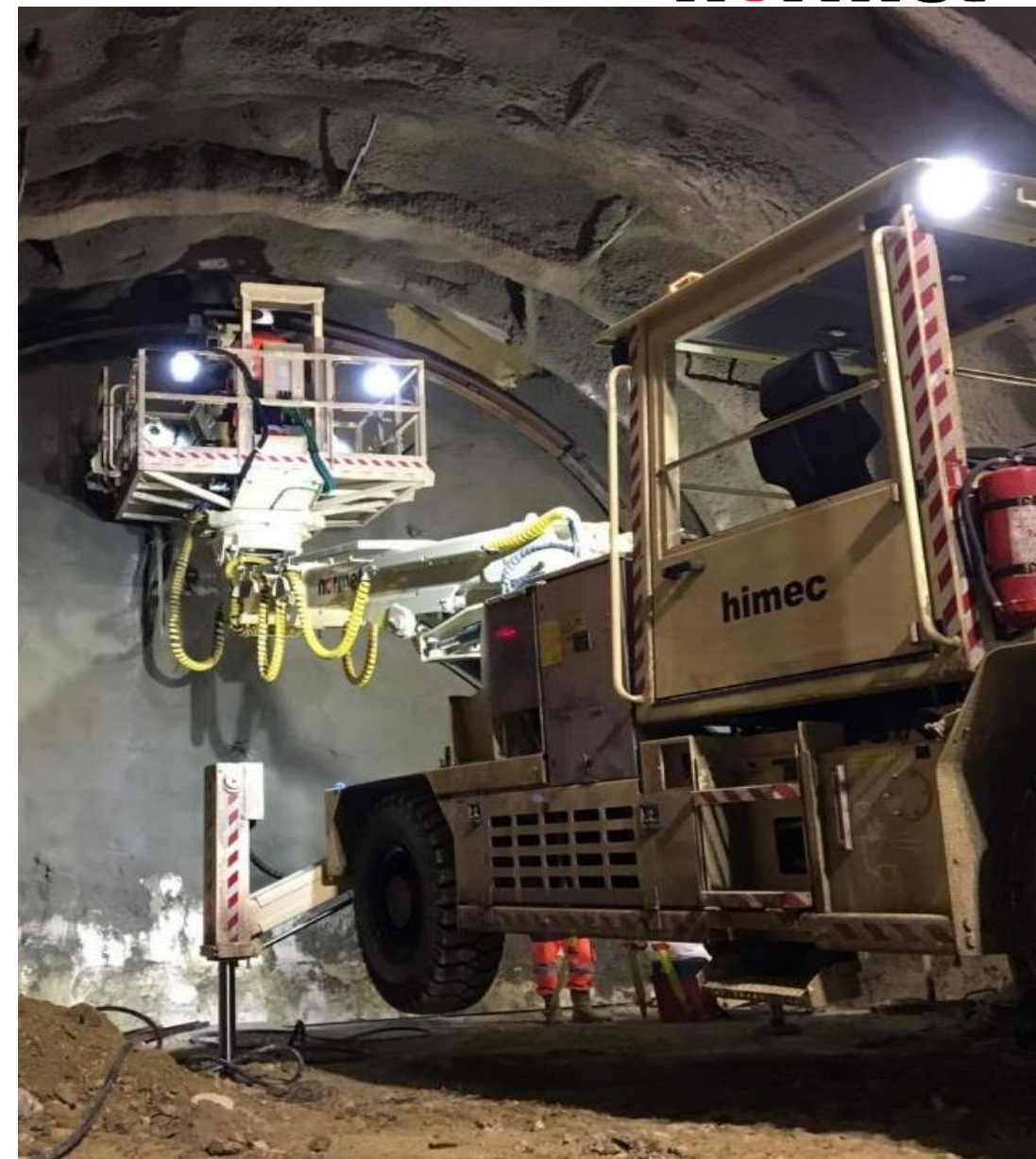
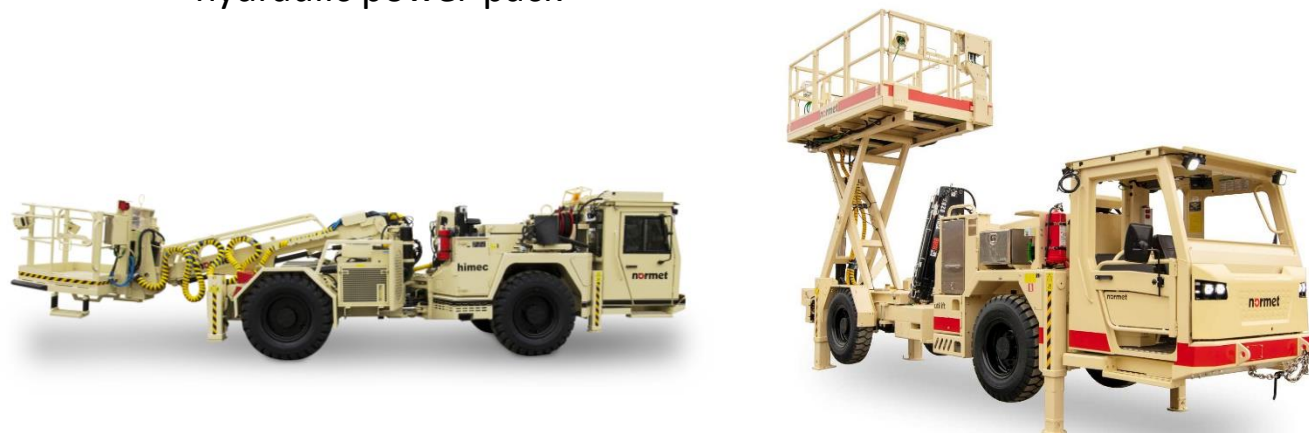
# NORMET EQUIPMENT OFFERING



*THE RIGHT  
EQUIPMENT FOR  
EVERY JOB*

# LIFTING & INSTALLATIONS

- › All Normet person lifters are designed for harsh underground environment, emphasizing safety and productivity
- › Normet has a large choice of different models available, from very small mining tunnels to large traffic tunnels
- › Optional accessories are designed for different tunnelling tasks, for example arch lifting manipulator, remote driving system etc.
- › Equipment are powered either by diesel engine or electro-hydraulic power pack



# EXPLOSIVES CHARGING

- › Normet can offer fully equipped anfo or emulsion charging equipment or carriers for 3<sup>rd</sup> party emulsion units
- › Large variety of different kind of booms available, with 4-12 m reach
- › Charmecs has been developed for different customer demands such as continuous anfo charging, special charging system for Chinese powder anfo, hose feeder and manipulator for long hole charging
- › Equipment are powered either by diesel engine or electro-hydraulic power pack



## Charmec TBC 905 - ANFO Charging System

- ANFO charging system is based on pressure vessel ejector principle enabling best possible adjustability for different ANFO types and flows
- All stainless steel ANFO tanks are designed and tested pressure vessels enabling safest possible operations. Design according to PED European Pressure Equipment Directive & EN 13445.
- Ejectors are located right after tank outlet bend to give kinetic energy boost and extra air to ANFO flow.
- More air means practically more speed increasing in hole density. Higher in hole density increases VOD and fragmentation which makes easier to haul detonated rock pile
- Blow function makes possible to clean and remove water even from lifter holes



## Productivity & Cost Benefits

### Anfo charging

Bulk Anfo cost	7355	INR
Cartridge cost	26730	INR
Detonator, Booster cost	3642	INR
Equipment cost	21000	INR
Work cost	1200	INR
Ventilation cost	0	INR
<b>Total cost</b>	<b>59927</b>	<b>INR</b>
<b>Total time (charging + ventilation)</b>	<b>2.0</b>	<b>h</b>
<b>Specific charge</b>	<b>1.39</b>	<b>kg/m3</b>

### Cartridge charging

Cartridge cost	67185	INR
Detonator, Booster cost	1092	INR
Equipment cost	14000	INR
Work cost	6000	INR
Ventilation cost	0	INR
<b>Total cost</b>	<b>88277</b>	<b>INR</b>
<b>Total time (charging + ventilation)</b>	<b>4.0</b>	<b>h</b>
<b>Specific charge</b>	<b>1.02</b>	<b>kg/m3</b>

**Tangible benefits per 3.0 meter of advance: INR 28350 for tunnel dimension 8.0 M X 7.9 M**

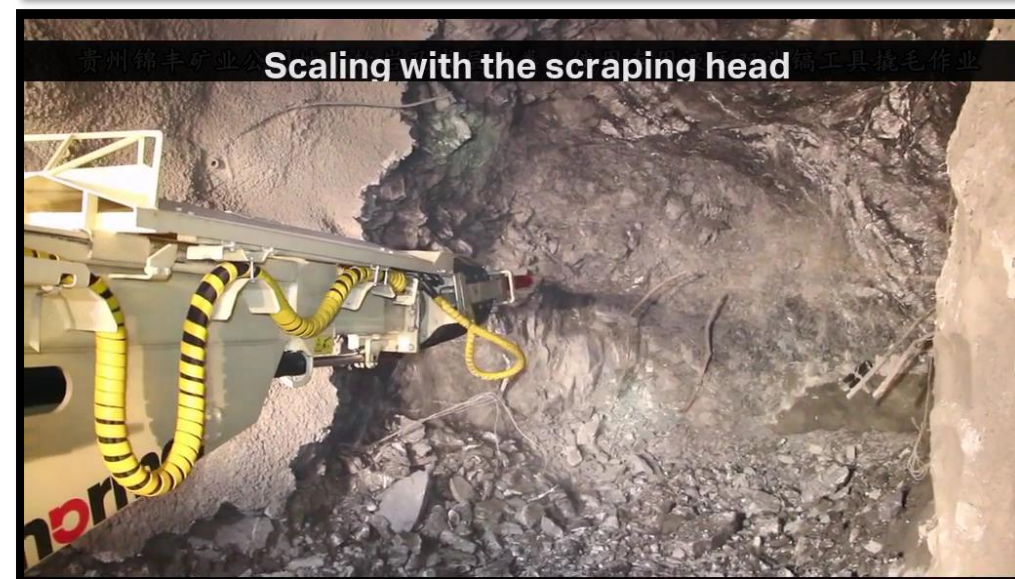
**Productivity benefits per 3.0 meter of advance: 120 Min for Tunnel dimension 8.0 M X 7.9 M**



- ❑ Safer, Simpler and Reliable charging
- ❑ Cost benefits in excess to 32% in comparison to conventional packaged explosives charging.
- ❑ 50% greater productivity enhancement.
- ❑ Extremely safer & automated operations lead to uninterrupted operations resulting in to saving significant man hours.
- ❑ Greater efficiency while working in partially inundated faces.
- ❑ More than 15% saving on product wastage.
- ❑ Elimination of dilution of product in comparison to conventional ANFO charging resulting in to greater product performance.

# SCALING

Normet's Scamec scalers are built to improve safety and productivity in underground scaling process and contribute to safest and cost-effective mechanized way to scale, with consistently high resale value and low lifetime costs.





# SPRAYED CONCRETE SPRAYERS

## STATE-OF-THE-ART CONCRETE SPRAYING EQUIPMENT USING THE LATEST TECHNOLOGIES

- › Innovative low-pulsation concrete pump guarantees continuous concrete delivery
- › Highly accurate accelerator dosing system to increase work safety and reduce costs
- › Agile and precise spraying boom for effortless spray application
- › Large volume air compressor for good compaction of the sprayed material
- › Reliable control system and electrics for harsh underground environments
- › Designed for safety and durability
- › Designed with emphasis on easy maintenance and serviceability



# Alpha 1430

## Truck Mounted Shotcrete Machine



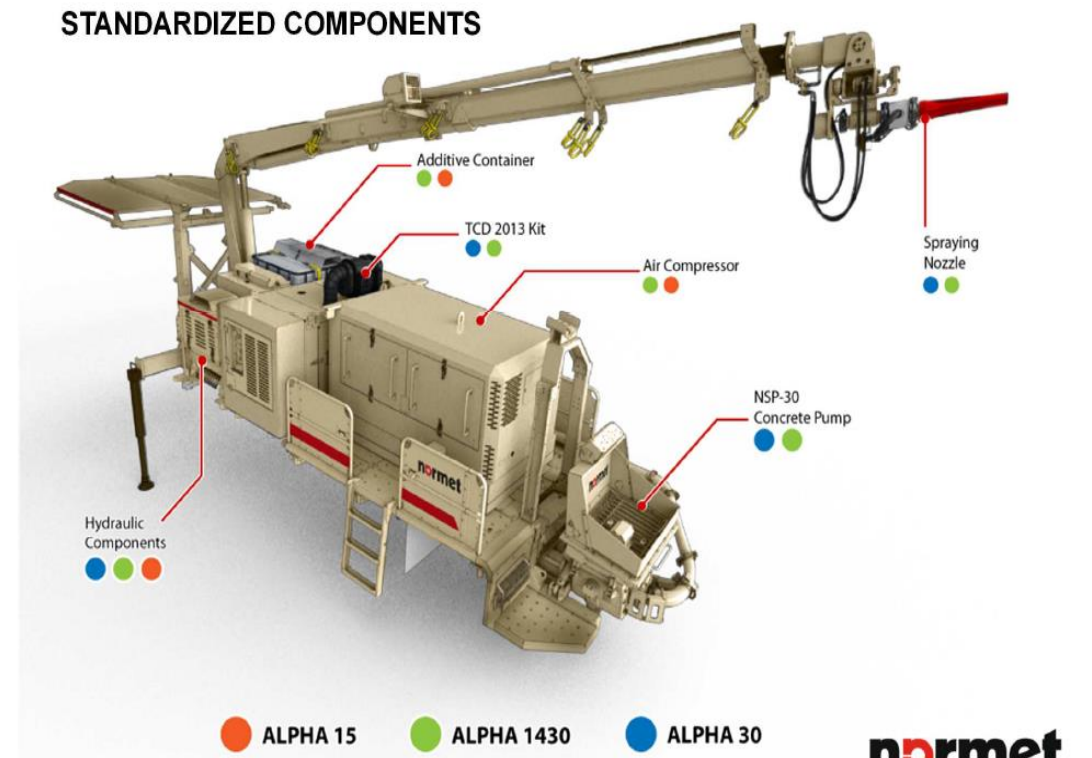
## Salient Features

- Mounted on Ashok Leyland Chassis
- Fitted with ELGI Air Compressor
- 90% Indigenised Product
- Made In India
- Centralised Lubrication System
- High Pressure Washing System
- Articulated Boom
- Ideal for Tunnels from 5 M to 14 M Height
- Quick Mobility
- Ease of Maintenance
- Low maintenance Cost

# Standardisation & Modularization

- Common Components of all Alpha Series Machines
- On board high capacity air compressor
- On board high capacity powerpack
- Trusted low pulsation NSP-30 , S- Valve Shotcrete Pump
- Adaptable to Diesel Drive
- On Board High pressure washing system
- Centralised Lubrication System
- Easily accessible components for maintenance
- Articulated Telescopic Boom with Nozzle Rotary Head
- Norsmart Accelerator Dosing system

## ADVANTAGES: Modularization

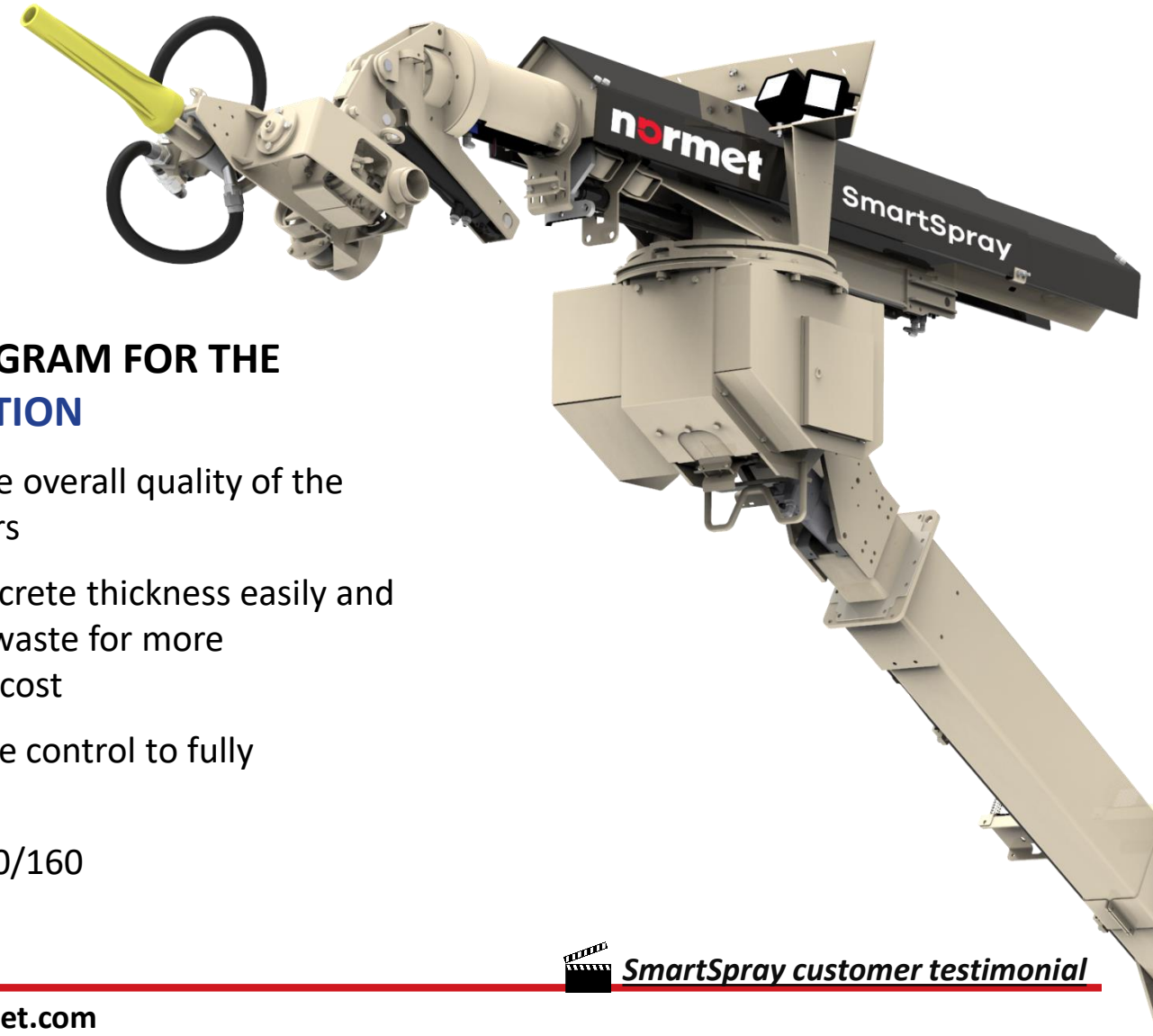


# SPRAYED CONCRETE TECHNOLOGIES

**normet**  
SmartSpray

## NORMET SMARTSPRAY IS THE TECHNOLOGY PROGRAM FOR THE AUTOMATION OF THE CONCRETE SPRAY APPLICATION

- › Decreases the ergonomic strain and helps to improve the overall quality of the application by beginners as well as experienced operators
- › Supports the operator to achieve the target sprayed concrete thickness easily and over a long period, at the same time reducing concrete waste for more environmentally friendly operation and lower operating cost
- › Three levels of automation available from nozzle distance control to fully automated spraying
- › Available for Normet Spraymec 8100 and NorRunner 140/160



# SPRAYED CONCRETE TECHNOLOGIES

**normet**  
SmartScan

## NORMET SMARTSCAN SYSTEM ENABLES IMMEDIATE **THICKNESS CONTROL AND DOCUMENTATION** OF THE SPRAYED CONCRETE LAYER

- › Helps to achieve the required minimum thickness of the concrete layer to ensure a safe underground operation
- › Minimizes over-spraying and thus reduces costs and time for rework
- › Gives instant feedback of the sprayed concrete layer allowing immediate corrective measures
- › Enables complete and timely documentation of the concrete spray application
- › Designed for underground use with minimum interaction by the operator
- › Normet SmartScan is available for new spraying equipment as well as retrofits for existing concrete spraying machines

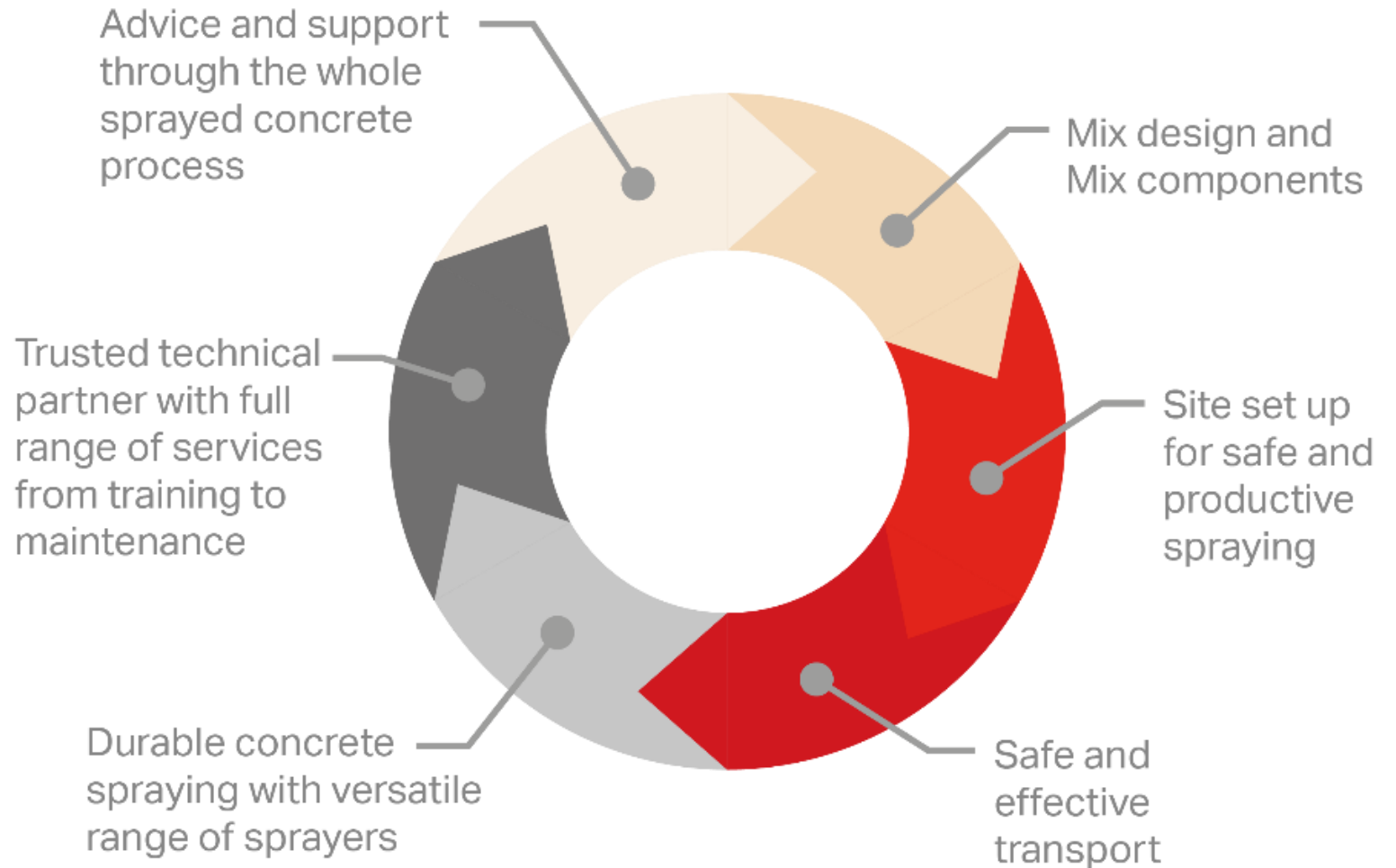


*SmartScan customer testimonial*

# SPRAYED CONCRETE APPROACH

## UNDERSTANDING YOUR NEEDS

- › Leading experts with knowledge and experience around the world
- › Normet provides the latest construction chemicals and equipment in the tunnelling and mining market
- › Industry leading technology
- › State-of-the-art training approaches to increase the skill level in every state of sprayed concrete process



# TRAINING ON SIMULATOR

## WHY CHOOSE SIMULATOR TRAINING?

- › On average, simulators improve operator efficiency by 23%
- › Faster, more effective learning
- › Certified trainers

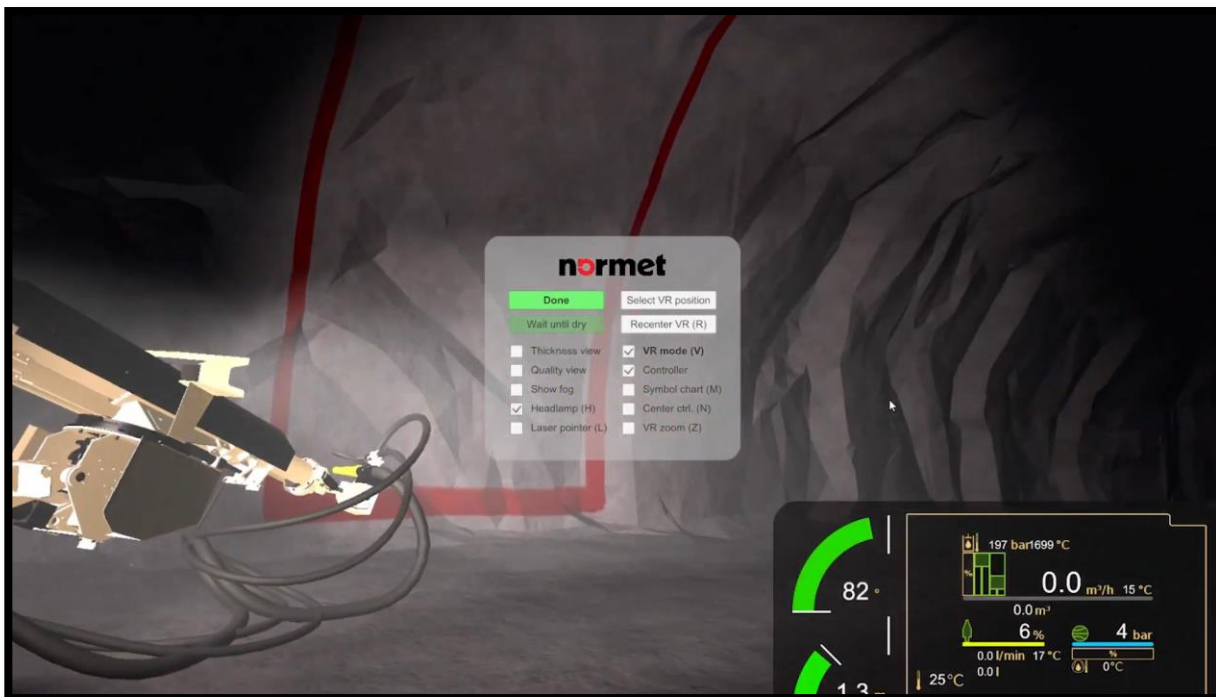
Skilled operators increase profitability by improving productivity and reducing downtime.

Reduce material consumption – less concrete sprayed, less accelerator used, and less rebound.

Improve safety with the correct operating procedures.

Courses for all skill levels, from basic, to advanced, and master levels.

Training where you want it – on your premises or at Normet facilities.



## SIMULATORS FOR SAFE TRAINING

Normet developed simulators to make training safe, efficient, and environmentally-friendly. With our simulators, we can train your staff how to use different types of Normet equipment in different working environments at your location. Simulators also reduce training costs because trainees can practice without wasting fuel or materials, and without diverting any equipment from active work.



# NORMET TECHNOLOGIES

**normet**  
SmartDrive

## NORMET SMARTDRIVE FOR MORE SUSTAINABLE UNDERGROUND OPERATIONS

- › Normet's battery electric architecture Normet SmartDrive provides improved performance with zero local emissions
- › Provides savings in ventilation and cooling and eliminates fuel & fuel transportation costs with lower equipment maintenance costs
- › Long life industrial Li-ion batteries are fast charging capable, and they recuperate energy in downhill driving
- › Visit [normet.com/smartdrive](https://normet.com/smartdrive) to see the full range of SmartDrive equipment and battery chargers available





# SMARTDRIVE EQUIPMENT OFFERING OVERVIEW

*Normet battery electric vehicle (BEV) offering*



[Normet SmartDrive introduction video](#)



[Normet SmartDrive driver assisting functions and benefits in logistics video](#)

# KEY BENEFITS COMPARED TO DIESEL

0 % local emissions

High productivity, up to 25 % faster cycles

Even 30 % less maintenance costs

Long-life industrial grade Li-ion batteries with lifespan of 20 000 full charging cycles

Standardized battery charging interfaces

Fast charging capable

Up to 50 % energy recuperation in downhill driving

Lower operational costs

75 % lower driving energy consumption

Up to 7 dB lower noise level during driving and 15 dB lower during idling

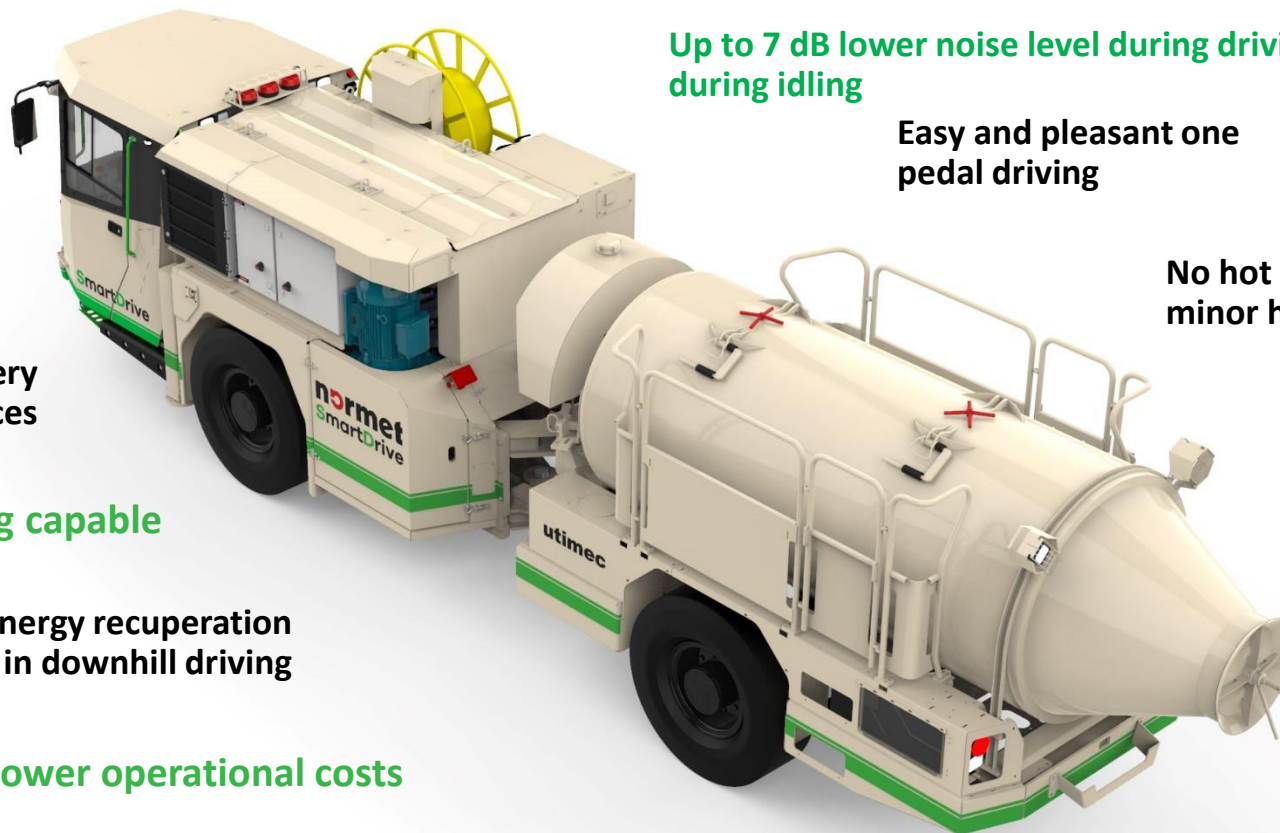
Easy and pleasant one pedal driving

No hot exhaust gases and very minor heating of surfaces

Decreased need for ventilation and cooling

Significantly reduced service brake wear

>100 % Increased uphill tramming speed and fast acceleration



[SmartDrive introduction 2019 video](#)

# KEY BENEFITS IN UNDERGROUND OPERATIONS

*Why fully electric (SmartDrive) vehicles?*

- Environment and health (no diesel emissions)
  - Stage IV engine after treatment systems vs. battery
- TCO & lower expenses due to
  - Less energy needed for driving
  - Energy recovery during braking/downhill
  - Less need for ventilation and cooling
- Better performance in uphill tramming due to high torque
- Better productivity via longer service intervals
- Less noise

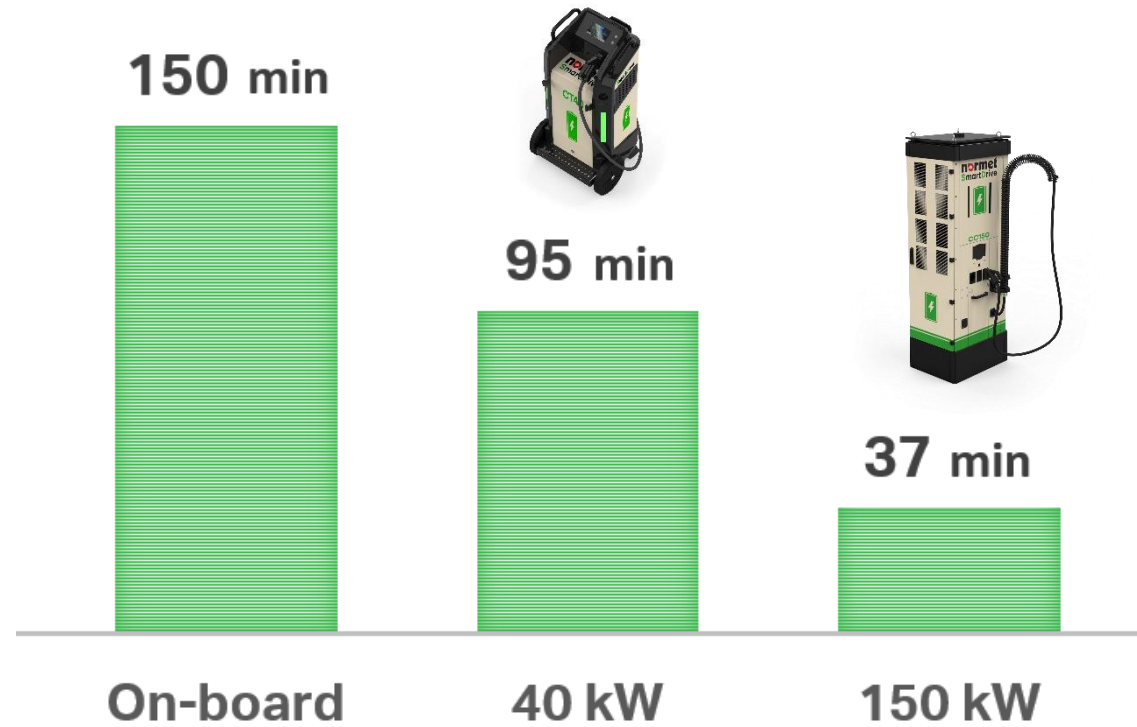


	Diesel vehicle fleet	Fully electric vehicle fleet	Difference (%)	Savings per year
Installed ventilation capacity (kW)	10 500 kW	5 800 kW	-44,8 %	
Installed cooling capacity (kW)	7 100 kW	3 400 kW	-52,1 %	
<b>Total (kW)</b>	<b>17 600 kW</b>	<b>9 200 kW</b>	<b>-47,7 %</b>	<b>5,05 M€</b>

Table 1. Customer example of reduced ventilation and cooling need



# BATTERY CHARGING TIMES



Approximate charging times from 0 % to 80 %  
SoC (State-Of-Charge) for 90 kWh batteries

# CONTINUOUS IMPROVEMENT

## OUR OPERATIONS APPROACH

- › Consistent and long-term perspective in developing production
- › Continuous investments in production methods
- › Manage supplier relationships to secure competitiveness and material availability
- › Safety and quality as the main attributes in creating customer-specific solutions



# INNOVATING FOR PERFORMANCE

## RESEARCH AND DEVELOPMENT

Our industry is every evolving and complex designs and advance in construction methods require innovative products.

Our continuing investment in global R&D team and facilities allows us to regularly develop and improve our technologies, providing the most effective and efficient solutions to meet an exceed our client's requirements

- › We partner with customers, universities, and suppliers to develop innovative solutions
- › Our in-house competence is complemented by a world-class partner network



# OUR SERVICES

- › Normet services are designed to maximize safety, productivity, and profitability in all areas of your tunnelling or mining business
- › From a single machine to your entire fleet, and from delivery of parts and training to fleet performance agreements
- › Over 40 service locations in 30 countries, as well as an extensive distribution network



# NORMET RENTAL

- › Our rental service is a full OEM service including people, equipment, logistics, service and training

The full OEM services are provided from excellent and well trained Normet people across the globe providing our customers the following unmatched offering.

Our expert advice includes:

- › Selection of right equipment
- › Timely delivery and pick up of equipment
- › Selection, inventory and supply of spare parts
- › Process and application training
- › Service and maintenance





# NORMET REMANUFACTURING

**Serving installed base of ~13 000 machines globally.**

5 global service centers equipped to support regional services with:

- › Technical support
- › Product masters
- › Service engineering
- › Highly trained service personnel

**Targeted to serve customers by extending equipment life-time and keeping Normet machines up-to-date with latest technology and increased efficiency.**



# THE COMPLETE PARTNERSHIP PACKAGE

Trusted technical partner  
with full range of services  
from training to maintenance

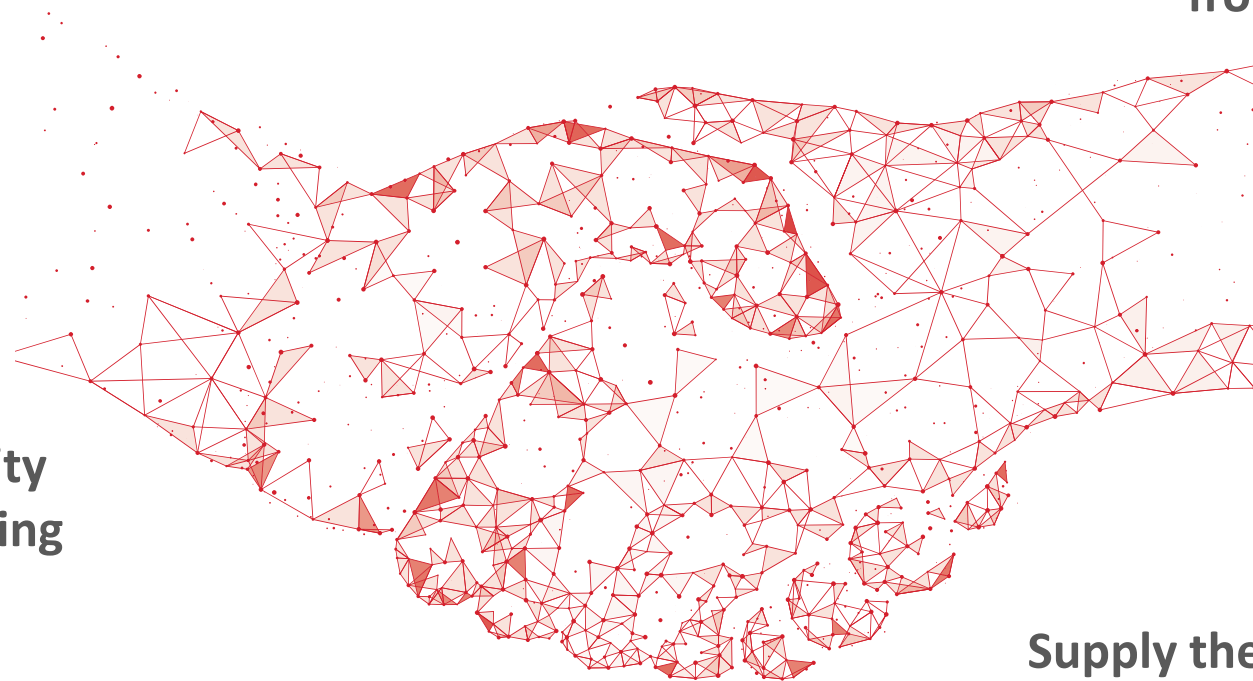
Continuous  
development of new  
safe and sustainable  
solutions

Comprehensive  
production capability  
and local stock holding

Supply the full range of  
equipment and units

Supply the full range of materials  
and systems for ground support  
and waterproofing

Advice and support  
through technically  
qualified experienced  
personnel



# MAKE IN INDIA

**normet**

**XS - Series**



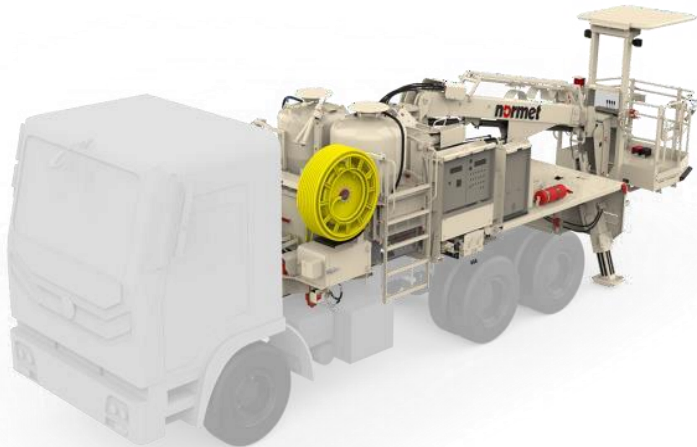
**Mid size sprayer-Alpha 40VC**



**Localisation of 5100VC**



**Truck based charging -TBC**



**Truck Based Shot Crete – Alpha 1430VC**



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# CONNECT WITH NORMET

## NORMET OFFICIAL SOCIAL MEDIA ACCOUNTS

LinkedIn: [Normet Group](#)  
Facebook: [@NormetGroup](#)  
Instagram: [@normetgroup](#)  
Twitter: [@NormetGroup](#)  
YouTube: [Normet Oy](#)





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International Conference on  
Underground Space : The Need of the Day



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**AITES**

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# THANK YOU

by

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NORMET INDIA PRIVATE LIMITED

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