Representatives | Introduction

MindCore Technologies

- manufactures disconnect switches from 15 kV to 800 kV (100A to 4000A).
- represents primtech and other SOFTWARE on the North American market. Offering additional services specific to power electrical engineering

entegra gmbh

- develops primtech (BIM software for HV-substation)
- member auf Autodesk developer network
- Autodesk gold partner for BIM and mechanical software

Wolfgang Eyrich

- Study and employed at University of Karlsruhe (KIT)
- Work focus:
  - Automated design of manufacturing tools (WBK Prof. Weule)
  - Using artificial intelligent techniques for design process automation (RPK Prof. Grabowski)
primtech | Reference customer list worldwide

Consultants, Engineering firms, EPCs

Operators

- SAG
- DMC
- ESIR
-穆罕默德
- Siemens
- Schneider Electric
- Bouygues Energie & Services
- Bouygues Energies & Services
- EDP Renewables
- EDF EnR
- EnBW
- TenneT
- Netze BW
- ISPE
- Fichtner
- Point Comm Inc
BIM | What’s BIM?

BIM = Building Information Modeling

- Planning method in the building and construction industry
- Principle = integrated, centralized and object-based management and coordination of project information
- View on the life-cycle – right from the beginning of the project

The relevancy of BIM in substation design and the integration of primtech in the BIM process?!
BIM = Building Information Modeling

- Design changes at a later stage lead to high costs
- Critical cost factors are determined in the early planning phase
Substation BIM | Requirements of a BIM software

Essential features of a BIM software (according to building SMART)
(1) Parametric 3D model elements with linked information
(2) Structuring and grouping in systems, construction...
(3) Derivation of drawings, views, intersections from the model
(4) Evaluations like BOM, quantity determination
(5) IFC Interface for data exchange

In the following with regard to substation design with primtech...
Substation BIM | Intelligent 3D objects

(1) Parametric 3D model elements with linked information

- High voltage objects like wires, tubes, isolators, circuit breakers, .... with type-specific meta data
- Intelligent parametric objects like foundations, steel constructions, wires, tubes, earth wires, ....
(2) Structuring according to systems, plants...

- Display of the substation structure according to voltage levels and bays
- Buildings, infrastructure and substations can be edited in different models
- Intelligent referencing – repeatedly used objects are available only once
Substation BIM | Derivation of drawings

(3) Derivation of drawings, views and sections from the model
- Easy drawing creation by predefined substation layouts
- Drawings are referenced to the 3D model and always consistent
- Consistent position numbers throughout all drawings

“A change anywhere is a change everywhere!”
(4) Evaluations like parts lists, quantity determination

- BOM incl. all parts also small parts like nuts and washers
- Evaluated according to substation structure (part station, bays)
- Position numbers are logically grouped e.g. wires, tubes, clamps...
- Infrastructure objects like foundations cable ducts, streets, fences, excavation, reinforcement steel....
Substation BIM | **Data exchange**

(5) **IFC interface for data exchange**
- IFC for building models
- Currently no IFC-definition for HV objects are available
- Important: As soon as an IFC definition for HV objects is defined, we are able to create the IFC data with primtech
- Export and import of geometry: 2D, 3D in .DXF, .DWG and .DGN
- Consistent data exchange of complete projects between primtech users – includes models, structures and metadata

**primtech supports lossless model exchange**
Substation BIM | One single data model in all disciplines

One single data model for all BIM model elements of all disciplines
Substation BIM | **BIM workflow - collaboration**

**primtech model in Autodesk BIM 360 Glue, Navisworks**
- Merge models from different applications
- Detect clashes and distances
- BIM 4D – time line
Substation BIM | Substation design process

primtech in all phases
- Easy tendering
- Fast and more precise offers
- Precise and complete implementation planning
- High quality documentation
- Perfect for extension/upgrade

primtech workflow follows BIM philosophy!

From “undefined” to “specified”
Efficient engineering | Layout pattern design

Creation of new projects

- Copy bays from “substation layout templates” or existing projects (primtech automatically copies corresponding assemblies, details and drawings)
- Replace or adjust devices, replace undefined details
- Assemble main layout, connect busbar
- Create layout drawings, edit assembly/detail drawings
- Check BOM

Copy and paste → merge and replace

- Copy with references and topology
- Auto-update of bubbles and BOM
- replace or specify undefined objects

From “undefined” to “specified”
Design checks | design optimization

Phase and clearance checker
- Identify live parts, insulators, ground parts
- Identify phases of live parts

wire sag and short circuit current effects
- Tensile forces from the diverse loads (weight, temperature weather)
- Sag and Installation Table
- short-circuit tensile force
- drop force
- pinch force

Lightning protection calculation
- rolling sphere method
Summary | **primtech = BIMtech**

**The solution for substation BIM**

- Drawings and BOMs are a derivation of the BIM model
- Two libraries (common, project) containing intelligent and parametric objects with linked information.
- Several tools to optimize design at any time during the design process
  - Using clearance check tools for minimizing distances
  - sag calculator, short circuit current effect calculator for cost reduction
- BIM process support
  - Tender -> Offer -> Implementation -> Documentation
- Layout pattern design support
  - Copying predefined layout patterns to the current project and bringing it from undefined to specified condition
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