



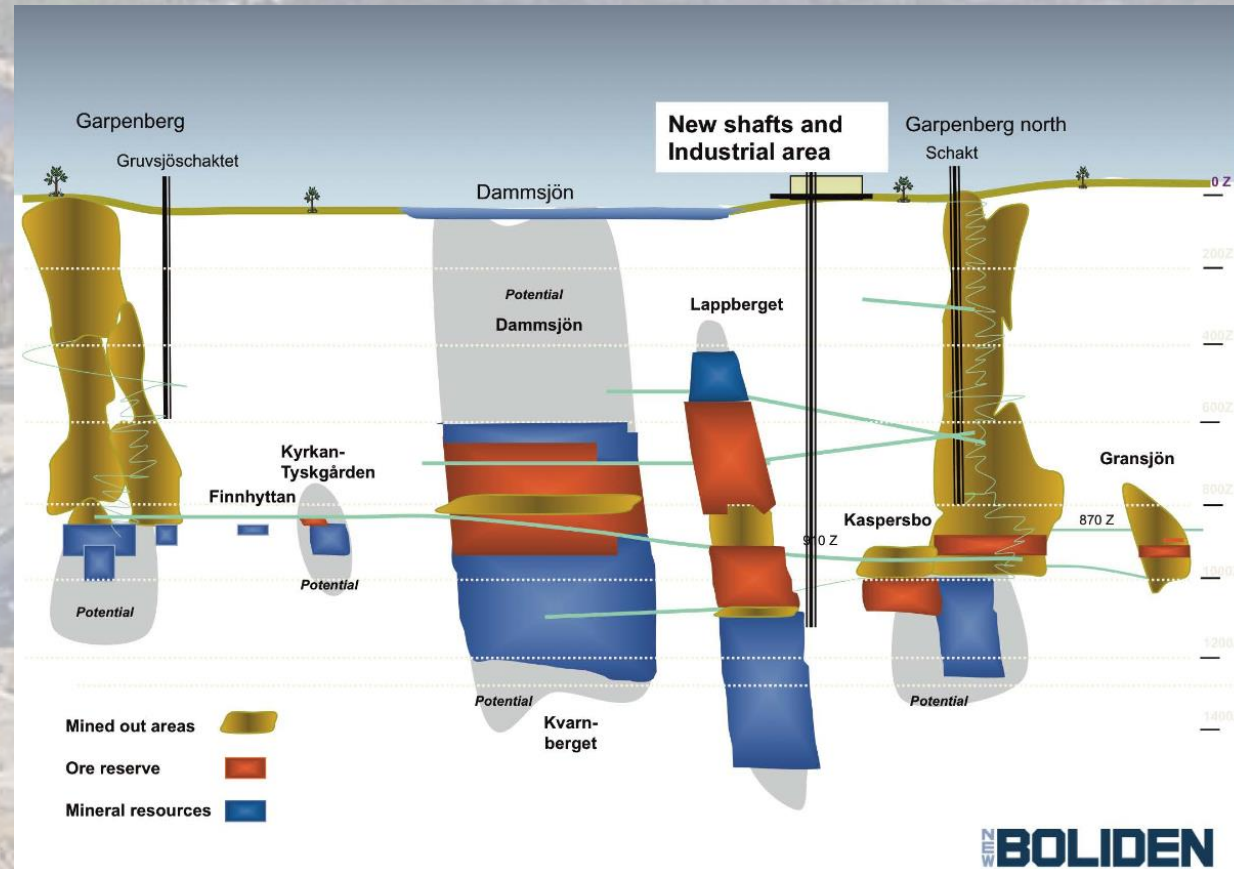
# R.I.T. – Rock Inspection Tool Implementation

## Boliden Garpenberg



# GARPENBERG SITE INTRODUCTION

- Garpenberg is one of the world's most modern mines
- It is Sweden's oldest mining area still in operation
- Complex ores containing zinc, lead, silver, copper and gold are mined
- A new production plant was opened that increased annual production from 1.5 million tonnes to 2.5 million tonnes
- Industry-leading and largely automated technology makes Garpenberg more operationally reliable, eco-friendly and cost-effective
- Several mining methods are used, ranging from LHOS (longitudinal and transverse) to Cut and Fill and Rill mining



**Deswik is in use** since 2014

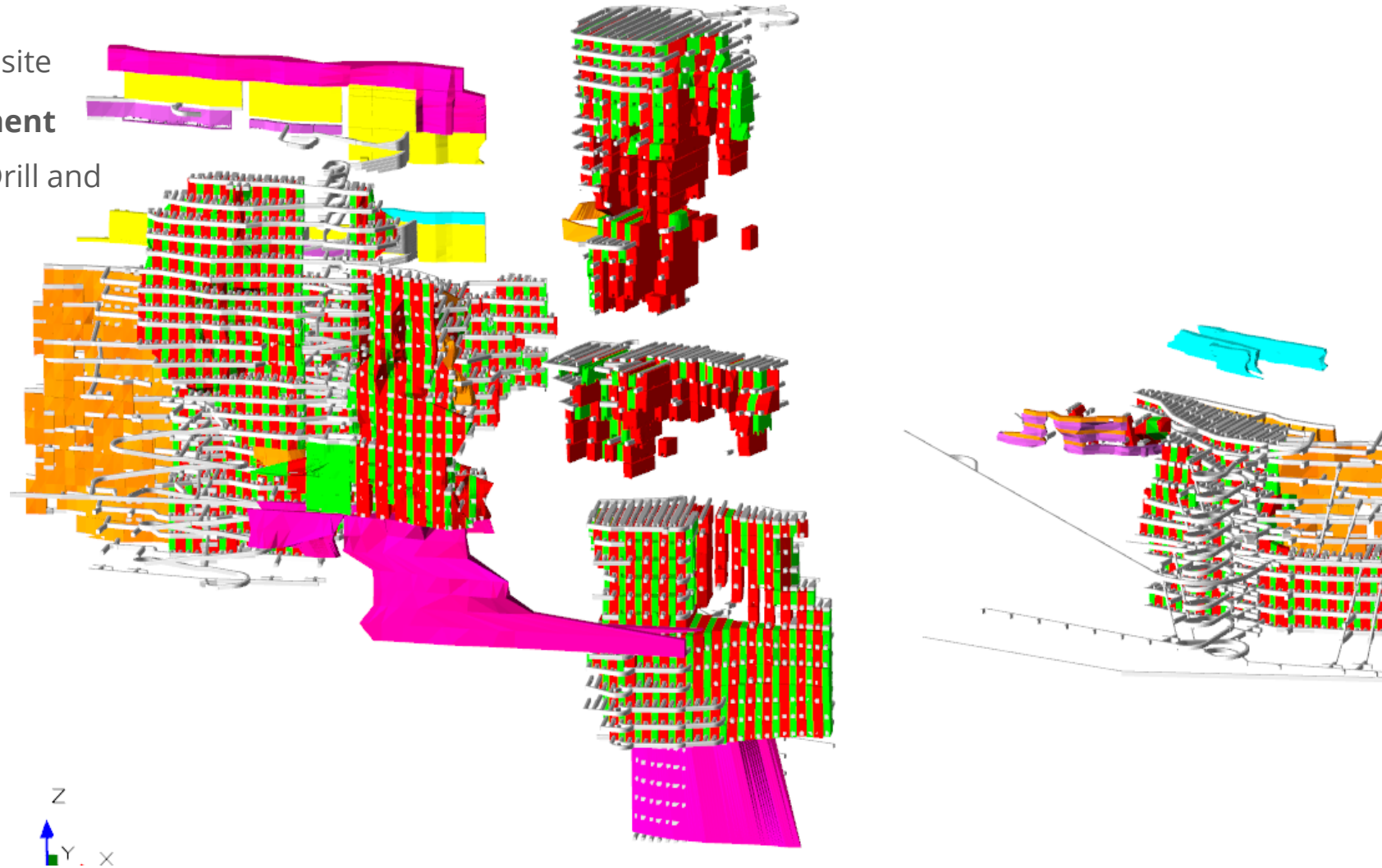
**Most of Deswik UG tools are implemented** on site

**Deswik.MDM** database, **core of data management**

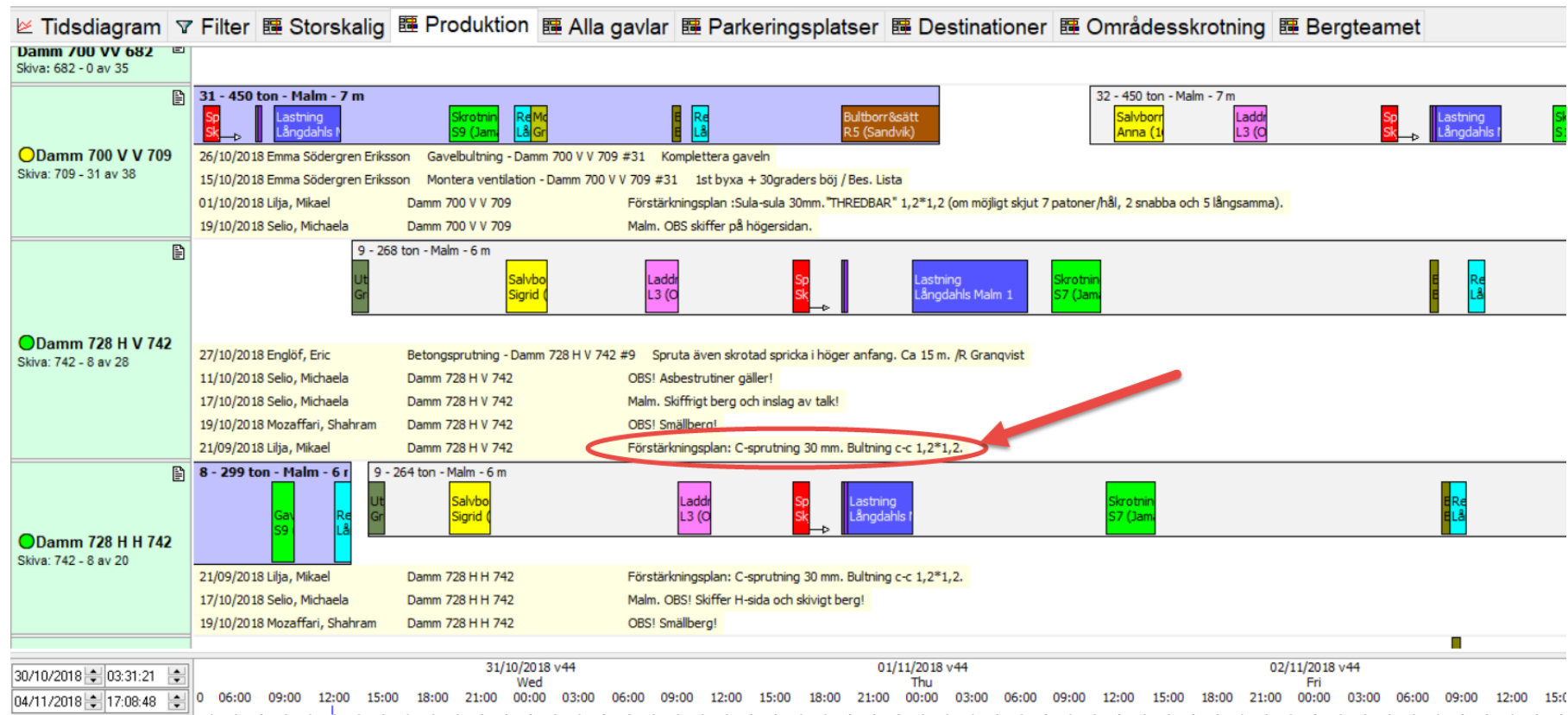
stores information for Geology, Survey, Design, Drill and Blast and Planning

**Mine is using Deswik daily for procedures:**

- Mine planning
- Drill and Blast design
- Stope and Development design
- Survey as built
- Creation of Geological Slices
- Updating Face Positions
- Reconciliation



- Information for areas was written in paper
- Messages from the Geotech to the Production department were passed manually

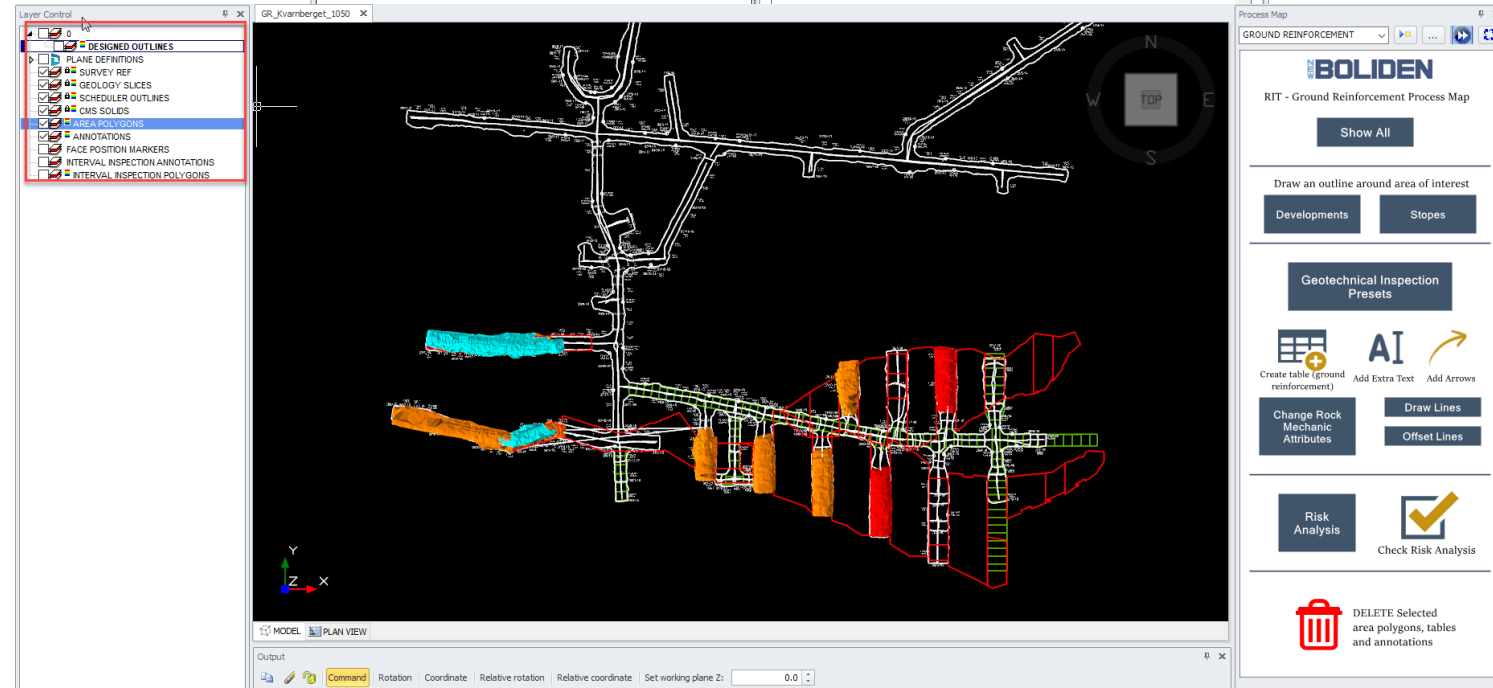
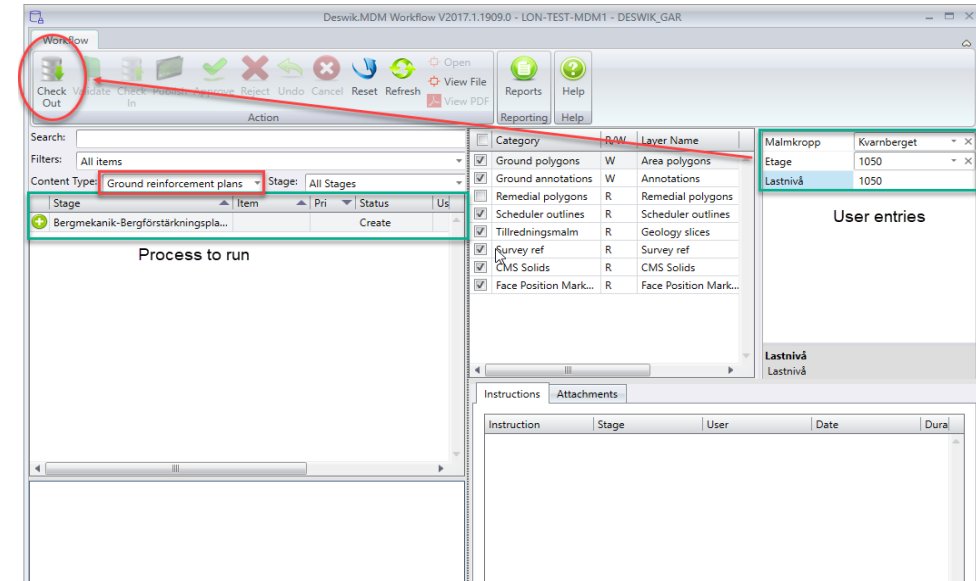


- A **quick** and **efficient** way to create maps for the Geotech group
- Easily visualize an area and assign rock mechanic properties (ie. Length of cables to be used, method of shotcreting etc.)
- Ability to **easily print/distribute** area of interest maps with additional rock mechanics information
- Ability to have **preset values** for rock mechanics properties (ie. Cable bolting mesh, thickness of shotcrete etc.)
- A transparent way to **create, store** and **retrieve** rock mechanics information.
- Reports and notifications of areas that need to be re-inspected
- Ability to add annotations and table for the aforementioned areas automatically
- Ability to run risk analysis for areas to be mined and store that information.
- Ability to add attachments to the outlined areas (pictures, reports, notes etc.)
- Ability to check out a Deswik.CAD file and use it on a tablet PC underground to add notes and information

# NEW DATA DRIVEN SOLUTION

Utilization of the MDM database to extract:

- Current Survey outlines
- Current Face Positions
- Short Term Planning information for stopes and development
- Geological Slices (where needed)
- CMS Solids of Mined out Stopes



# USE OF CAD FUNCTIONALITY AND PROCESS MAPS

## Outline areas of interest

**Input values** (through limited lists or freehand) for geomechanics attributes

**Color the outlines areas** using legends which in turn can determine (amongst others):

- The geotechnical preset used
- If the area has been risk assessed
- If the area has been re-inspected

**Check out a graphics file** and use it on a tablet PC underground

The process map is used to outline the area, assign values to rock mechanics and create annotations

Built Typ	D-built
Bultmönster	1,2x1,2m
Sprutning	C-sprutning
Sprutning Tjocklek	30 mm
Kabel Längd	6m
Kabelmönster	2x2m
Kabelåls	3a
Bågar Typ	Bultåre
Bågar Avstånd	10 m
Salvlängd	3m
Nätning	ovanpå sprutbetong
OBS!	Attention Needed

Area to be inspected

GROUND REINFORCEMENT

**BOLIDEN**

RIT - Ground Reinforcement Process Map

Show All

Draw an outline around area of interest

Developments Stopes

Geotechnical Inspection Presets

AI

Create table (ground reinforcement) Add Extra Text Add Arrows

Change Rock Mechanic Attributes Draw Lines

Risk Analysis Check Risk Analysis

DELETE Selected area polygons, tables and annotations

Process Map

GROUND PRESETS

**BOLIDEN**

RIT - Ground Reinforcement Presets

PRESET 1

PRESET 2

PRESET 3

BACK TO ROCK MECHANICS

Deswik

Bultning

Built Typ: Kangämsbult

Bultmönster

Fibersprutbetong

Sprutning: C-sprutning

Sprutning Tjocklek: 30 mm

Kabelbultning

Kabel Längd: 6m

Kabelmönster: 2x2m

Kabelåls: 3a

Annot

Bågar Typ: Bultåre

Bågar Avstånd: 10 m

Salvlängd: 3m

Nätning: ovanpå

Assigning values for rock mechanics

Built Typ	D-built
Bultmönster	1,2x1,2m
Sprutning	C-sprutning
Sprutning Tjocklek	30 mm
Kabel Längd	6m
Kabelmönster	2x2m
Kabelåls	3a
Bågar Typ	Bultåre
Bågar Avstånd	10 m
Salvlängd	3m
Nätning	ovanpå sprutbetong
OBS!	Attention Needed

# MDM DATA MANAGEMENT AND WORKFLOWS

Three MDM workflows are utilized:

(attachments and Deswik.CAD file and printouts

available in all workflows):

- **Ground Reinforcement plans**

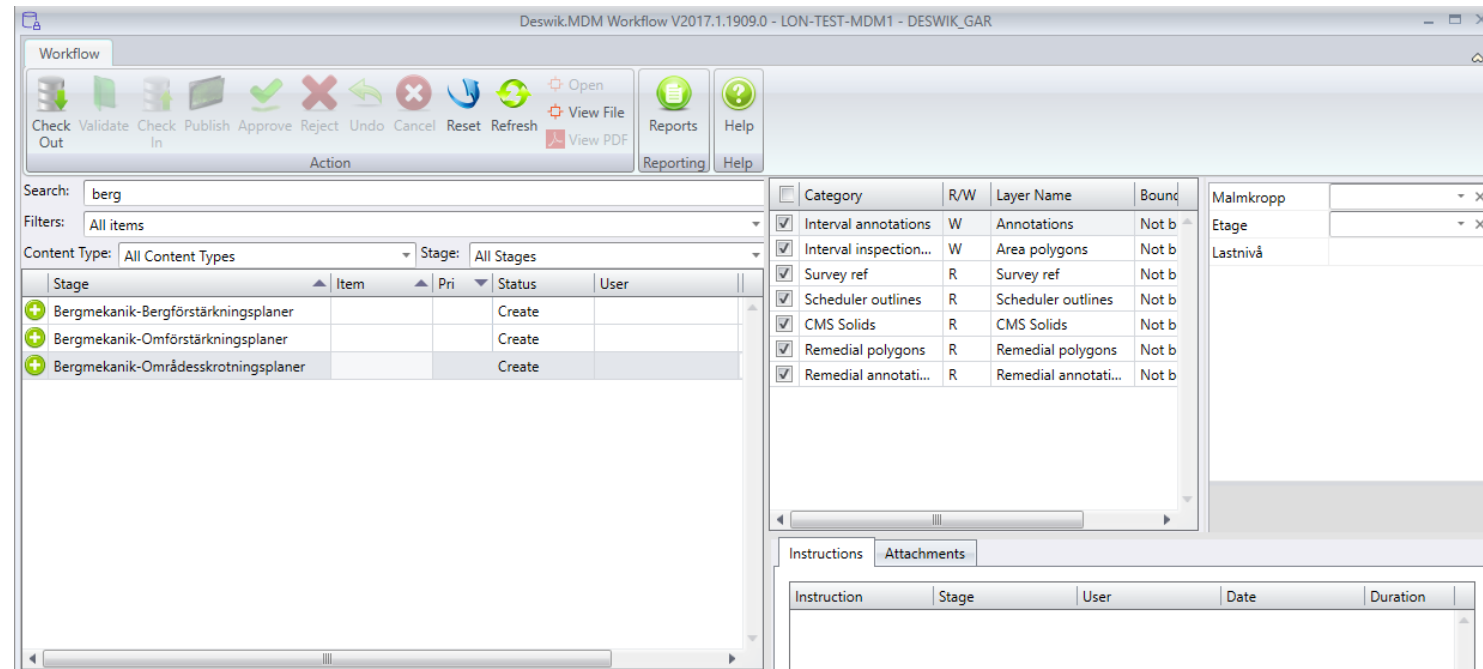
For areas not mined out yet

- **Remedial Reinforcement plans**

For mined out areas

- **Interval Inspection plans**

For mined out areas in need of re-inspection







# MDM DATA MANAGEMENT AND WORKFLOWS

## Remedial Reinforcement plans

### Key Facts

- For areas of the mine are already mined out (development drifts and stopes)
- Includes a process of changing a remedial area to an interval inspection one
- Attachments of reports and photos for the areas in question

### Work Method and use

- The User outlines the area in question (Development or Stope)
- Fills in a table with geomechanics information
- Add annotations, automated tables etc.
- Makes printouts
- Checks the area back into the database so that it becomes available for the stakeholders
- After visiting the area, the user can check out the same remedial area, attach photos and reports or even change the area to interval inspection

Sprutning	C-sprutning
Sprutning Tjocklek	30 mm
Kabel Längd	6m
Kabelmönster	2x2m
Kabellås	Ja
Bågar Typ	Sprutbåre
Bågar Avstånd	10 m
Salvlängd	3m
Nätning	ovanpå sprutbetong
OBS!	Warning!

# MDM DATA MANAGEMENT AND WORKFLOWS

## Interval Inspection plans

### Key Facts

- For areas of the mine are already mined out (development drifts and stopes)
- User can set re-inspection dates
- User can set areas as “inspected”

### Work Method and use

- The User outlines the area in question (Development or Stope)
- The user can also pick one of the areas that have been changed from remedial to interval inspection (available to choose in this workflow)
- Fills in a table with geomechanics information (for new areas)
- Sets re-inspection dates to the available areas
- Sets as “Inspected” for areas that have already been inspected
- Can check if areas have already been inspected graphically
- Can create reports of inspection dates and “inspected” status with MDM Reports function

Deswik

Enter next inspection date:

OK Cancel

20-12-2021

Sprutning	
Sprutning Tjocklek	
Kabel Längd	
Kabelmönster	
Kabellås	
Bågar Typ	
Bågar Avstånd	
Salvlängd	
Nätning	ovan
OBS!	

Process Map

INTERVAL INSPECTION 201

**BOLIDEN**

RIT - Interval Inspection Process Map

Show All

Draw an outline around area of interest

Developments Stopes

Geotechnical Inspection Presets

Create table (ground reinforcement) Add Extra Text Add Arrows

Change Rock Mechanic Attributes Draw Lines Offset Lines

SET REINSPECTION DATE

SET AS INSPECTED Check if Inspected

DELETE Selected area polygons, tables and annotations

# REPORTS AND NOTIFICATIONS

- Email notifications to the planning department of new rock mechanics areas added – updated
- Flexible reporting through the MDM database for all rock mechanics attributes, including:
  - Re-Inspection Dates
  - Risk Analysis
  - Inspection Status

Deswik.MDM Reporting V2017.1.1909.0 - LON-TEST-MDM1 - DESWIK\_GAR

Reports

Print Preview Export To Excel  
Fields List Export To Excel Template  
Run Report Formulas Export To CSV

Report Name: Reinspection dates by Area  
Categories Formatting Excel Template New Report Delete Report  
Category Linking Direction Summaries Weighting Generate Grid Save Summary table  
Category Linking Joins Merging Attribute Filters Save Report Publish settings

Report

Drop Filter Fields Here

Drop Data Items Here

Malmkr...	Etage	Lastnivå	Nästa Be...	Checked	Date Ins...
Lappberget	700	554	30/01/2018...	YES	01/08/2016 00:...
			01/01/2019...	NO	01/01/1900 00:...

Grand Total

PivotGrid Field List

Hidden Fields

Bågar Avstånd  
Bågar Typ  
Besiktning  
Bult Ingjutning  
Bult Längd  
Bult Typ

Filter Area Column Area

Row Area Data Area

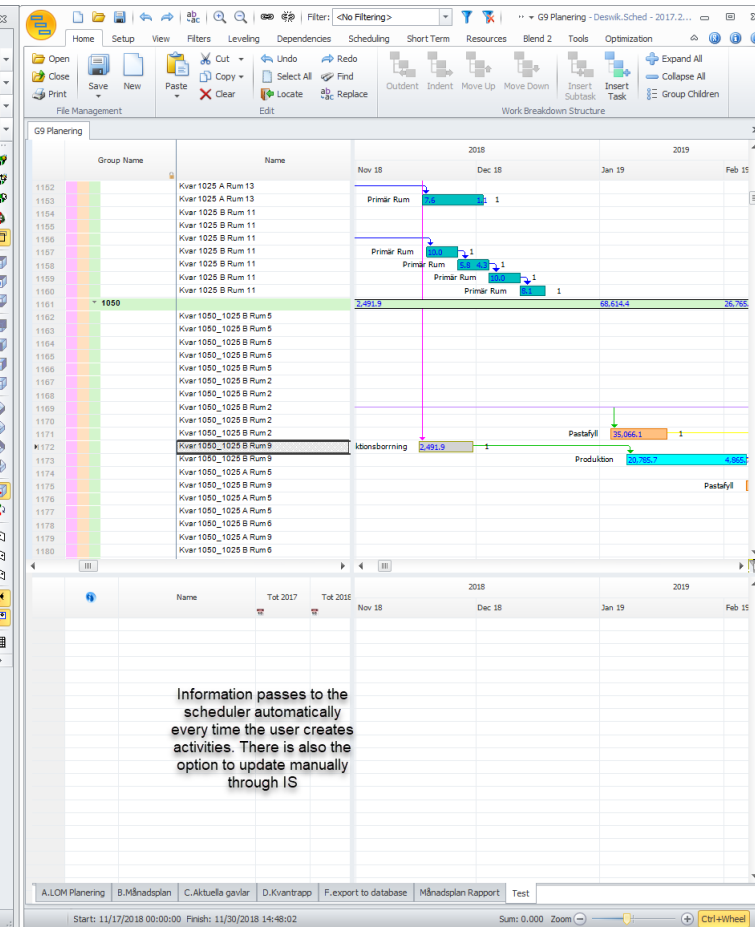
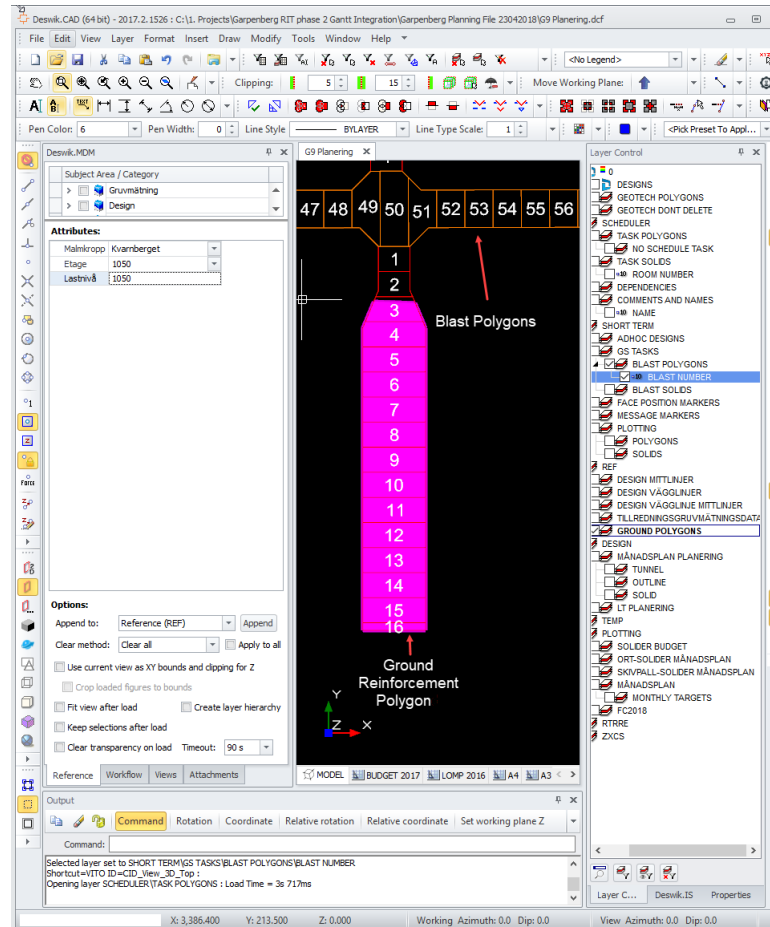
Malmkropp  
Etage  
Lastnivå  
Nästa Besiktning  
Checked

Defer Layout Update Update

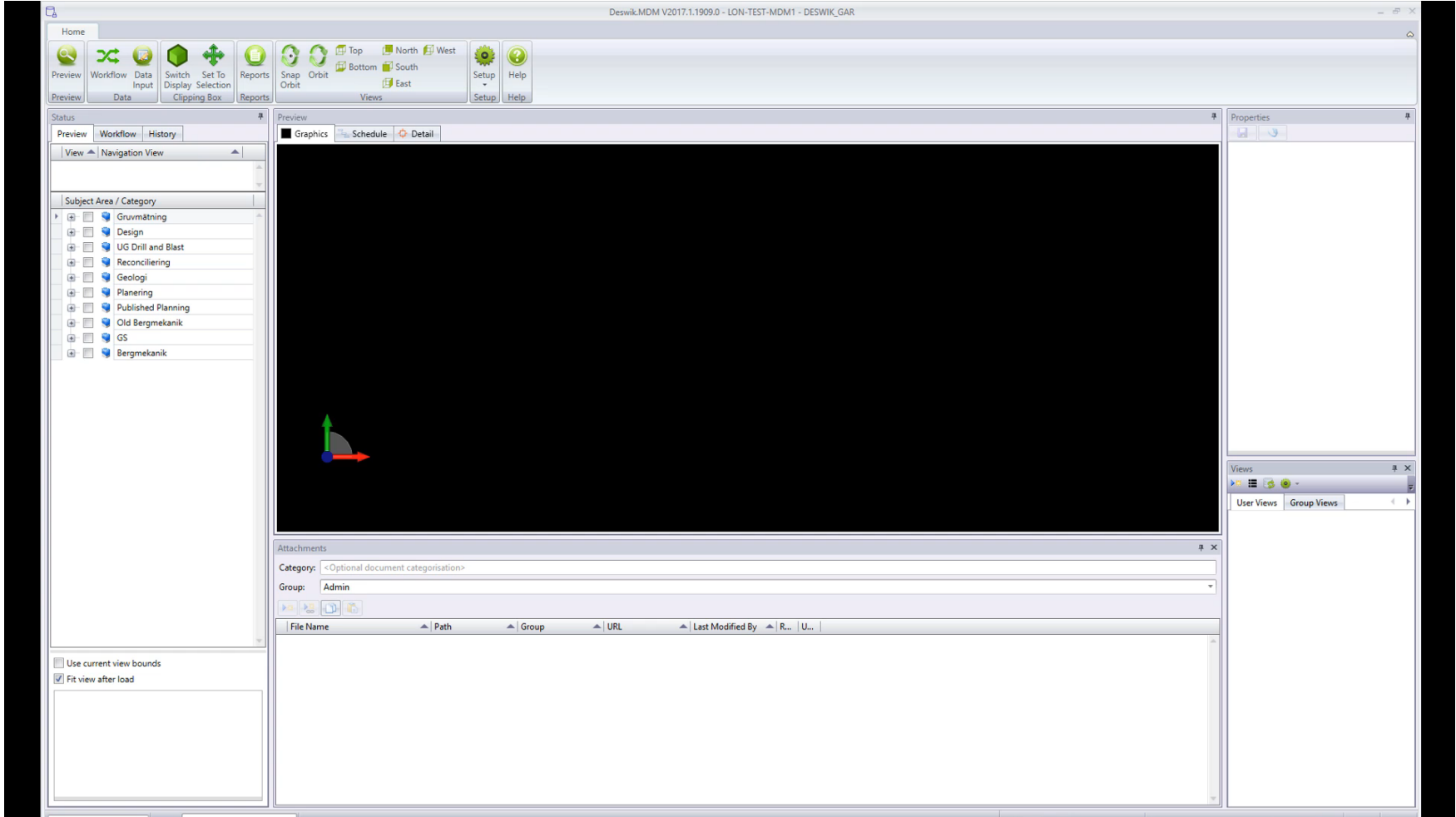
Report generated in 418(ms). 2 records returned from source

# SCHEDULE INTEGRATION

- Use of the MDM plugin to bring the Rock Mechanics Polygons to the Planning file
- Use of Deswik.IS to assign rock mechanics information to the Short Term Plan, by the automatic attribute assignment by grids to the blast polygons
- Geomechanics data are stored in the MDM database and are accessible to all users with the right permissions (read-write)



# DEMONSTRATION – GROUND REINFORCEMENT WORKFLOW IN ACTION



# KEY BENEFITS

- The site has an efficient system that can transfer Geotech information from the rock mechanics department to the various stakeholders (Planning, Design, Operations)
- Transparency and auditability through the use of the Deswik.MDM database on site
- Simple tool to use, easy to be trained at, even for basic CAD users
- Ability to attach documents and photographs allows for storing legacy information to the system
- Email notification system makes sure that the information added from the rock mechanics department does not get neglected

- Update the Remedial and Interval Inspection workflows to modern standards and add additional functionality
- Take use of the upcoming advances in both MDM and Deswik.CAD to further refine the project
- Use of approval system in MDM





Thank you for  
your attention!

