One integrated solution for data management, visualization and analysis

- IRIS.Tunnel
- machine and tunnelling supply data
- navigation data
- measurement systems inside/outside the tunnel
- documents
- statistics
- online evaluation
- warning and monitoring system
- reporting
- joint data platform
- virtual sensors
- geotechnical sensors
- maps and photos
Purpose

Integrated Risk Information System

- Integration of risk and information management
- Internet based
- Risk assessment
- Cost analysis
- Data analysis
- Data management
- Communication
- Transparency
- Data platform
- Life cycle management

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IRIS is a 100% web application

Global access to local projects
- central server / local internet browser
- central data management and central support
- no local installation, no local support

fast reaction time
- reduced costs for operation and maintenance
→ Introduction

→ IRIS Tunnel program overview
  → Data input
  → Reporting
  → Visualization
  → Analysis

→ References
1. Log in

2. Data acquisition
   a. Process data (asynchronous import)
   b. Actual State data („real time“)

3. Reports

4. Analysis
   a. Standard modules
   b. Advanced modules
   c. Service modules
→ Introduction

→ IRIS Tunnel program overview
  → Data input
  → Reporting & Inventory lists
  → Visualization
  → Analysis

→ References
### Line 18 > Advance > Work shift report

<table>
<thead>
<tr>
<th>Quick protocol choice</th>
<th>SP-1999-05-07-2</th>
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<tr>
<td>Shift</td>
<td>Schicht 02</td>
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<td>Shift master</td>
<td>Zheng</td>
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<td>Sun</td>
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</table>

#### Advance
- 301 Extension supply pipe
- 302 Extension water/air supply
- 303 Extension bentonite supply
- 304 Track works
- 305 High voltage works
- 306 Extension air ventilation

#### Ring installation
- 301 Extension supply pipe
- 302 Extension water/air supply
- 303 Extension bentonite supply
- 304 Track works
- 305 High voltage works
- 306 Extension air ventilation

#### Stand still
- 301 Extension supply pipe
- 302 Extension water/air supply
- 303 Extension bentonite supply
- 304 Track works
- 305 High voltage works
- 306 Extension air ventilation
→ Introduction

→ IRIS Tunnel program overview
  → Data input

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→ References
## Reporting > Information Export

### 1. Import via IRIS, Field Bus, OPC, FTP

Logged in as: franzii

**Line 18 > Advance > Work shift report**

<table>
<thead>
<tr>
<th>Date</th>
<th>Shift engineer</th>
<th>shift:</th>
<th>Shift master</th>
<th>Start chainage</th>
<th>End chainage</th>
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<tr>
<td>04.07.1999</td>
<td>Chen</td>
<td>Schicht 2/2</td>
<td>Zhang</td>
<td>103.91</td>
<td>109.96</td>
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</table>

**Report No.:** SP-1999-05-07-2  Shift driver: Sun  Face pressure: 2.2  Advance: 5.05 [m]

![Shift comments](image)

### 2. PDF export

![Pie chart](image)

**System out**: 245 [n/min] 17.7%
**Operational disruptions / repair**: 240 [n/min] 16.6%
**Others**: 445 [n/min] 2.2%
**Advance**: 185 [n/min] 25.7%
**Compressed air work**: 125 [n/min] 8.3%

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4 Standard weekly report

Beijing Subway - Line 18

Weekly report CW 1999-20 from May 9, 1999 to May 9, 1999
Risk assessment of environment
Decision management
→ Introduction

→ IRIS Tunnel program overview
  → Data input
  → Reporting & Inventory lists

→ Visualization

→ Analysis

→ References
Map viewer
Guidance system (GS viewer)
**Interactive Tunnel Viewer (ITV)**

![ITV - Interactive Tunnel Viewer](image)

**Geotechnical Long Section**
Online TBM Data Viewer
→ Introduction

→ IRIS Tunnel program overview
  → Data input
  → Reporting & Inventory lists
  → Visualization

→ Analysis

→ References
Analysis > Modular structure

Standard module

G Environment

Advanced modules

1. Cutter wear > Site data / prognosis tools
2. Segment Management > Site data / damage records
3. Consumable record > Electricity, Water, Mortar etc.
4. Target-Performance analysis > Jack forces, advance etc.
5. Slurry plant > Mass balance, bentonite volume
6. Settlement > Surface Settlement Evaluation

Service module

1. Data Interpretation > State and Process analysis
2. Interaction-Analyse > Recommendations / Decisions
> Prognosis
- Comparison with Performance-Data
- Update of prognosis with TBM-advance

Diagram: Initial prognosis, Real performance + updated prognosis, Daily performance
Analysis > Settlement evaluation

Modules: G + 6

Visualization of settlement

Visualization of settlement points

Visualization of key TBM data
Analysis > Settlement evaluation

Visualization of key TBM data

TBM face pressure

Recommended pressure range

Critical pressure range
Analysis > Settlement evaluation

TBM control
• face pressure
• tail grouting
• cutter head revolution
• volume control
• etc.

Real time monitoring
• geotechnical monitoring
• building monitoring
• geo-environmental monitoring
• ground improvement records
• etc.
Analysis > Settlement evaluation

**INPUT**
- Mass balance
- Shift data
- Tool wear
- Face pressure
- Grouting pressure
- TBM advance
- Penetration rate
- Revolution
- Jack forces
- TBM navigation
- Precise levelling
- Total station
- Extensometers
- Crack monitoring

**ANALYSIS**
- Target-performance analysis
- Volume loss evaluation
- Email/SMS
- Map viewer
- Interactive tunnel viewer

**Tunnel**

**Geomonitoring**

**IRIS.SYSTEM**

**itc engineering services**
- Settlement prediction
- Building damage risk assessment

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Thank you