# Extensions for Autodesk® Revit® Structure 2013 for the Precast Concrete Industry

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General Manager, IDAT

# Class Summary

This class shows how extensions to Autodesk Revit Structure can dramatically speed up creation of precast hollow core slab elements.

You will learn how to define families for hollow core slabs with profiles and the strand patterns. These families will be used for automatic dividing of hollow core slabs into producible panels. We will look at assemblies and the splitting tools from Revit.

We will go through the automatic creation of shop drawings and data for the production in the precast factory.

With the defining of the transport stacks and the production line, we will see the full workflow from design to production of hollow core slabs inside of Revit.

# Reinhard Lackner

- General Manager of the company IDAT/Germany
- Studied computer science at Technical University of Vienna
- Experience in the Precast Industry since 1990

# Learning Objectives

At the end of this class, you will be able to:

- Define families for hollow core slabs
- Automatically dividing of hollow core slabs
- Use of the splitting tools
- Automatic creation of shop drawings
- Export data for production

# Class Contents

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| | Automatically and manually dividing floors into hollow core slabs |
| Section 4 | **Assemblies** |
| | Automatic detection of same elements |
| Section 5 | **Shop drawings** |
| | Creation of Shop drawings for hollow core slabs |
| Section 6 | **Creating data for external programs** |
| | Machine files, external database, Stacker, Palletizer |

# Introduction

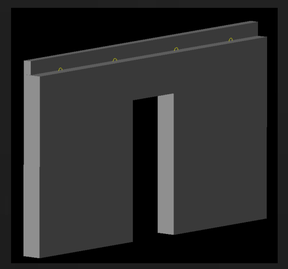
# Introduction

- What are the Revit Precast Tools?
  - Extensions to and around Revit to support the workflow from design to fabrication for the Precast Concrete Industry
  - Developed by IDAT (www.idat.de) in cooperation with Autodesk
- Who is IDAT?
  - German based company developing software for the Building Industry since 1981
  - IDAT is Industry Partner of Autodesk since 2010
  - Clients in over 30 countries world wide
  - Main product: Precast software for AutoCAD Architecture

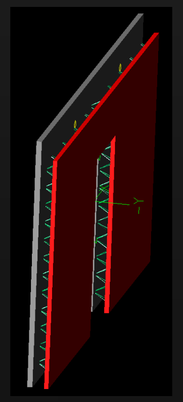
# Precast CAD Software Modules for AutoCAD Architecture

## Walls

Solid Wall / Sandwich Wall

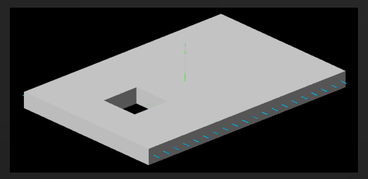


Twin Wall

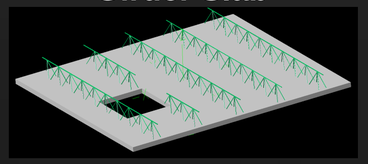


## Slabs

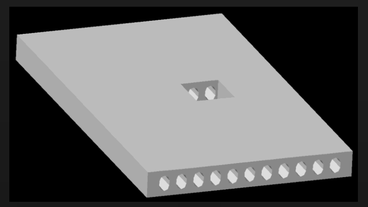
Solid Slab



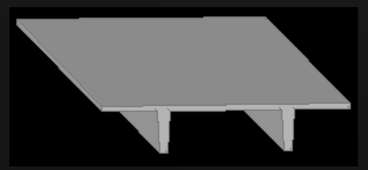
Girder Slab



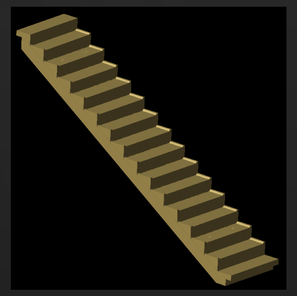
Hollow Core Slab

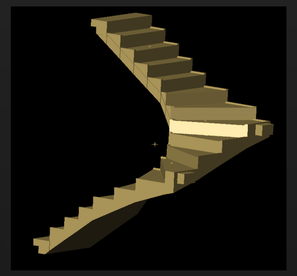


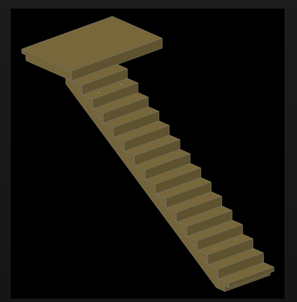
TT - Slab



## Stairs

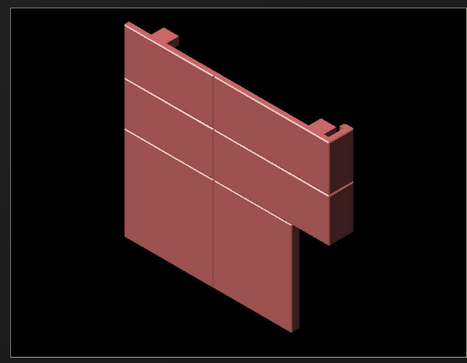






## Colums + Beams

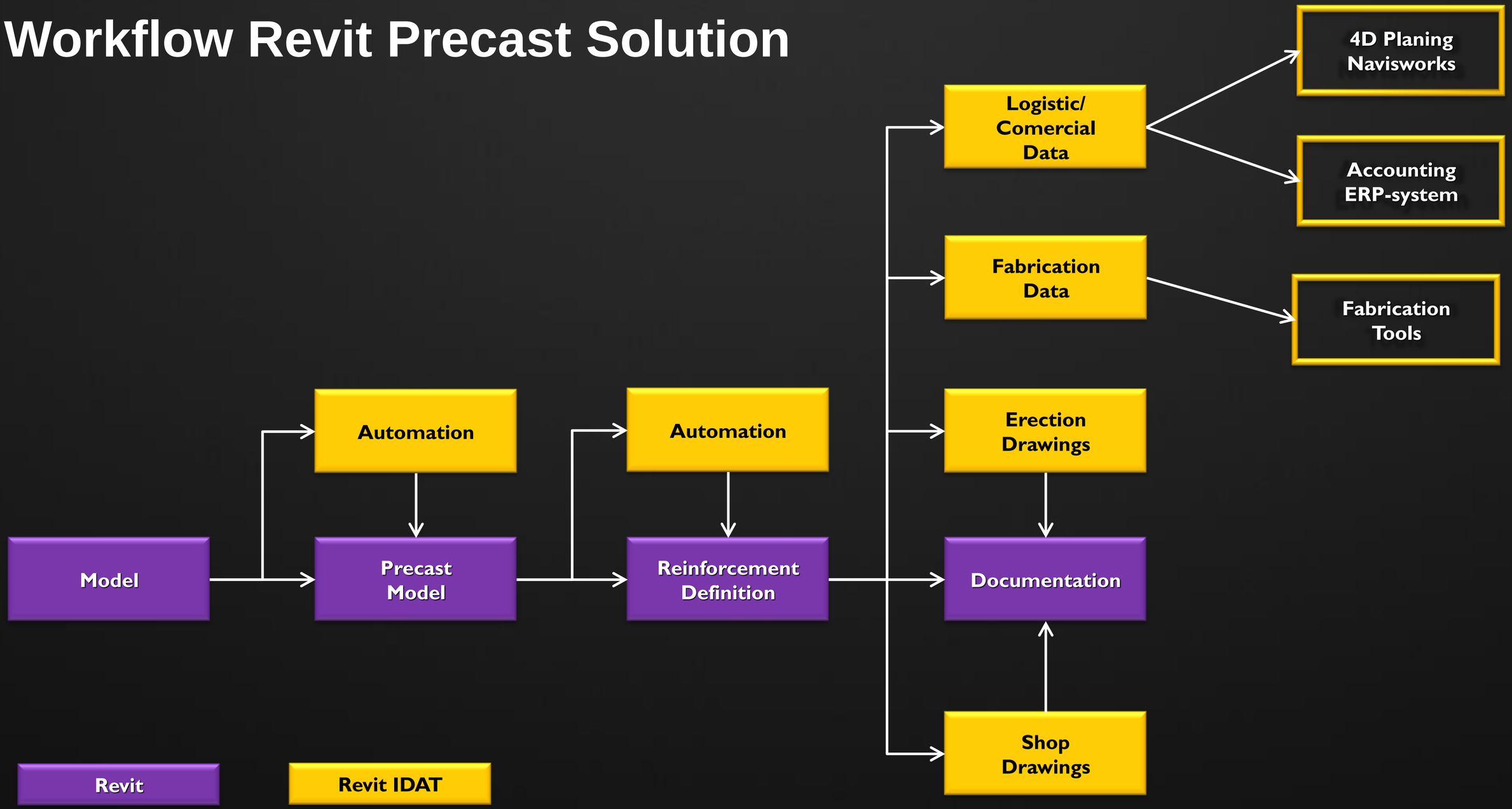
## Facades / Special designs



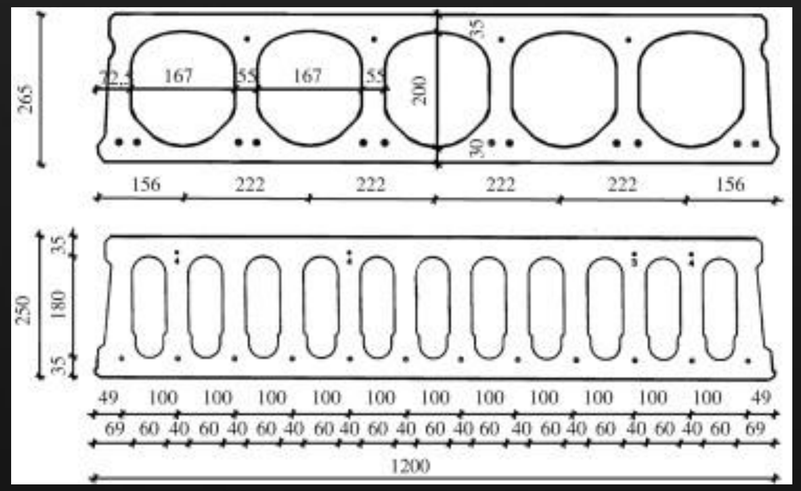
# Revit Precast Tools for Autodesk Revit Structure

- Preview version of the Revit Precast Tools was released in 2011
- Can be downloaded from the IDAT website: www.idat.de
- Each module will be released step by step for Revit Structure
- First module for the hollow core slabs

# Workflow Revit Precast Solution

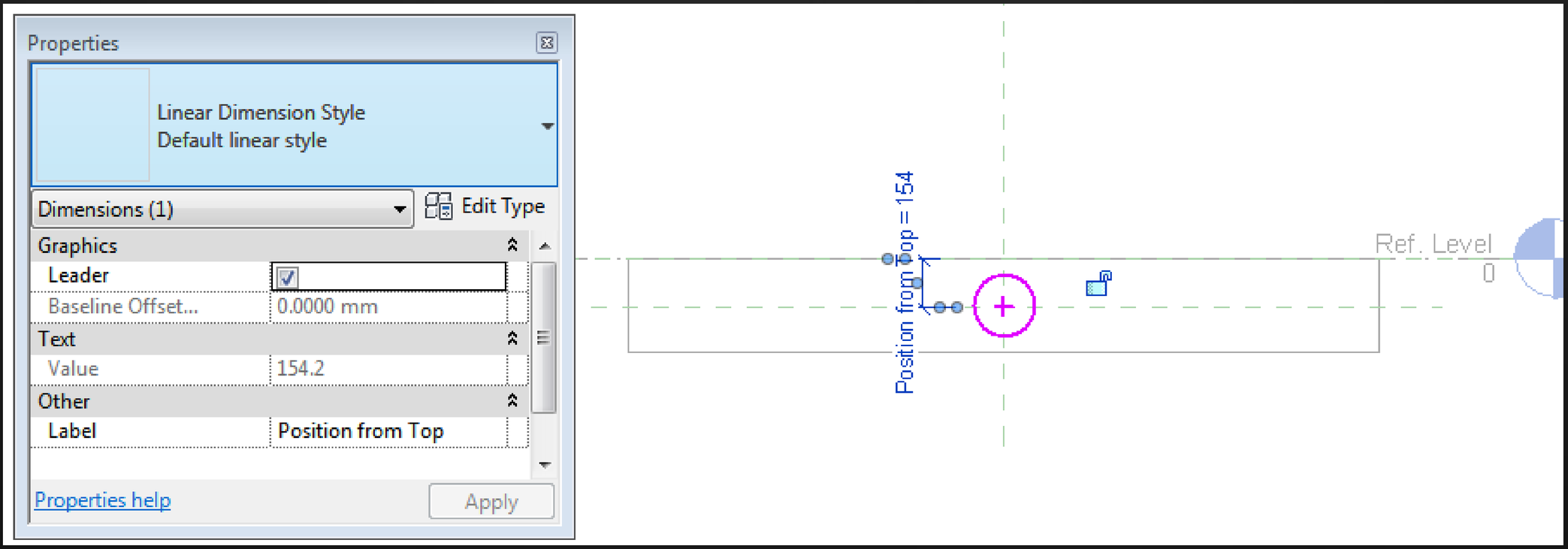


# Creation of hollow core families



# Hole definition

- Use template “Metric Generic Model face based.rft”

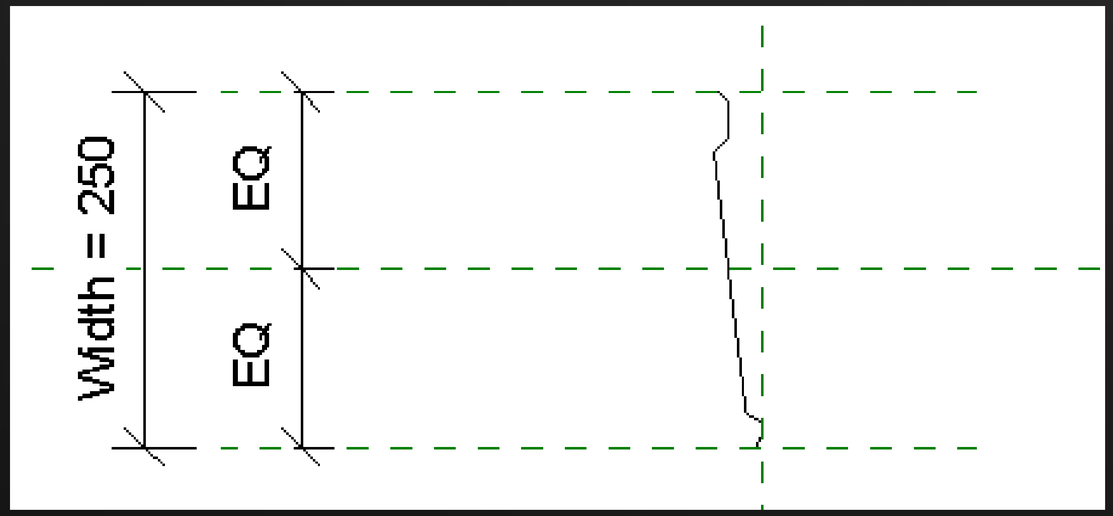


# Hole definition

- Load shared parameter file C:\ProgramData\IDAT\Revit Precast Tools 2013\ItSharedParameter.txt
- Use “Position from Top” as distance from top to center hole
- Use “Element Length” for the length of the hole
- Set in the properties of the family “Cut with Voids When Loaded” and “Shared”
- Save file in folder *C:\ProgramData\IDAT\Revit Precast Tools 2013\IDATFamilies\en-US\Hollow Core Slab*

# Side profile

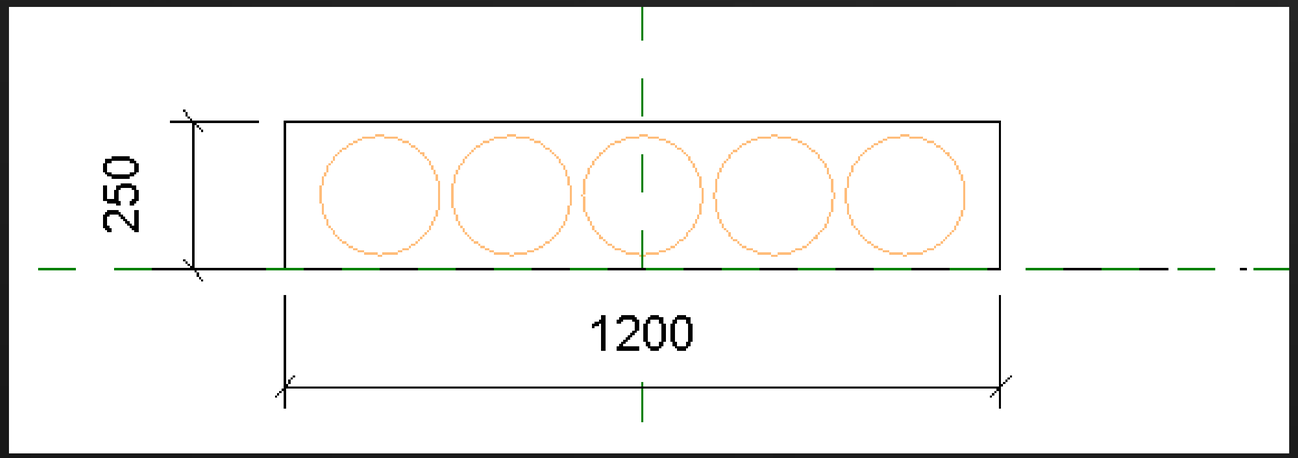
- Use template „Metric Division Profile.rft“
- Define on the left the profile with lines




- Save file in folder *C:\ProgramData\IDAT\Revit Precast Tools 2013\IDATFamilies\en-US\Profiles*

# Cross section

- Use template “*Metric Generic Model.rft*”
- Load hole family and place holes

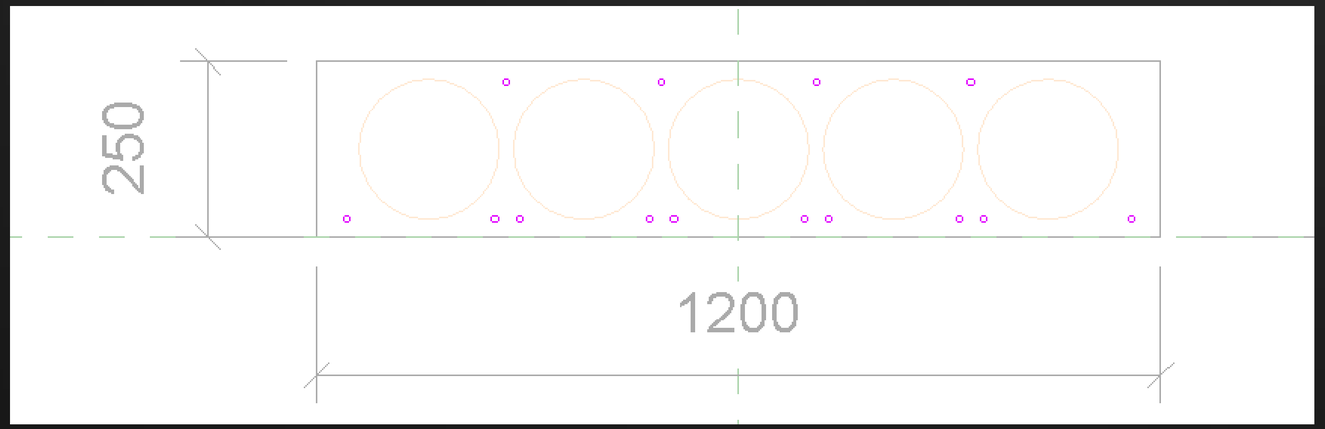


# Cross section

- Add shared parameter “ProfileType” with side profile name
- Add shared parameter “Valid widths” with [xx1-yy1][xx2-yy2]…..
- Save file in folder *C:\ProgramData\IDAT\Revit Precast Tools 2013\IDATFamilies\en-US\Hollow Core Slab*
- Set file name to hbd_xx.rfa where xx is the thickness of the slab

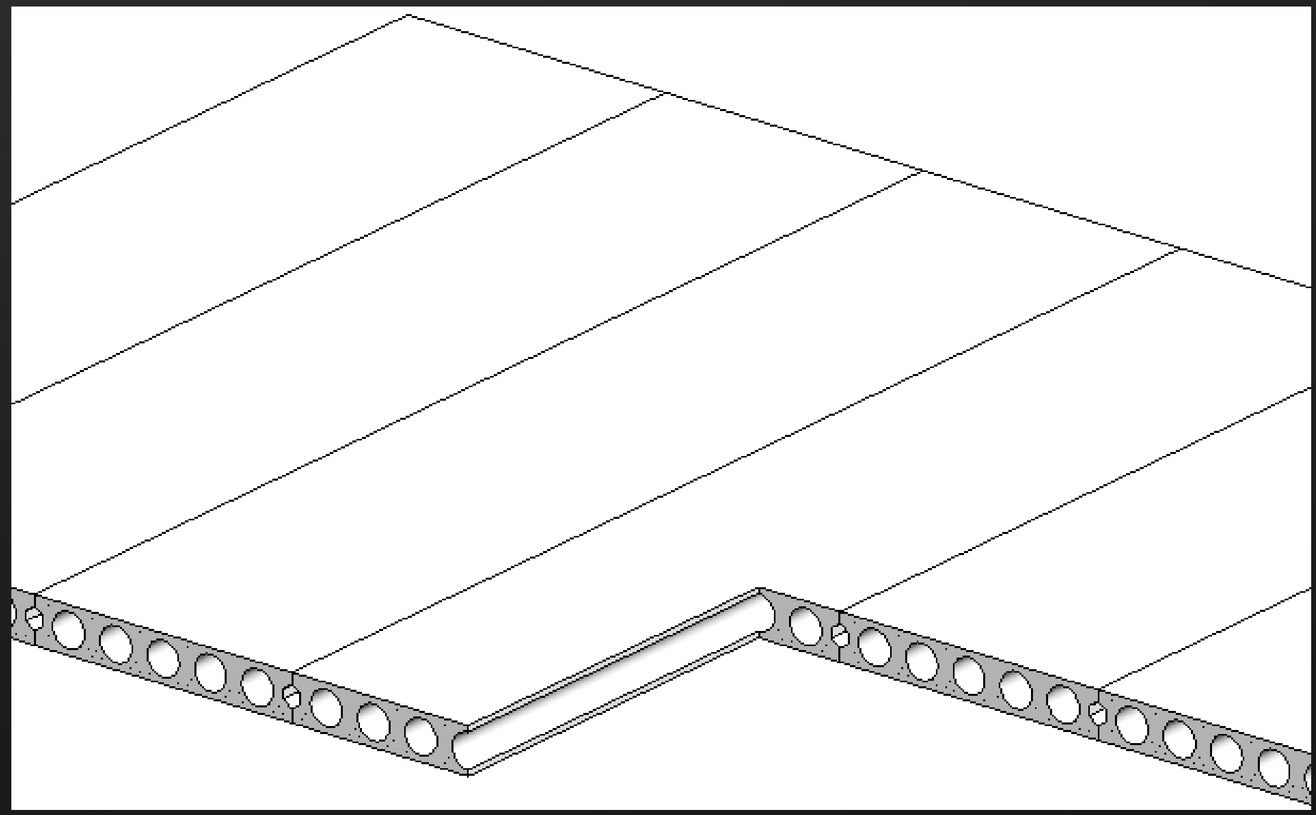
# Strand pattern

- Copy cross section family file
- Place strands as cylindrical extrusions with according diameter



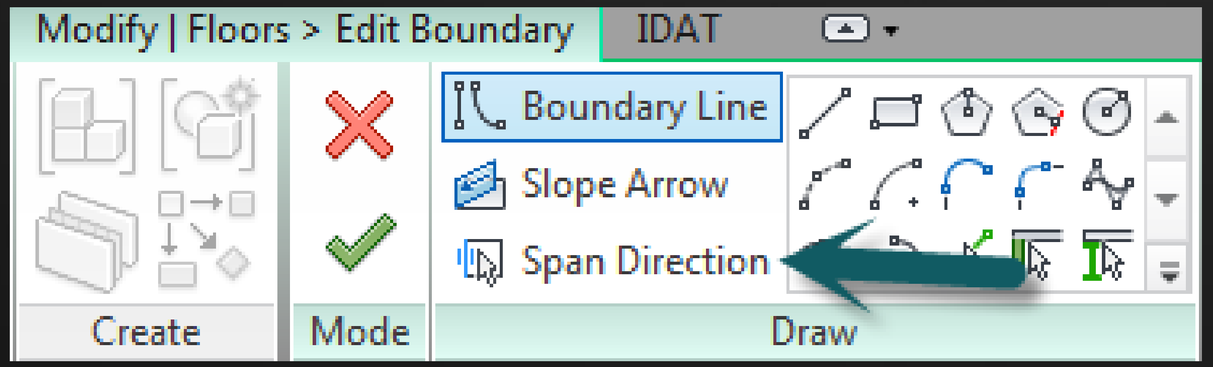

- Delete holes
- Save file in folder *C:\ProgramData\IDAT\Revit Precast Tools 2013\IDATFamilies\en-US\Hollow Core Slab*

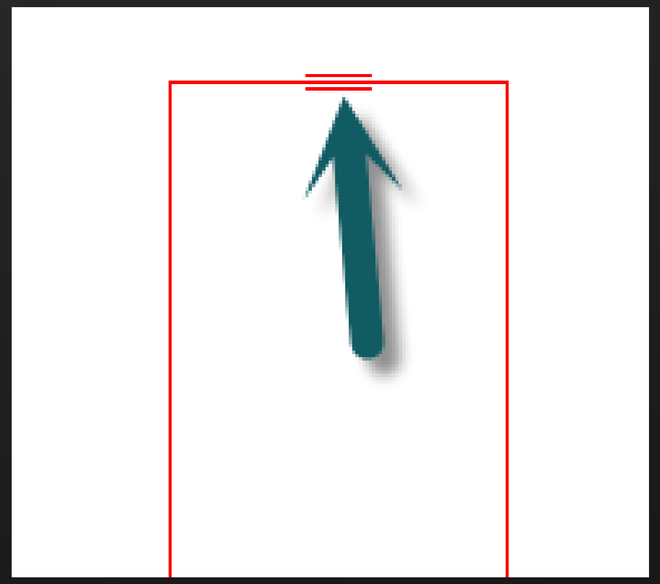
# Segmentation



# Segmentation

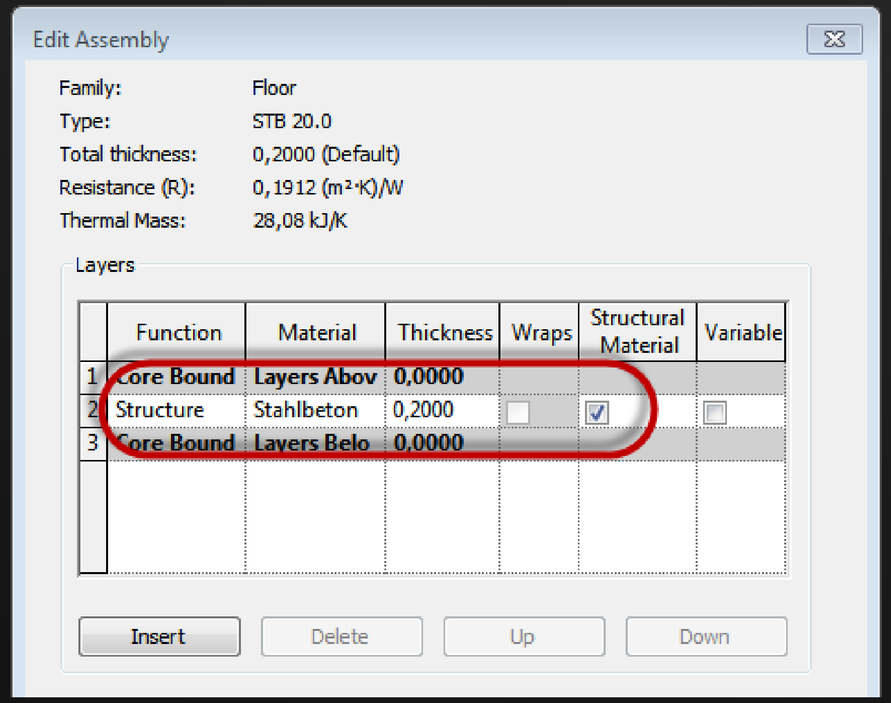
- Set the span direction of the floor



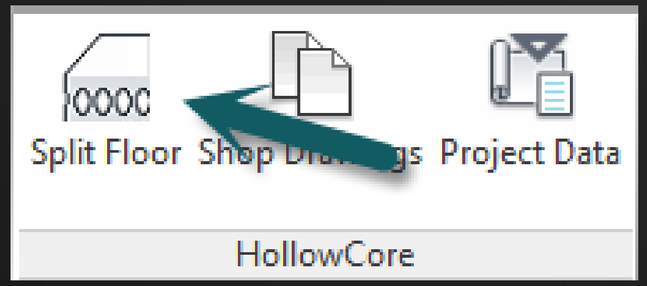
# Segmentation

- Set structural layer to hollow core thickness
- Set structural material

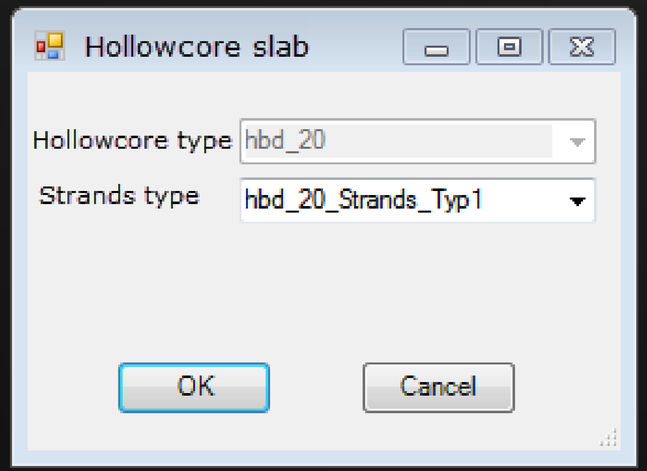


# Segmentation

- Select the floor and start the command

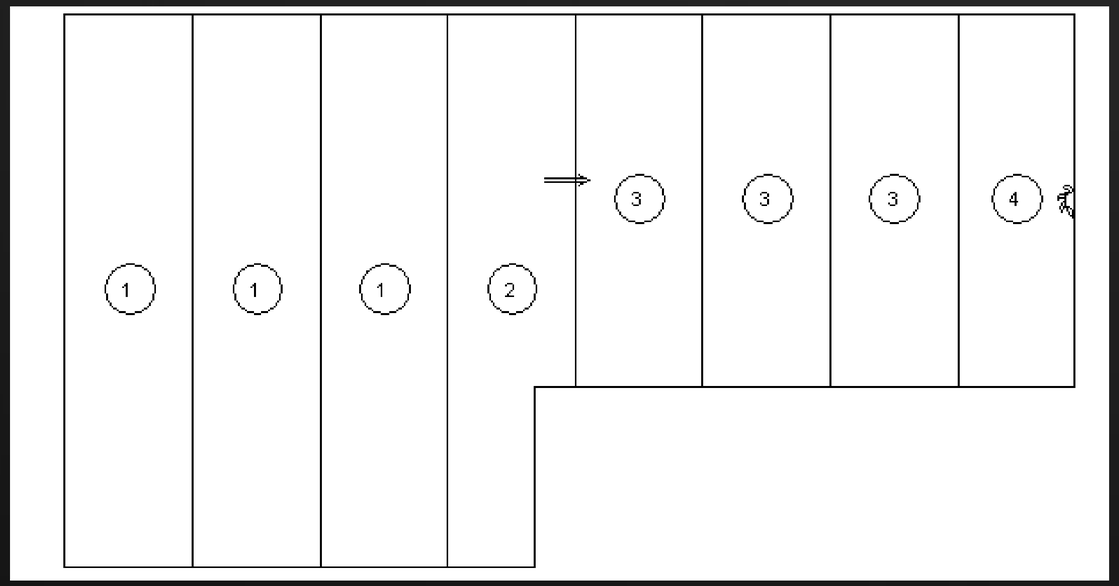



- Choose the strands type



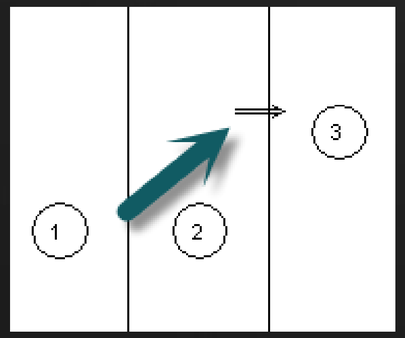
# Segmentation

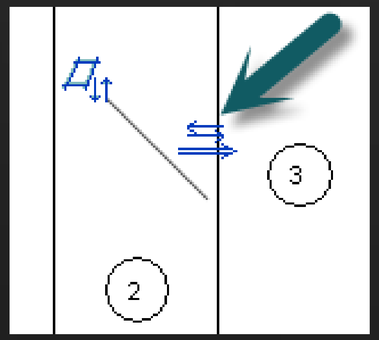
- Same elements get the same position number



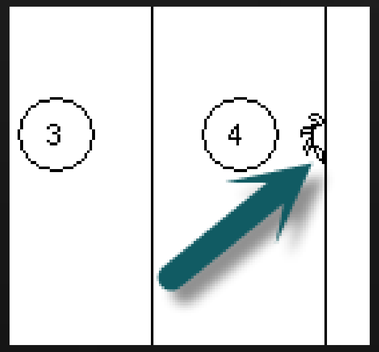
# Segmentation

- Shifting direction can be changed



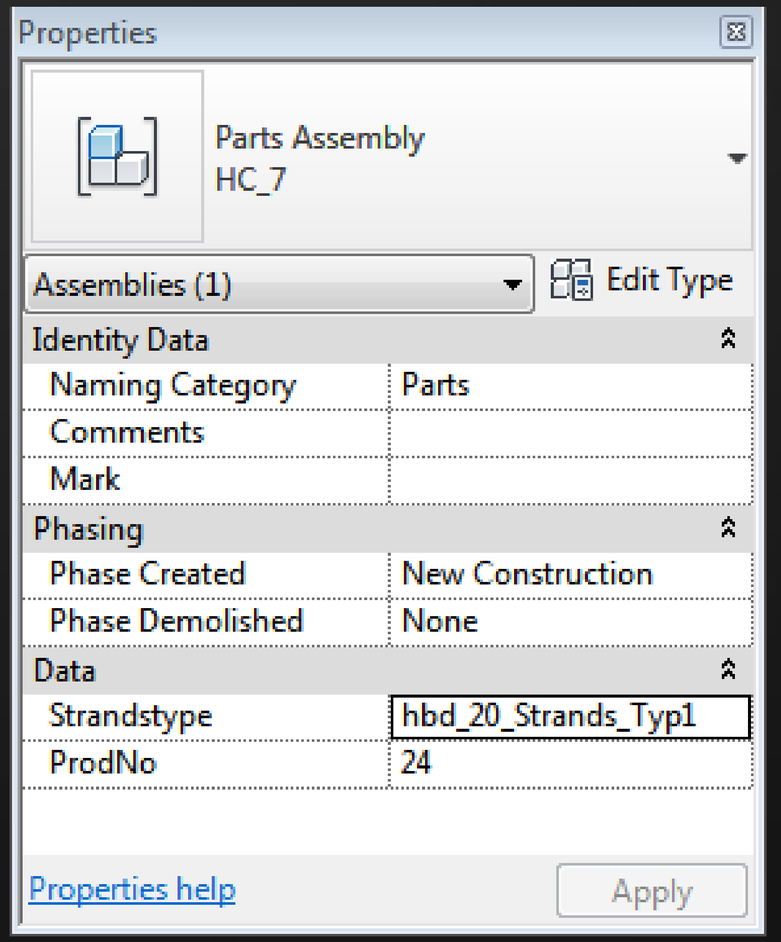

- The side where the element must be cut can be changed with the saw cut symbol



# Assemblies

# Assemblies

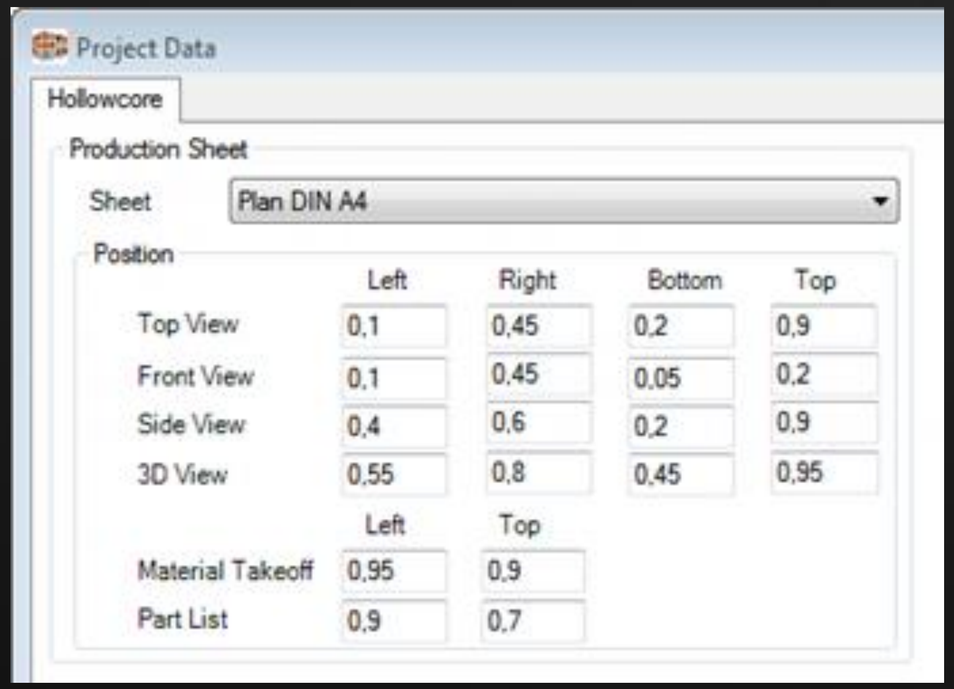
- The hollow core elements are converted to assemblies
- Same assemblies get the same assembly type name
- In the data of the assembly the strands type is stored and can be changed if needed
- Unique production number is stored in the data



# Shop drawings

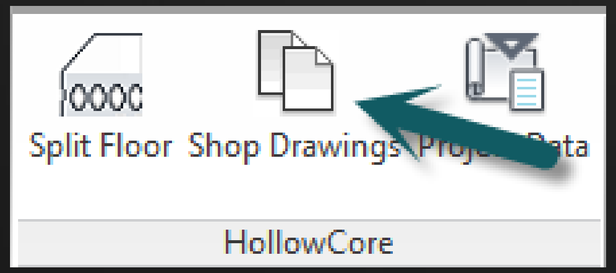
# Shop drawings

- Set the title block in the project data
- Define the position for the views on the sheet (values between 0 and 1)

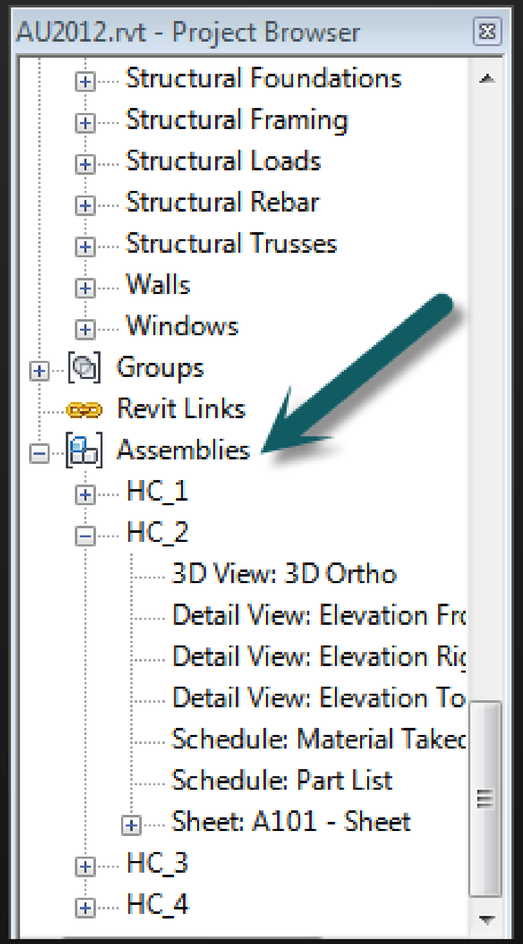


# Shop drawings

- Shop drawings are created with the command “shop drawings”

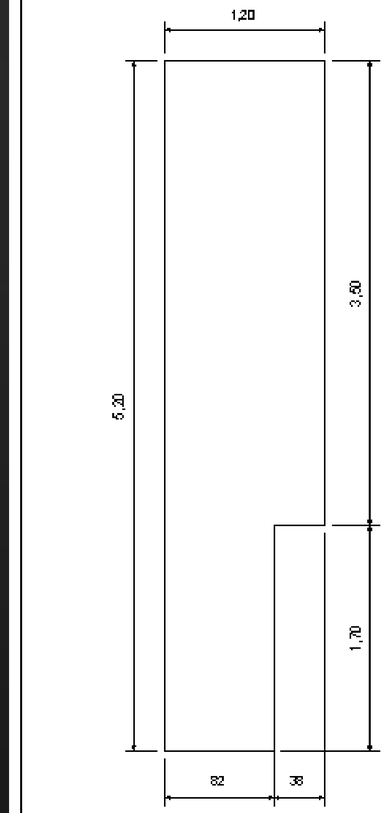


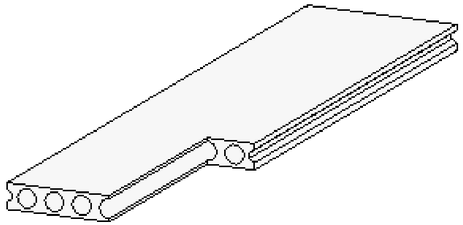

- The shop drawings can be found in the Project Browser under Assemblies



# Shop drawings

- Example



| Material Takeoff | |
|---|---|
| Material: Name | Material: Volume |
| Stahlbeton - Ortbeton | 0,68 m³ |

| Part List | | |
|---|---|---|
| Category | Family and Type | Count |
| Structural Rebar | Rebar Bar: 8 BSt 500S | 32 |

Project Autodesk University 2012
Geben Sie die Adresse hier ein

IDAT

Client IDAT

Plan Sheet

Position:2
No elements:1
Elements:4
Floor Type:hbd_20
Thickness:20
Weight:1637kg
Volume:0,68 m³

Date 10/14/12
Drawn Author
Checked Checker

Scale 1 : 31

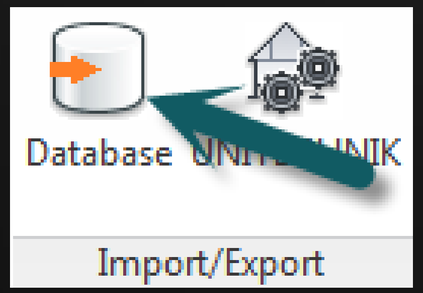
Project number
1234

Plan number
A102

# Creating data for external programs

# Data for external database

- Data for all assemblies can be stored into an external database
- This contains geometric data, mounting parts and the reinforcement (strands)
- Lists can be created and data can be exported to ERP systems




IDAT

## Plate Flooring Sum List

Date: 14.10.2012

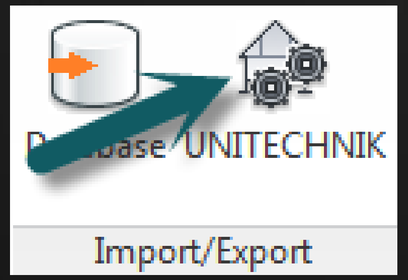
Orderer: IDAT GmbH
Building Proj.: Autodesk University
Constr.loc.: Las Vegas -

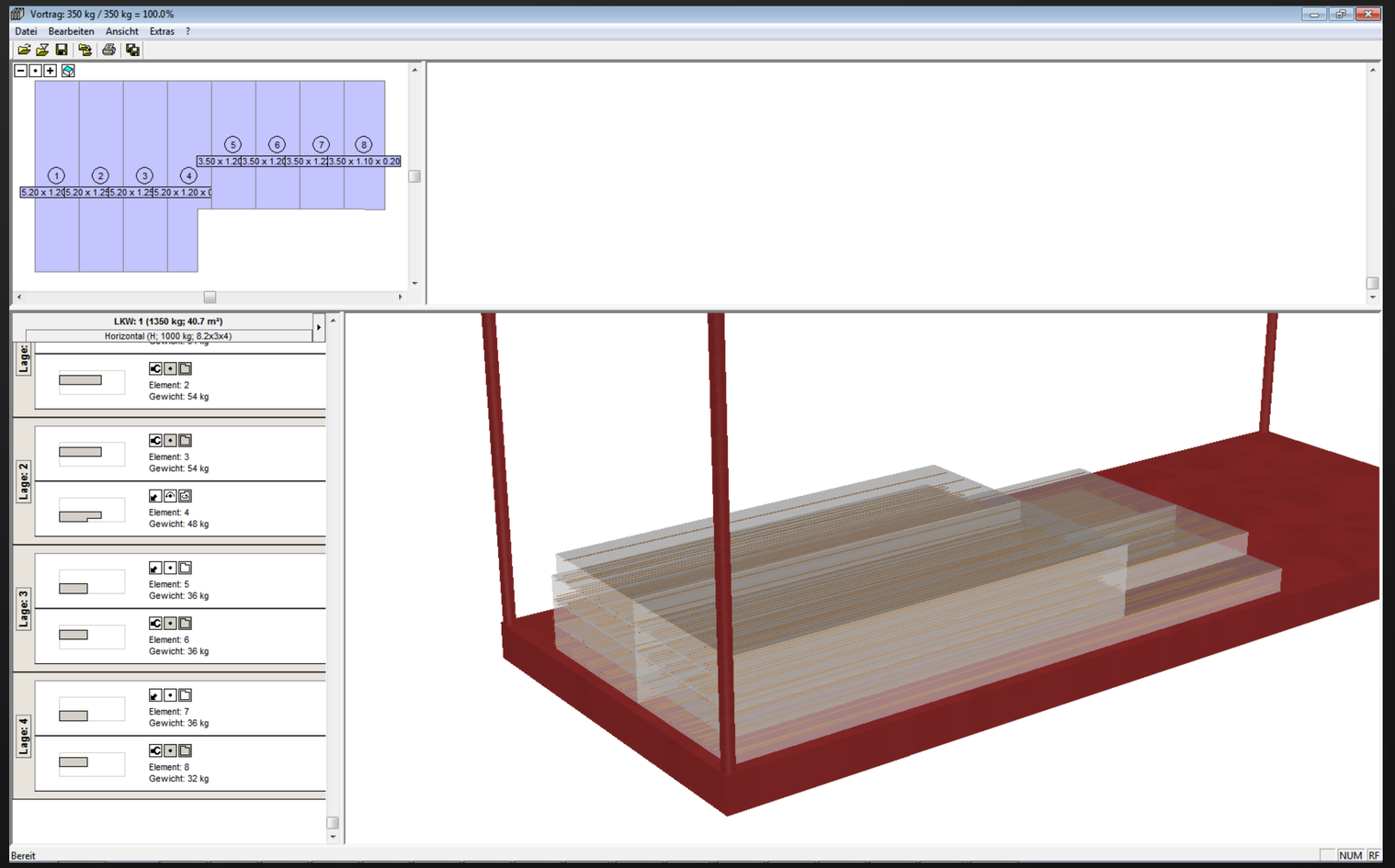
Order #: 1234 03
Storey o.: FF

| Panel | Concrete | Length mm | Width mm | Area m² | Thickness mm | Volume m³ | Weight kg |
|---|---|---|---|---|---|---|---|
| 1 | C45/55 | 8223 | 1200 | 9,867 | 150 | 1,480 | 3700 |
| 2 | C45/55 | 8223 | 1200 | 9,867 | 150 | 1,480 | 3700 |
| 3 | C45/55 | 8223 | 1200 | 9,867 | 150 | 1,480 | 3700 |
| 4 | C45/55 | 8223 | 1200 | 9,867 | 150 | 1,480 | 3700 |
| 5 | C45/55 | 8223 | 1200 | 9,867 | 150 | 1,480 | 3700 |
| 6 | C45/55 | 8223 | 1200 | 9,867 | 150 | 1,480 | 3700 |
| 7 | C45/55 | 8223 | 1200 | 9,867 | 150 | 1,480 | 3700 |
| 8 | C45/55 | 8223 | 1200 | 9,867 | 150 | 1,480 | 3700 |
| 9 | C45/55 | 8223 | 1200 | 9,867 | 150 | 1,480 | 3700 |
| 10 | C45/55 | 8223 | 1200 | 9,867 | 150 | 1,480 | 3700 |
| 11 | C45/55 | 8223 | 1200 | 9,867 | 150 | 1,480 | 3700 |
| 12 | C45/55 | 8223 | 1200 | 9,867 | 150 | 1,480 | 3700 |
| 13 | C45/55 | 8223 | 1200 | 9,867 | 150 | 1,480 | 3700 |
| 14 | C45/55 | 8223 | 1200 | 9,867 | 150 | 1,480 | 3700 |
| 15 | C45/55 | 8223 | 1200 | 9,867 | 150 | 1,480 | 3700 |
| 16 | C45/55 | 8223 | 1200 | 9,867 | 150 | 1,480 | 3700 |
| 17 | C45/55 | 8223 | 1200 | 9,867 | 150 | 1,480 | 3700 |
| 18 | C45/55 | 8223 | 1200 | 9,639 | 150 | 1,446 | 3615 |
| 19 | C45/55 | 6074 | 1200 | 7,288 | 150 | 1,093 | 2733 |
| 20 | C45/55 | 6074 | 1200 | 7,288 | 150 | 1,093 | 2733 |
| 21 | C45/55 | 6074 | 1200 | 7,288 | 150 | 1,093 | 2733 |
| 22 | C45/55 | 6074 | 1200 | 7,288 | 150 | 1,093 | 2733 |
| 23 | C45/55 | 6074 | 1200 | 7,288 | 150 | 1,093 | 2733 |
| 24 | C45/55 | 6074 | 1200 | 7,288 | 150 | 1,093 | 2733 |
| 25 | C45/55 | 6074 | 1200 | 7,288 | 150 | 1,093 | 2733 |
| 26 | C45/55 | 6074 | 1200 | 7,288 | 150 | 1,093 | 2733 |
| 27 | C45/55 | 6074 | 1200 | 7,288 | 150 | 1,093 | 2733 |
| 28 | C45/55 | 6074 | 1200 | 7,288 | 150 | 1,093 | 2733 |
| 29 | C45/55 | 6074 | 1200 | 7,065 | 150 | 1,060 | 2649 |
| 30 | C45/55 | 5422 | 1200 | 5,822 | 150 | 0,873 | 2183 |
| 31 | C45/55 | 4282 | 1200 | 4,454 | 150 | 0,668 | 1670 |
| 32 | C45/55 | 3141 | 1200 | 3,085 | 150 | 0,463 | 1157 |
| 33 | C45/55 | 2001 | 1200 | 1,717 | 150 | 0,258 | 644 |
| 34 | C45/55 | 861 | 906 | 0,39 | 150 | 0,058 | 146 |
| Sum: | | 230535 | | 272,8 | | 40,916 | 102294 |
| Sum plate floor | | 230535 mm | | 272,79 m² | | 40,92 m | 102294 kg |

# Machine files for the Stacker program

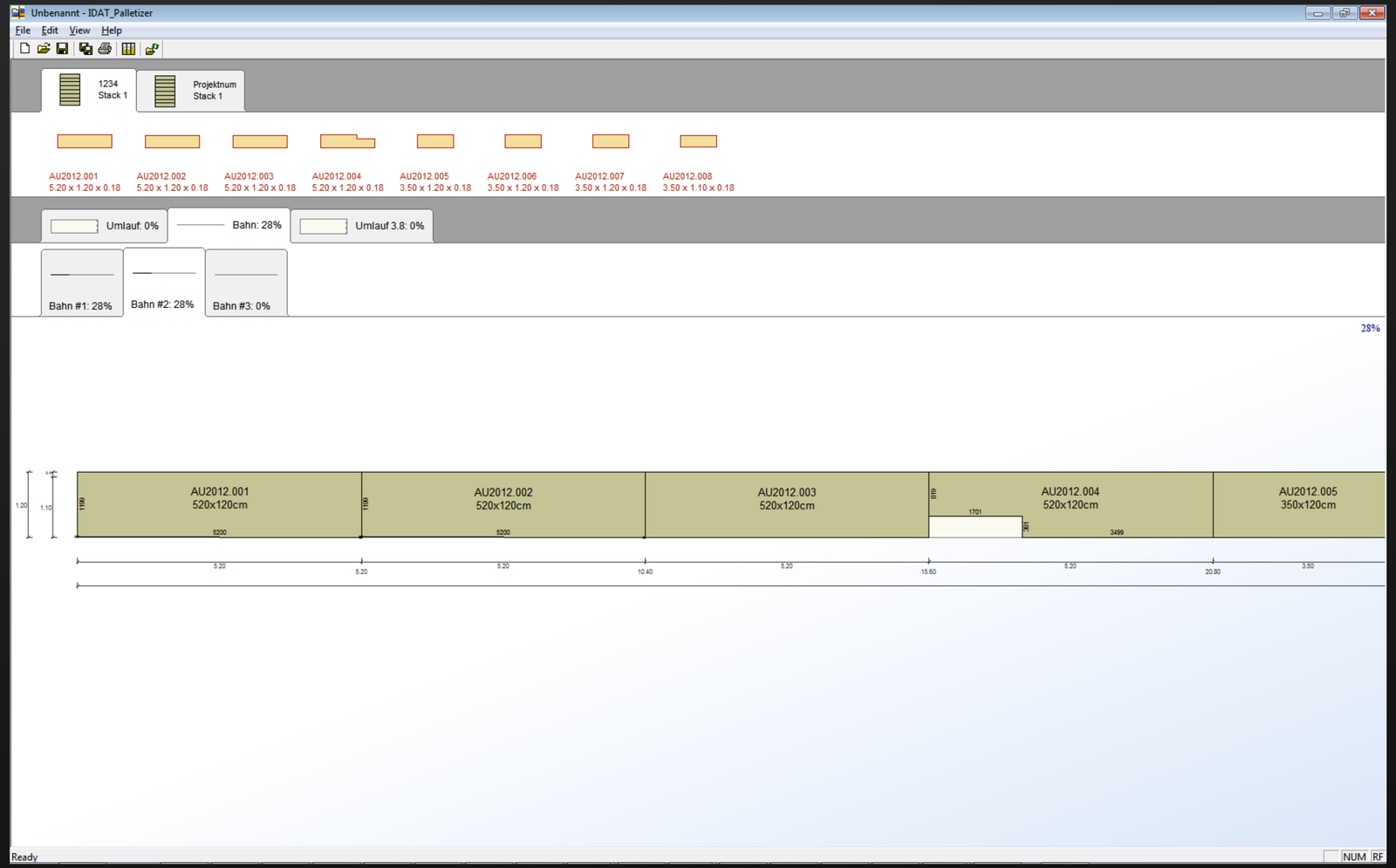
- UNITECHNIK format
- Defining transport stacks (load trucks)



# Production planning with the Palletizer program

- Planning the production line
- Exporting UNITECHNIK files for production
- Data for plotter, saw



# Change to the model

- Change in the Revit model after all the machine files are created
- Only the UNITECHNIK files for the according assemblies must be created again

# Production

# Summary

- Definition of the hollow core families
- Automatic segmentation
- Creation of hollow core elements with correct sections and strand patterns
- Converting to assemblies with equality check
- Creation of shop drawings
- Exporting data to external programs
- Changes in the model
- Production

-> Full workflow from design to fabrication for hollow cores inside of Revit

# Thank you!

**You can download a preview of the Revit Precast Tools:**
**www.idat.de**

**Contact me: lackner@idat.de**