SIEMENS
Ingenuity for life

# Sicat Master

## Engineering of overhead contact line systems

siemens.com/rail-electrification

When engineering overhead contact lines for mass transit and main line railways, we combine the calculations of our Sicat® Master IT tool with our extensive systems know-how.

**Features**

- Increasing efficiency and reducing sources of errors thanks to standardized and automated work processes
- Improved design quality
- Reduced time expenditure for project engineering
- Flexible adaptation to local conditions and technical requirements
- 3D data model for processing of level and height information

**Dialog and report languages**

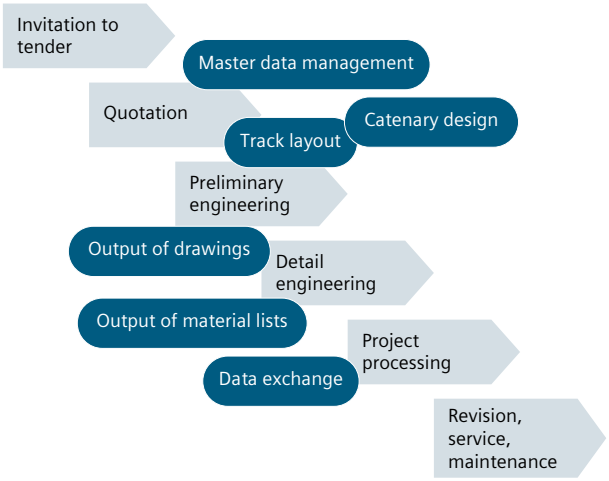
By default, German and English are available for dialog languages in the program surface as well as for report languages. Further dialog languages are possible.

# Process integration

Sicat Master supports the most important phases of engineering processes for mass transit and main line railways.

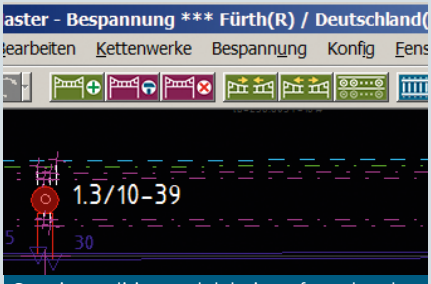
Preliminary project engineering makes it possible to produce documents that are needed for preparation the bid.

When it comes to actual engineering of the overhead contact line, the combination of our IT tools and the know-how of our engineers ensure a consistently high level of engineering quality. The planning documents necessary for material procurement and for the structural measures are also drawn up in the process. Furthermore, this creates the basis for high installation quality and logistics support for maintenance.

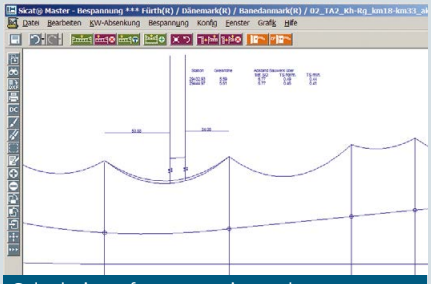



Sicat Master supports most of all important project phases

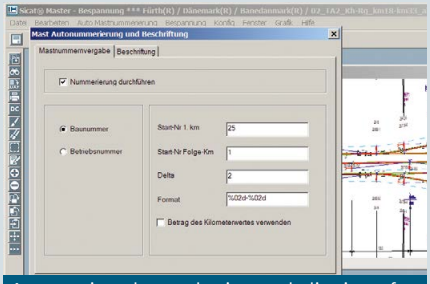
# Key features



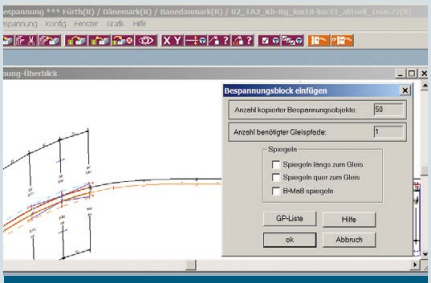

Creation, editing and deleting of overhead contact line elements



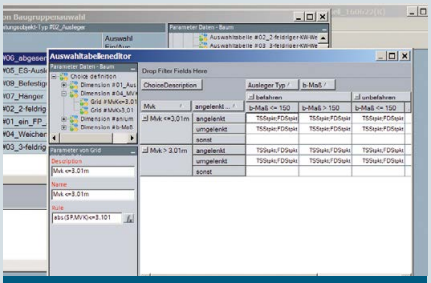
Calculation of contact wire and catenary wire height in catenary dips



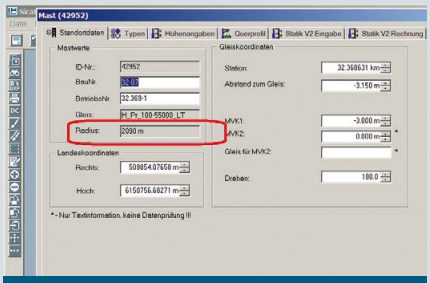

Automatic pole numbering and aligning of labeling acc. to track



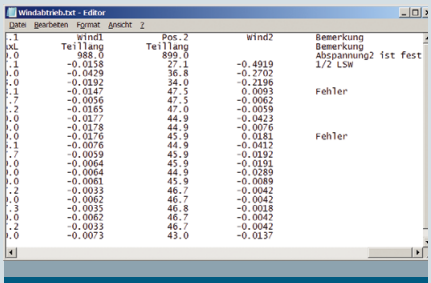

Copy and paste on base of track layout



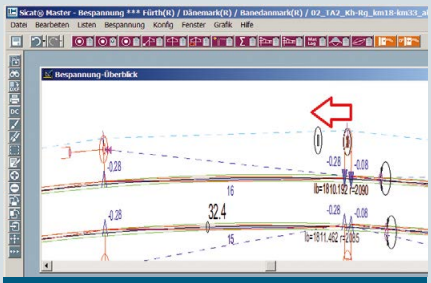

Manual and automatic determination of material quantities



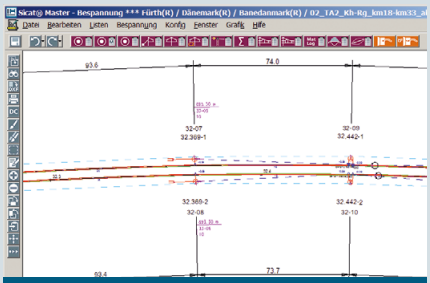

Calculation of track curve at any optional position in transition bend




Check and adaption of longitudinal span lengths (wind deflection) and contact line sagger




Drag and drop function for overhead contact line elements retaining track assignment

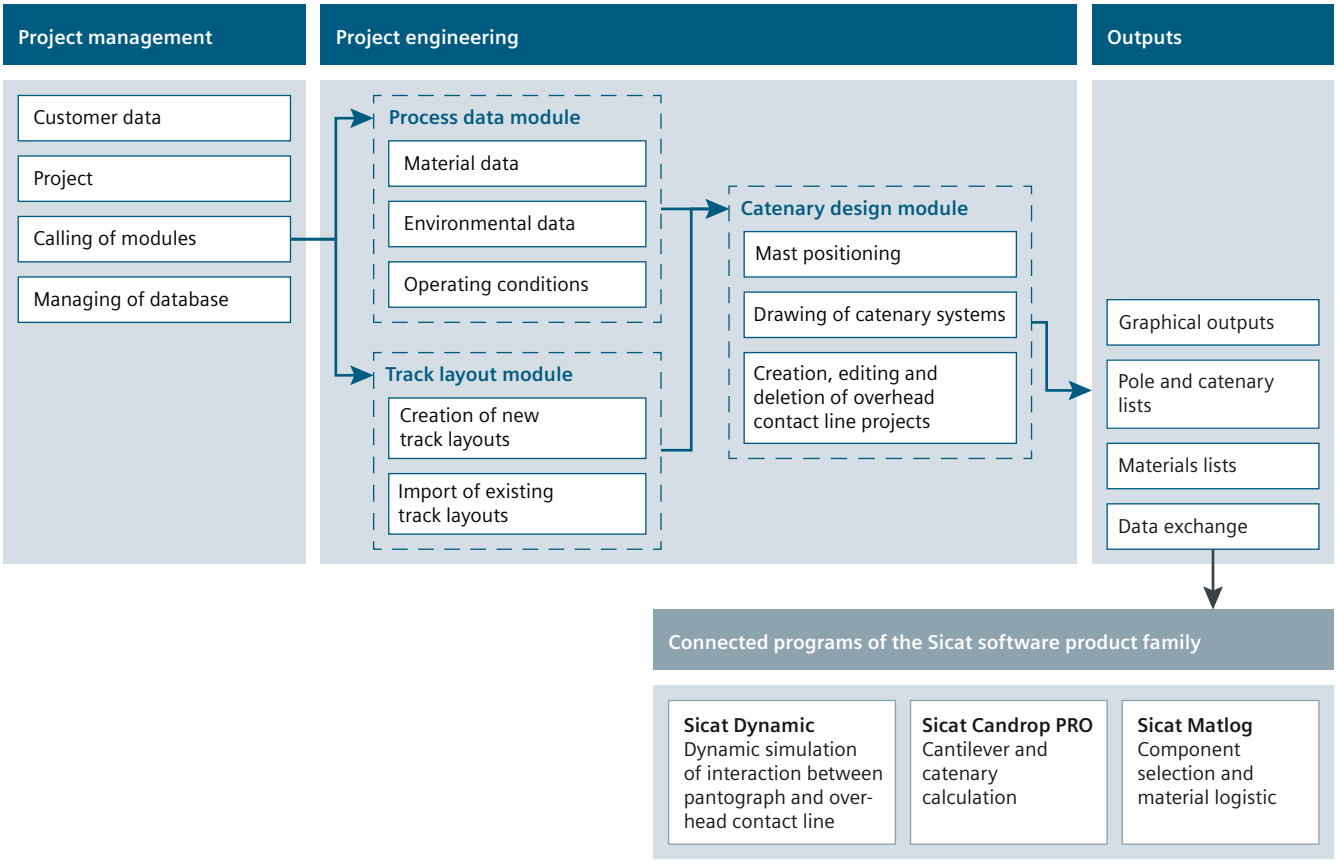


Automatic dimensioning of pole distances and alignment of subsidiary lines acc. to track

# Program structure

The planning and engineering of overhead contact line projects is explained by the program structure of Sicat Master.

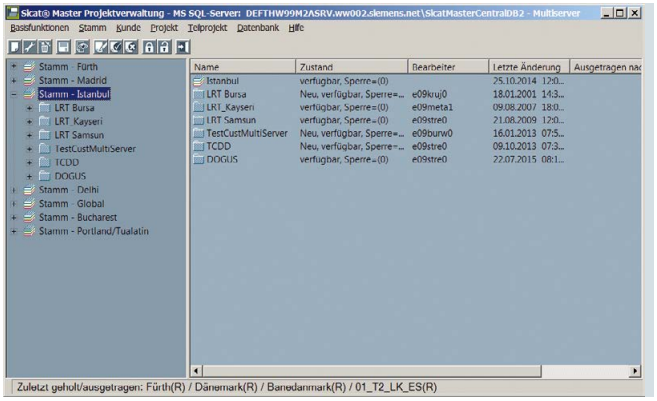
All data, such as general data relating to materials and type of construction, customer data or project planning data, are stored in central databases and can be updated with the aid of master data editors.




## Project management

The project management is the central part of the program. This overall part serves for recording general project data, managing customer data, organizing database access and calling the project engineering modules.

High flexibility with work at international projects is achieved by a multi server operation extended across locations with data synchronization via SQL server replications.




Project management in multi server operation extended across locations

# Project engineering

The modules process data, track layout and catenary design for engineering the overhead contact line system.

## Process data module

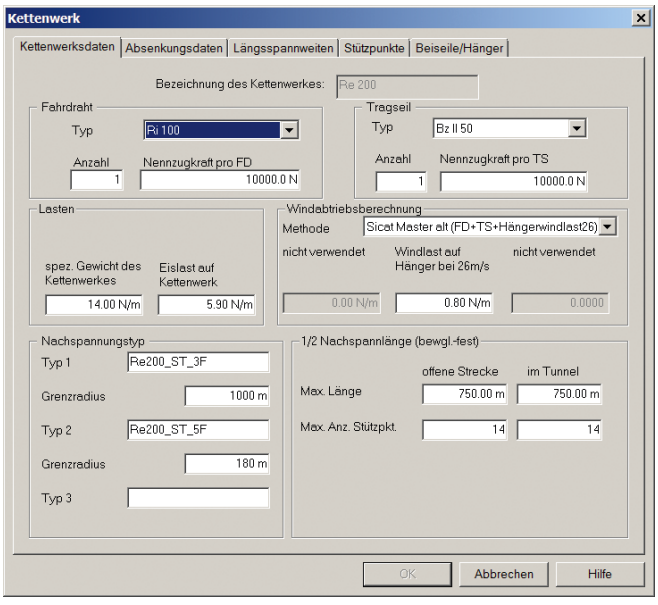
In the process data module, the standard constructions are managed and project specific default values for project engineering and data processing are stored.

By default, overhead contact line types that are conform with the interoperability requirements like Sicat HA and Sicat SA as well as standard contact line types of the German DB AG like Re250 and Re330 with their characteristics are provided. In addition, customer specific new overhead contact line types can be created via comfortable editing functions. The system is adaptive and widens automatically with every new type of overhead contact line.

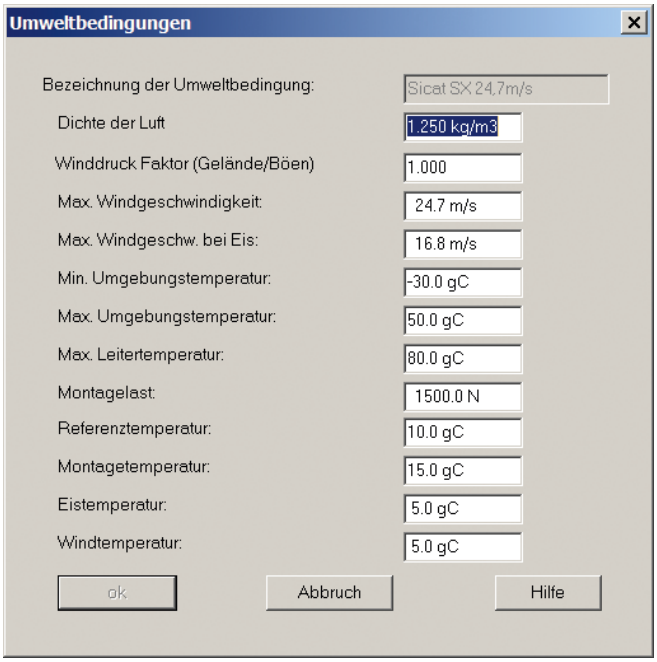
**Process data**

- Material data
  - Elasticity module
  - Max. tensile strength
- Environmental data
  - Wind velocity
  - Ice loads
  - Assembly loads
- Operating conditions
  - System height
  - Stagger
  - Valid pantograph range
  - Max. tensile force

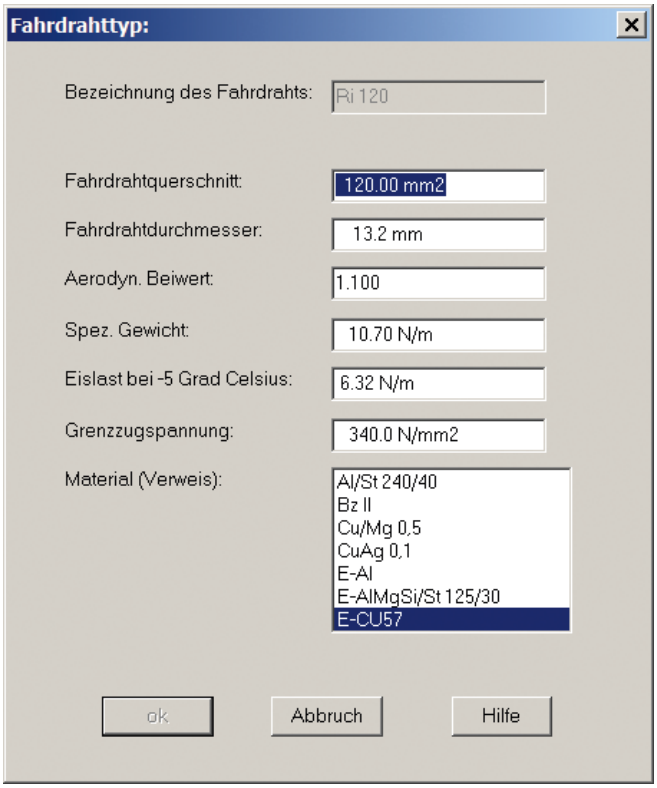
During project engineering, the selected standard overhead contact line type and the process data are referenced to calculate the design of the required overhead contact line system.




Input of catenary parameters




Input of environmental data




Input of type of contact line

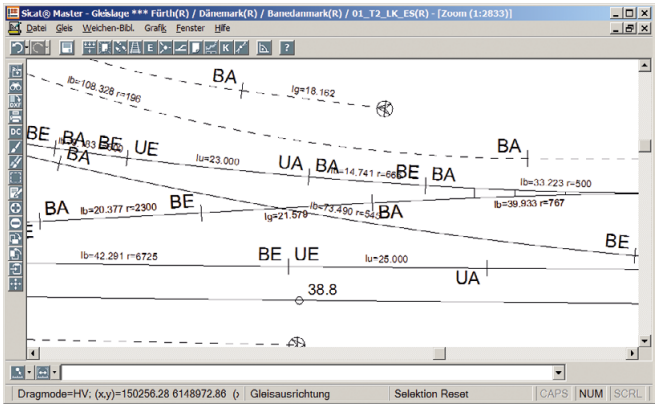
## Track layout module

The track layout data –a three-dimensional description of the track pattern – are important starting data for the engineering of overhead contact lines. The track layout description plays a crucial role in the quality of project engineering and the system to be designed.

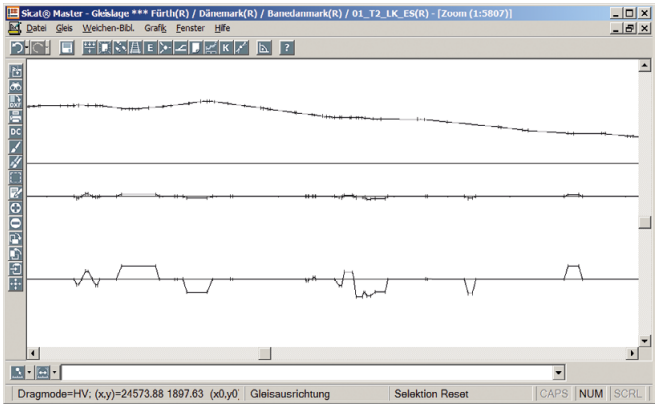
**Entering of track layout data via**

- Entering acc. to Gauß-Krüger coordinates by means of
  - structured text files
  - graphical dialog boxes
  - data migration of geo information system of the DB AG (DB-GIS)
- Importing existing track layouts from dxf files, e. g. also from customer systems
- Reading from transport planning software (ProVI, Nova)

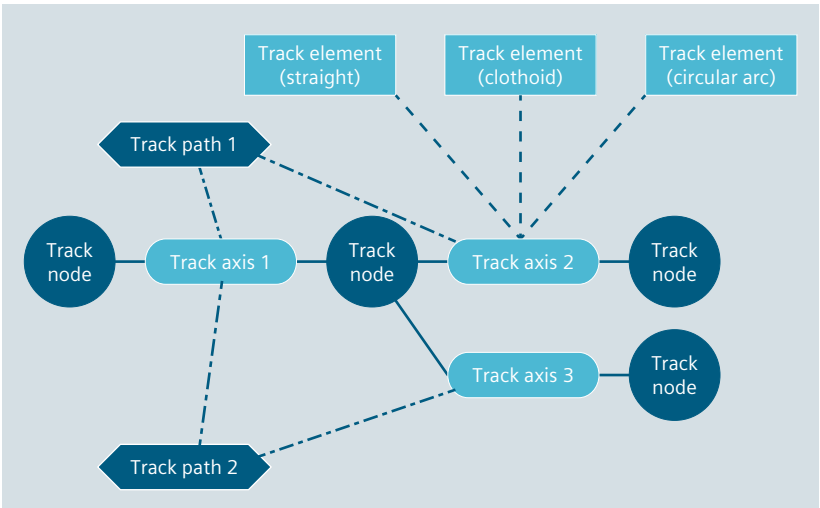
An extensive library of points with standard point designs facilitates entry of data. In addition, the import of track elements from dxf background images with coordinates and location parameters is possible.




Track layout module: plan view




Track layout module: track data diagram, view of gradient, track bend and cant




Schematic view of interal data organization – illustration of a point

**Internal data organization in track layout module**
The track path describes a track layout across several track axis, track nodes and points, which estabalish the relationship to the run of a catenary.

Adjacent view:
Main track path (track path 1) and Diverted track path (track path 2)

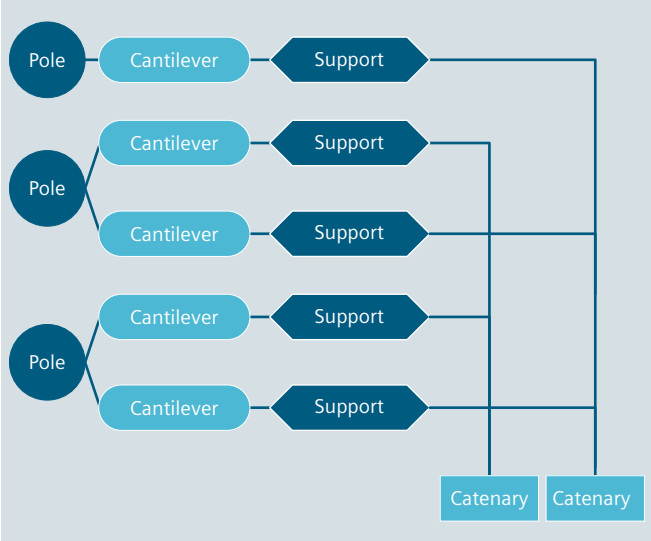
## Catenary design module

On basis of the track layout data and the process data, the overhead contact line system is planned in the catenary design module. A large number of functions and diverse forms of display support the engineer in this process:

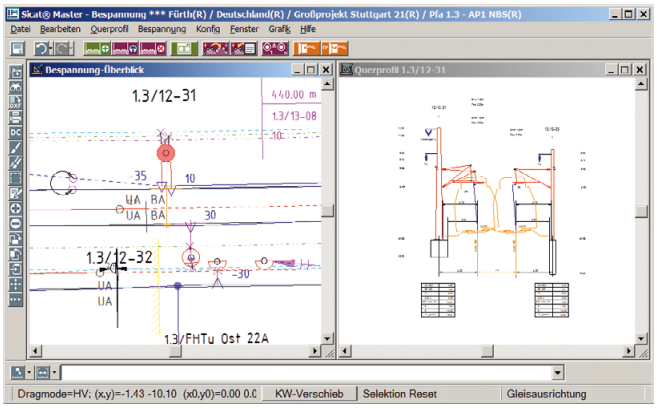
**Functions**

- Pole positionierung
- Drawing of catenaries
- Functions for creating, editing and deleting of overhead contact line elements
  - Catenary
  - Attachment points
  - Poles
  - Cantilevers, multiple track cantilevers
  - Tunnel supports
  - Cross spans and yokes
  - Switches, insulators, connectors, section insulators
  - Traction power lines
- Calculation and check of run of catenaries in dips
- Insertion of section insulations and tension assemblies from an extensive library
- Functions for automatic dimensioning and labeling
- Check of wind deflection
- Rule-based automatic and manual determination of material quantities
- Comfortable, track layout based copy and paste function of complex groups of overhead contact line objects

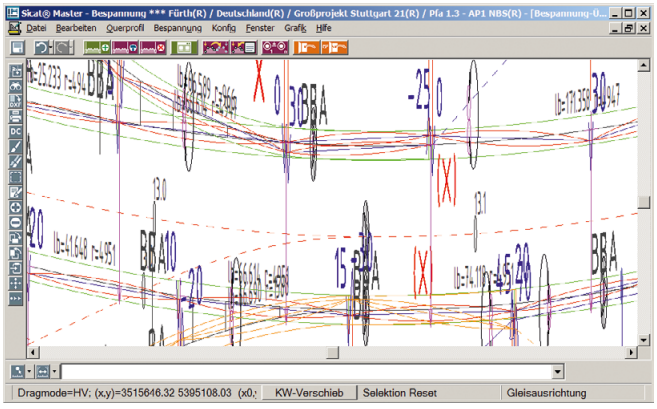
Calculation algorithms, such as the algorithms for longitudinal span length optimization and for the definition of reusable catenary installation blocks, ensure efficient project planning and engineering. Furthermore, they permit the analysis of the static loads on poles together with their built-on parts.




Schematic view of the object model for overhead contact line elements – detail of an overlap section



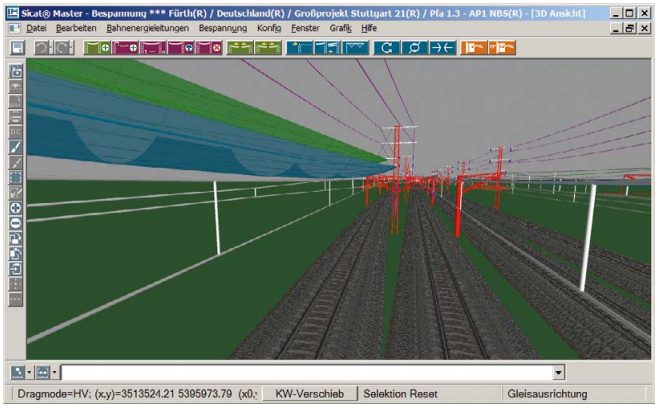

Plan view and cross section



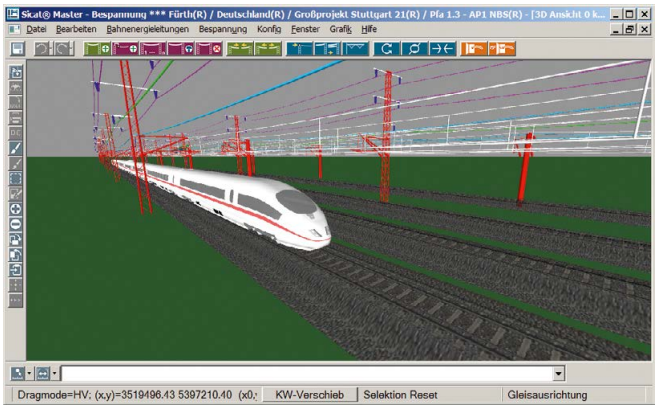

Descaled view with pantograph range and run of wind deflection

## Display possibilities

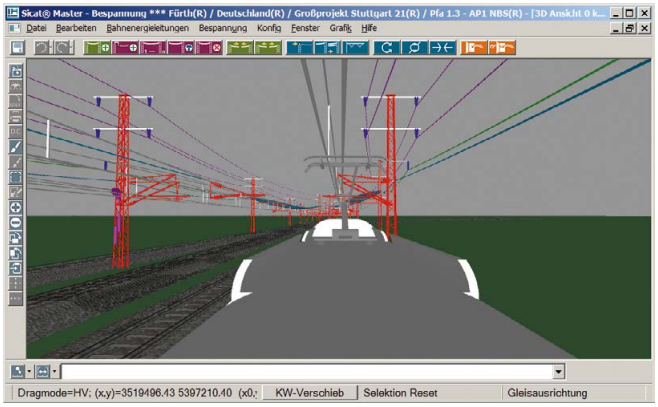
- Flexible, symbolic view of overhead contact line elements (symbol size, customer specific adaption of symbols)
- Descaled view for visual check of wind deflection
- View of cross sections
  - Visualization for each pole position
  - Calculation of fication height and dimensioning
  - Visualization of structure gauges and standard sections
- Longitudinal profiles
  - Graphical view of catenary dip
  - Graphical view of vertical run of feeder and reinforcement lines
- 3D view of complete overhead contact line system
  - 3D simulation of train runs
  - Visualization of line sag and line decay process via hammock
- Visualization of background images of territory in plan view and cross section
  - dwg / dxf CAD files
  - Georepherenced ECW files




3D view: line with hammock, which visualizes the sag and the decay process of a line, for proof of gap to overhead contact line elements beneath




3D view: simulation of train run




3D view: camera perspective behind pantograph

# Outputs

For the output of data, diverse options are available:

| Output formats |
|---|
| **Graphical outputs**<br>Layout plans, cross sections and longitudinal profiles of catenary dips can bei imported into CAD programs as dwg or dxf files. |
| **Pole and catenary lists**<br>Lists like pole lists, catenary lists and quantity data are used for project logistics and can also serve as the basis for maintenance work. |
| **Material lists**<br>Results of the automatic and manual selection of Siemens parts for further processing. |
| **Data exchange**<br>to other poject engineering tools |

Interfaces to other IT tools complete the integration into the project engineering process:

### Sicat Dynamic

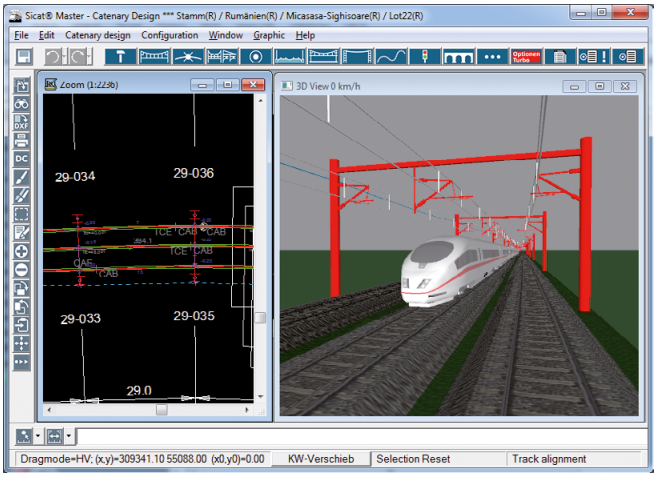
Based on the catenary and environmental parameters from Sicat Master and also additional pantograph parameters, Sicat Dynamic simulates the dynamic interaction between pantograph and contact line with the help of a special mathematical model.

### Sicat Candrop

Sicat Candrop uses the track geometry and pole locations imported from Sicat Master to calculate production lists for cantilever and dropper manufacture.

### Sicat Matlog

Sicat Matlog provides support in the component selection and in material logistics and, thanks to its interface to Sicat Master, is always up-to-date with the latest state of the project engineering process.




3D view incl. simulation of train run

**Material list – Project**

| No | Module | Description | Quantity | Unit |
|---|---|---|---|---|
| 1 | C.5307-03-B1200-S001 | Mast HE-A 220 Typ 1+5 | 246,00 | St |
| 2 | C.5307-03-B1200-S003 | Mast HE-A 240 Typ 6 | 32,00 | St |
| 3 | C.5307-03-B1200-S302 | Mast HE-B 240 Typ 8 | 58,00 | St |
| 4 | C.5307-03-B1200-S300 | Mast HE-B 260 Typ 3+4 | 57,00 | St |
| 5 | C.5307-03-B1200-S309 | Mast HE-B 300 Typ 8 mit VL | 2,00 | St |
| 6 | C.5307-03-B1200-S303 | Mast HE-B 260 Typ 6 | 16,00 | St |
| 7 | C.5307-03-B1200-S002 | Mast HE-A 240 Typ 1+5 | 18,00 | St |
| 8 | C.5307-03-B1200-S304 | Mast HE-B 260 Typ 8 | 16,00 | St |
| 9 | C.5307-03-B1200-S305 | Mast HE-B 300 Typ 3+4 | 7,00 | St |
| 10 | C.5307-03-B1200-S307 | Mast HE-B 300 Typ 3+4 mit VL | 6,00 | St |
| 11 | C.5307-03-B1200-S301 | Mast HE-B 240 Typ 1 | 19,00 | St |
| 12 | C.5307-03-B1200-S306 | Mast HE-B 240 Typ 1+5 mit VL | 1,00 | St |
| 13 | 8WL1603-3 | Schutzhuelse 70-130 | 535,00 | ST |
| 14 | 8WL2184-8 | Verschlusskappe 60,3 (2") | 628,00 | ST |
| 15 | 8WL2114-7 | Oesenschelle 60,3, kompl. | 628,00 | ST |
| 16 | 8WL2115-4 | Augenschelle 60,3, kompl. | 903,00 | ST |
| 17 | 8WL2031-4B | Tragseildrehklemme 55-60,3/12 | 628,00 | ST |
| 18 | 8WL2724-1 | Gelenkgabel 55-60,3 kompl. | 628,00 | ST |
| 19 | 8WL2175-4B | Rohr DIN2448-60,3x4,0 | 3331,20 | M |
| 20 | 8WL3500-8M_DBB:059517-105 | Seitenhalter aus Aluminium, abgewinkelt | 46,00 | ST |
| 21 | 8WL1251-3_DBB:046154G | Bügelschraube M16 (118-70-45) kompl. | 267,00 | ST |
| 22 | C.5307-03-J4253-A001 | Rechteckrohr für Druckstrebe | 267,00 | ST |
| 23 | 8WL2184-7_DBB:202008X-07 | Verschlusskappe 42 | 628,00 | ST |
| 24 | 8WL2104-5 | Hakenkloben 42/42,4 mit Ringschneid- | 628,00 | ST |
| 25 | 8WL2175-2B | Rohr DIN2448-42,4x4,0 | 1736,15 | M |
| 26 | 8WL2113-5 | Oesenschelle 32/33,7-42/42,4 kompl. | 269,00 | ST |
| 27 | 8WL2724-0 | Gelenkgabel 42/42,4 kompl. | 544,00 | ST |
| 28 | 8WL1114-8_DBB:202020X-01 | Beta-Splint für Bolzen 19 | 139,00 | ST |
| 29 | C.5307-03-J4211-S001-A | Rundstange 26 für Mastanker | 143,00 | ST |
| 30 | C.5307-03-J4211-S001-C | Rundstange 26 für Mastanker | 32,00 | ST |
| 31 | 8WL1110-0 | Bolzen DIN43161-19x52 | 139,00 | ST |
| 32 | 8WL6221-1A_DBB:056711X-01 | Gelenkstueck 26 mit Gabel | 217,00 | ST |
| 33 | 8WL6223-0A_DBB:056712X-01 | Gelenkstück 26 mit Auge, mittig | 217,00 | ST |
| 34 | KNH:KBE-751-820 | Spannschloss M20 Öse/Öse 20 L=620-1020 | 139,00 | ST |
| 35 | 8WL2005-0 | Klemmenhalter 42, kompl. | 63,00 | ST |
| 36 | 8WL4517-1K_DBB:059506-3-B | Fahrdrahtklemme 16R | 63,00 | ST |
| 37 | 8WL1553-0_DBB:200107X-06 | Pressverbinder 16f-20, nrSt | 184,00 | ST |

Extract of a material list generated in Sicat Master



Sicat Master / Product information
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