

SDS Modular Production and Logistics Management System

Modules | Functions | Advantages

SDS | Modular Production and Logistics Management System

The experience that VMT has gained in over 20 years of worldwide tunnel projects has been integrated into the development of this modular production and logistics management system. SDS was designed to meet the special demands of segment manufacture and has already been successfully used in countless tunnel projects.

With its SDS.Production, SDS.Storage and SDS.TBM modules, the system comprehensively controls, monitors and documents all the major processes within the production and storage of segments and captures their position and installation data in the tunnel. SDS thus guarantees planable, efficient, transparent handling on site. The system can be adjusted as required so that the customer's specifications and guidelines are followed and implemented in all stages in the process.

SDS is far more than a documentation system – as an integrated solution, it manages and accompanies the life-cycle of the segments from the production stage to the tunnel. In this, SDS ensures compliance with quality and documentation standards combined with optimum use of resources, excludes risks, avoids errors and reduces costs. All areas of the tunnel site are linked to an intelligent, efficient workflow network, thanks to SDS.



“Through SDS, the error rate is zero. Mistakes caused by ‘the human factor’ are discovered early on through feasibility controls and can be overcome with little effort. A wrong delivery to the TBM, for example, costs a great deal of money because of the need to replace rings and the associated downtimes, and yet it still happens time and again. At the Koralm Tunnel KAT 2, we have so far not had a single wrong delivery, thanks to using IRIS.tunnel and SDS. The reduction in the number of staff needed over the total term of the project covers the costs of the system completely.”

In my opinion, the error avoidance and computer-guided logistics delivered by SDS enables the process to run really smoothly on the building site.”

Andreas Lange

Segment Production Manager at ARGE Koralm Tunnel KAT 2

VMT sees itself as your partner and consultant when it comes to segment production. With our expertise and experience gained from well over 1,000 tunnel projects, we are at your side: globally – 24/7.



SDS.Production

The SDS.Production module supports production planning and ensures compliance with defined quality and documentation standards. SDS manages both stationary and carousel production.

SDS.Production | Functions

For identification, each segment is provided with a barcode label/RFID tag with its own individual dataset, in which information such as the reinforcement used, tools, concrete composition and geometry of the segment etc. are recorded using scanners and interfaces. Alongside this documentation function, every work stage and all the components are specified and monitored by the system → production errors are avoided.

Damage caused to a segment can be recorded, photographed and classified in the database using scanners → the delivery of faulty segments is prevented.

At the press of a button, the software can also prepare all sorts of evaluations and reports which can be used by the people responsible as an important basis for discussions and decisions.

Module characteristics

- SDS-Stationary for stationary production
- SDS-Carousel for carousel production

Options

- Temperature sensors for the curing chamber
- Quality control through 3D measurement using the supplementary LIS product
- Synthetic label/RFID tag for long-term identification of segments after installation

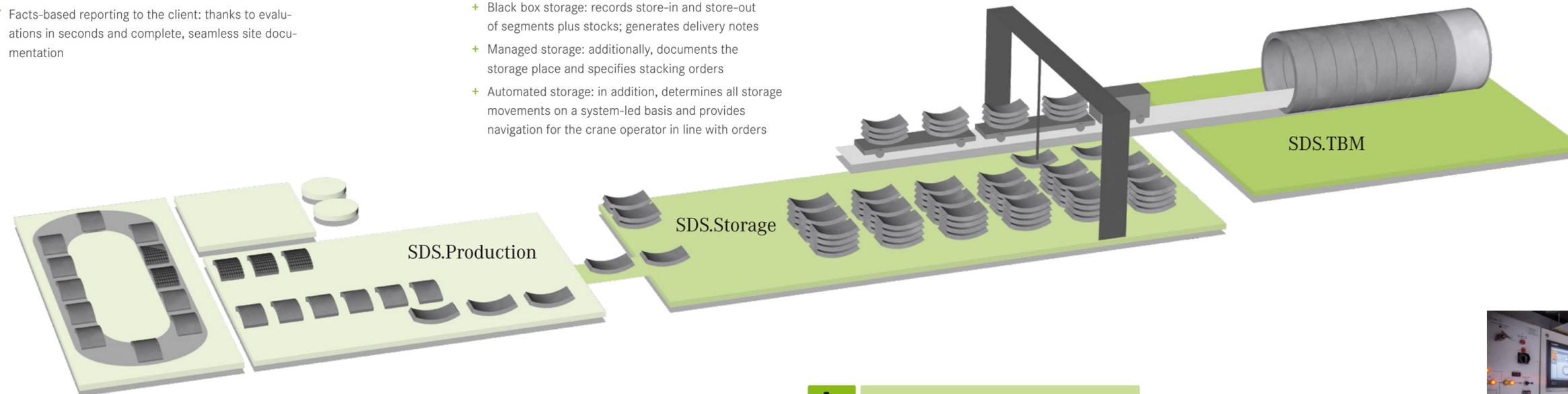
Interfaces

- Communication with an ERP system (e.g. SAP)
- Interface to the concrete mixer for part-automation of concrete ordering
- Interface to existing heat sensor technology
- Interface to VMT Data Management System



SDS.Production | Benefits

- Reduction in repair, reject and removal costs: through monitoring and direct feedback, SDS can prevent errors before they happen (wrong reinforcement in the mould, wrong concrete mix, etc.)
- Easier and faster training of new employees: SDS sets out defined stages on the hand-held scanner and takes users through all work stages
- Time is saved by part-automation of the documentation: the system creates absolute transparency about the state of the production process at all times
- Facts-based reporting to the client: thanks to evaluations in seconds and complete, seamless site documentation



SDS.Storage | Benefits

- Less storage space/staff required, plus shorter loading and delivery times through optimised storage rules
- Transparency of storage stocks avoids over-production and costly production restarts
- SDS.Storage ensures availability of segments and thus avoids interruptions in tunnel driving
- Permanent inventory overview cuts inventory costs



SDS.Storage

The SDS.Storage module manages and organises storage as well as store-in and store-out processes. Thanks to its modular functions, various production and site storage systems – including partly or fully automated systems – can be supported.

SDS.Storage | Functions

Clearly defined storage and stacking rules make incorrect deliveries impossible and save storage space. There is no need for redistribution, which considerably reduces the risk to employees and damage to the segments – and also cuts staffing costs. When the segments are removed from storage, SDS checks compliance with curing times along with freedom from damage and automatically generates the delivery note.

Module characteristics

- Production storage
 - Black box storage: records store-in and store-out of segments plus stocks; generates delivery notes
 - Managed storage: additionally, documents the storage place and specifies stacking orders
 - Automated storage: in addition, determines all storage movements on a system-led basis and provides navigation for the crane operator in line with orders

- Site storage
 - If the production location is some distance from the site, temporary storage is needed on site. This site storage can generally be managed as a black box storage.

Options

- Additional storage area to expand storage space
- Crane navigation for gantry cranes

Interfaces

- Interface to an existing crane navigation system
- Interface to VMT Data Management System

SDS.TBM

The SDS.TBM module captures the position and installation data during ring construction in real time. Thanks to the interface with VMT's TUnIS Ring Sequencing, orders in the storage can be triggered directly from the TBM. All data come together in the SDS database promptly.

SDS.TBM | Functions

Capturing, documenting and archiving the precise position and installation data of each segment simplifies and speeds up error diagnosis if there is any damage in the tunnel. The ring order is forwarded from the TBM straight to the crane operator as an instruction to store-out. Finally, the TUnIS interface ensures that both the availability of the various ring types and the current order and delivery status are displayed at the TBM.

Module characteristics

- Number of TBM modules required depends on the number of TBMs

Options

- Offline damage recording for tunnel acceptance

Interfaces

- Interface to the TBM's TUnIS Ring Sequencing
- Interface to VMT Data Management System

SDS.TBM | Benefits

- The installation location of any segment can be traced at any time
- Smooth advance of TBM thanks to automatic, error-free segment ordering by the TUnIS Interface
- The interface ensures that design requirements and other conditions that define the ring sequences can be precisely implemented
- No more expensive, time-consuming risks during delivery and installation



View SDS product film: sds.vmt-gmbh.de



LIS | Laser Tracker Industrial Measurement System

LIS is a supplementary product that supports quality management by SDS. Both moulds and segments can be measured with sub-millimetre precision and their geometry checked (distances, angles and torsion). The integrated reporting system forwards the measurement logs to SDS and provides information as to whether the required tolerances have been observed.



Functions

LIS checks the 3D geometry of the segments and moulds directly on site to determine their basic geometry and installation parts. The measurement technology is fast and highly precise, yet extremely easy to handle. Measurements, calculations and an analysis of the results can be carried out within about 20 to 40 minutes. Evaluations can be adapted for specific customers and the results provided in any format required.

Range of services

- ▣ Purchase or rental with corresponding training
- ▣ Measurement service by VMT engineers on site (equipment included)

Options

- ▣ Virtual ring construction after segment measurement (replaces physical test and master ring construction)

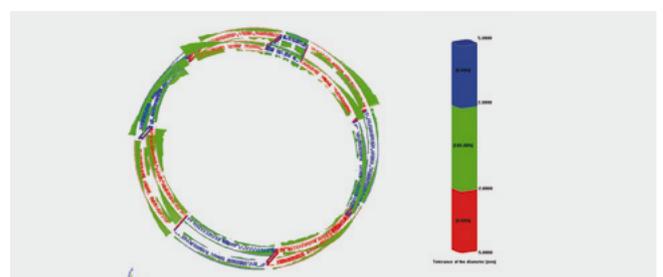
Interfaces

- ▣ SDS data server

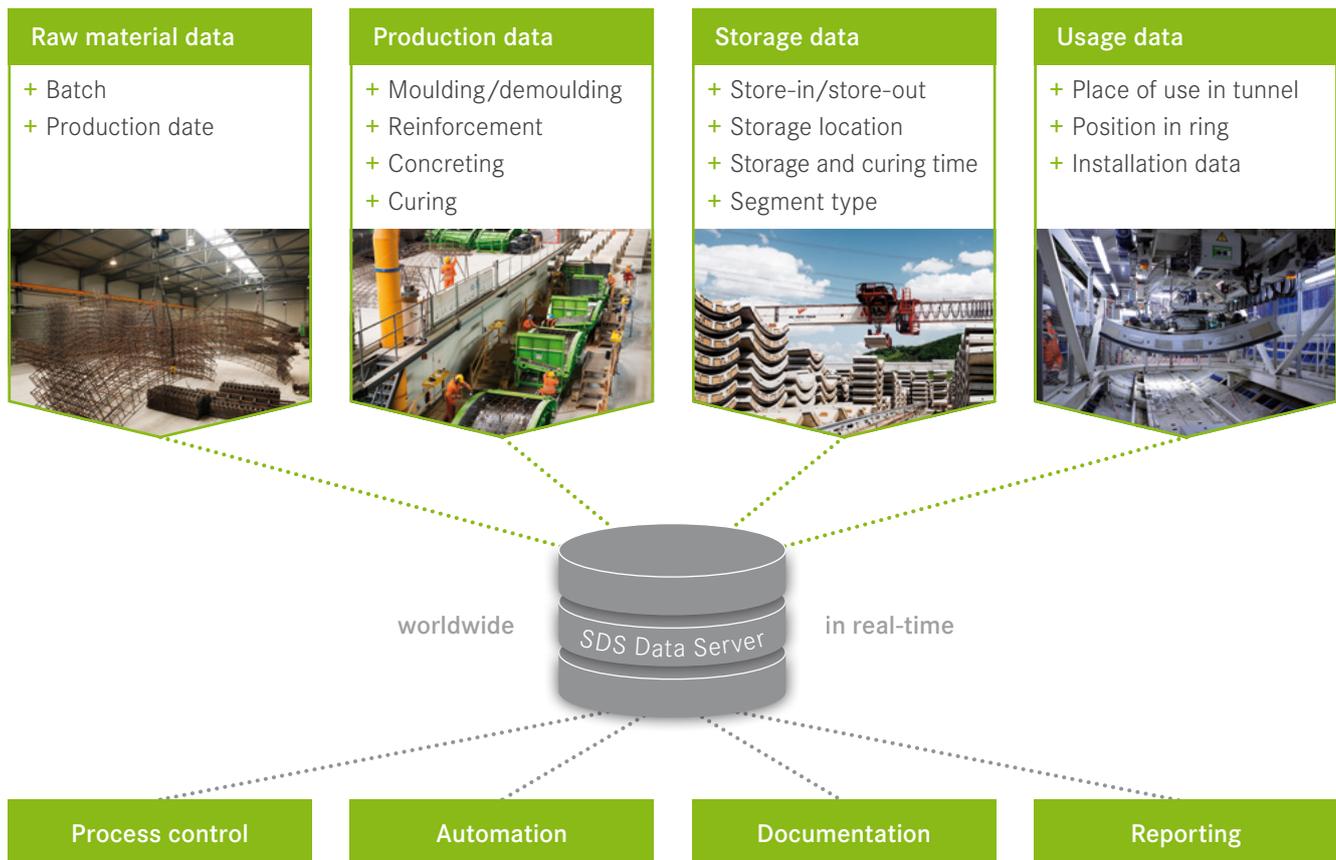


Benefits

- ▣ Ensures compliance with the tolerances demanded by the client
- ▣ Optimised and part-automated measurement routines and evaluations save time
- ▣ Simple handling (no specialist required)
- ▣ Virtual test ring construction saves time, costs, space and personnel



SDS | Data Management



SDS – for accurate, efficient handling of your tunnel project



Benefits

- ▣ Requirement-focused production planning according to the advance of the TBM
- ▣ Compliance with defined quality standards and documentation requirements for production and storage
- ▣ Traceability and transparency of all segment-related data and information – at any time, at different locations (production hall, production office, crane, outside area, TBM)
- ▣ Optimal planning and use of storage capacities
- ▣ Attractive human resources savings potential compared with traditional production documentation processes
- ▣ Reduction in error potential and therefore error rate in production
- ▣ Avoidance of wrong deliveries of segments to the TBM
- ▣ Considerable expansion potential of the core system through relevant interfaces





References

Australia | Sydney

North West Rail Link

Project start	May 2014
Tunnel length	2 × 15,000 m
Diameter	6,000 mm
Segments	100,000
Modules	SDS-Carousel SDS.STORAGE.Managed SDS.Depot SDS.TBM



“... Not only did the SDS system offer an effective way of removing human errors and human functions from the production and delivery operation, it also met a requirement from the client where certain data needed to be submitted throughout the process...”

Jeremy Glasgow, Project Manager of the Kellyville Precast Facility



Turkey | Istanbul

Strait Road Crossing

Project start	December 2013
Tunnel length	3,340 m
Diameter	13,660 mm
Segments	15,000
Modules	SDS-Stationary SDS.Depot SDS.TBM

In the segment production, for which Yapi Merkezi was responsible, SDS helped the engineers with the supply and quality management of all concrete segments for the tunnel construction.

Austria | Graz

Koraln Tunnel – KAT 2

Project start	September 2012
Tunnel length	17,000 m & 15,000 m
Diameter	9,930 mm
Segments	120,000 incl. base elements
Modules	SDS-Carousel SDS.STORAGE.Automated SDS.TBM LIS



“The reduction in the number of staff needed over the total term of the project covers the costs of the system completely.”

Andreas Lange, Segment Production Manager at ARGE Koraln Tunnel KAT 2

New Zealand | Auckland

Waterview Connection

Project start	August 2013
Tunnel length	2 × 2,400 m
Diameter	14,000 mm
Segments	24,000
Modules	SDS-Carousel SDS.STORAGE.Automated SDS.Depot SDS.TBM



The segment plant in Auckland produced over 24,000 segments, plus 2,400 for construction of the tunnel invert. Production of the segments, including the materials used, their storage in three storage areas and the just-in-time logistics were monitored, controlled and documented by SDS.



Germany | NBS Wendlingen Ulm

Albaufstieg

Project start	August 2014
Tunnel length	2 × 8,806 m
Diameter	11,162 mm
Segments	55,000
Modules	SDS-Carousel SDS.STORAGE.Automated



“Storage movements are carried out much more efficiently with SDS – no need for organisation beforehand or long searches in the storage. This saved time and money on the Bossler Tunnel.”

Philipp Lackner, Head of Internal Technical Services / Work Preparation at ARGE PTS

Qatar | Doha

Metro Gold Line

Project start	January 2015
Tunnel length	6 × 6,000 m
Diameter	7,000 mm
Segments	154,000
Modules	SDS-Stationary SDS.STORAGE.BlackBox LIS



VMT | Your partner in tunnel building



Navigation and supplementary systems



Modular production and logistics management system



Deformation monitoring system



Process data management system



Location and safety system



Industrial measurement solutions

With its measuring systems and services, VMT has been a leading supplier in tunnel building and industrial measurement for over 20 years. Well over 1,000 successful tunnel projects worldwide document the efficiency and innovative strength of the VMT product portfolio in the areas of navigation technology, production and logistics management, deformation and process monitoring, and data management.

In addition, the individual VMT products can be combined to create efficient, modern network solutions which support an optimum project flow and seamless quality assurance in every tunnel project.

In every phase of a tunnel project, VMT sees itself as a competent, reliable partner for clients and contractors.

The personal advice, active support and boundless dedication of all VMT employees – from project engineers on site to IT developers in the office – are the top priority in the corporate philosophy and are demonstrated day after day.

VMT GmbH, which is headquartered in Bruchsal and has subsidiaries in Shanghai, Seattle, Melbourne and St Petersburg, is part of the Herrenknecht Group, the world market leader in mechanical tunnel driving technology. With over 240 employees worldwide, the VMT Group achieves annual sales of around €30 million.

VMT Germany | Headquarters
 t +49 7251 9699 0
info@vmt-gmbh.de
www.vmt-gmbh.de

VMT China | t +86 21 50750276 | info@vmt-china.com | www.vmt-china.com
VMT Australia | t +61 1300 553 905 | info@vmt-tg.com.au
VMT USA | t +1 253 447 2399 | info@vmt-us.com
VMT Russia | t +7 812 677 79 74 | info@vmt-iiit.ru

