Faster and Better Proposals with CADISON® Project Engineer

One of the big challenge for any organization is to get its Costing and Proposals as accurate as possible and remain competitive in the marketplace. Most CAD systems and plant design solutions on the AutoCAD platform do not have the capability to assist in this process. CADISON® does. The CADISON® Project Engineer module enables faster and better proposal creation through its conceptual engineering, cost estimation and report generation capabilities.

Below we define the first few steps explaining how to go about doing this:

1. Create new Project Database

Using Project Engineer create a new project database which automatically creates an empty structure along with essential CADISON® objects, report formats. Use project edit wizard to set all project and cost related details.
Or Copy an existing project database and revise all the project and cost related details that need changing to establish the new proposal project structure.

2. Create Sections and Logical plants

Divide the entire project into sections such as compressed air section, filtration section, water treatment section, boiler section etc (as shown in the picture). Create logical plant structure for these sections using object manager of CADISON® Project Engineer or copy sections and logical plants of previous project.

3. Add Object Catalogs and Document Structure to a logical plant

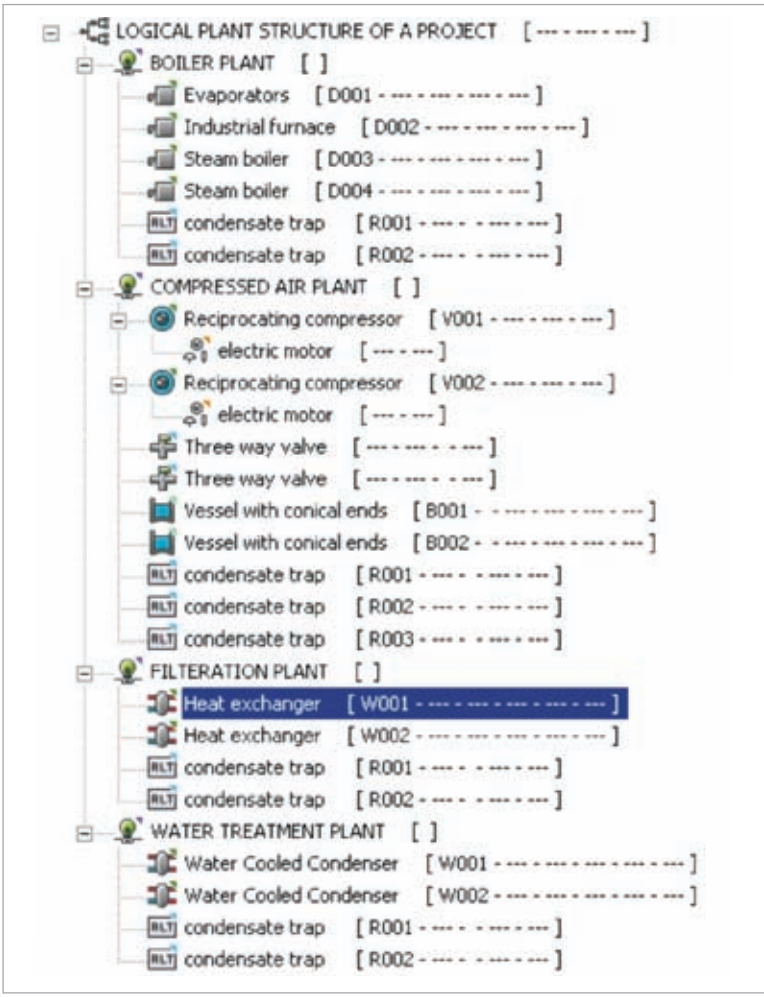
Add object catlogs like equipments, vessels, valves, pumps and instruments which are required for the respective logical plant. Update objects with price for purchase, testing cost and transportation costs, etc either using ERP interface or manually. Prepare a drawing scheme with symbols and assemblies from existing library. Add the document structure applicable based on the logical plants.

4. Use Quotation Scheme of Project Engineer for calculations

Attach quotation object for each logical plant using object manager. This will calculate total cost of all major objects like equipment, vessels, valves and pumps, etc at logical plant level for report generation.

5. Create reports

Define or modify Word, Excel report templates as per project needs. Generate reports in techno commercial format using predefined report templates, like valve lists, equipment lists, submittal reports etc at logical plant level or get aggregated report at project level using CADISON® Report feature.



CADISON® Tree Structure

6. Save project as a Template for reusing in future

Copy and save the project which contains number of logical plants with object data including price to reuse in subsequent phase of projects. Any logical plant of a saved project can be used as an independent set, for reusing in future proposals. This can also be used for cost analyses at the end of project.

Bid Calculation and Bid Preparation

This Best Practice Article is intended to show you how to use CADISON ° for bid calculation with subsequent bid preparation.

Workshop Part 1

Basic principles

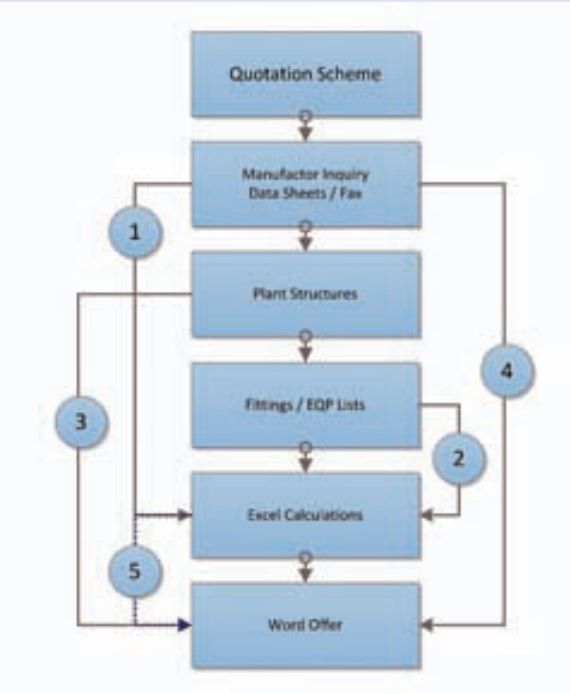
Today a lot of bids have to be submitted before you can acquire a contract. To this end, normally a bid scheme will be prepared as the basis for preparation and supplementation of the respective calculation. Calculation is frequently made with Excel and the required data are taken from the bid scheme (graphic part) and from previous experiences so that they are brought together in a spreadsheet. Items included in the spreadsheets are contained in the bid scheme only partially. The non-graphic information must be collected with huge effort and, depending on the project, the spreadsheet must be adapted. The calculation requirements based on Excel are generally of individual nature and do not always reflect the company standard correctly. Multiple data inputs cannot be avoided in this way and errors will certainly arise.

Another problem is that in the graphic range (AutoCAD, Visio, etc.) not all information like valve, measuring point and pipeline numbers etc. should be shown in the bid scheme.

Today's method of bid preparation
Normally today's method of bid preparation looks as follows:

The bid scheme is prepared with a graphics editor (AutoCAD, Visio, etc.)

1. Inquiries regarding the most different objects are transmitted to different manufacturers.
2. The required lists are prepared (manually, Attribute Extraction etc.) and adopted in the Excel calculation.
3. The plant structures defined before are adopted in the bid or modified.
4. Data taken from inquiries are incorporated in the bid.
5. The determined prices are transmitted to the bid.



This bidding procedure can be performed to a large extent only manually. In case the plants are similar, "Copy & Paste" can be used where applicable. The following manual adjustment and check-up is inevitable, time-consuming and error-prone.

Advantages
- No extra tools for calculation and bid preparation are required
- Similar data can be used with "Copy & Paste"

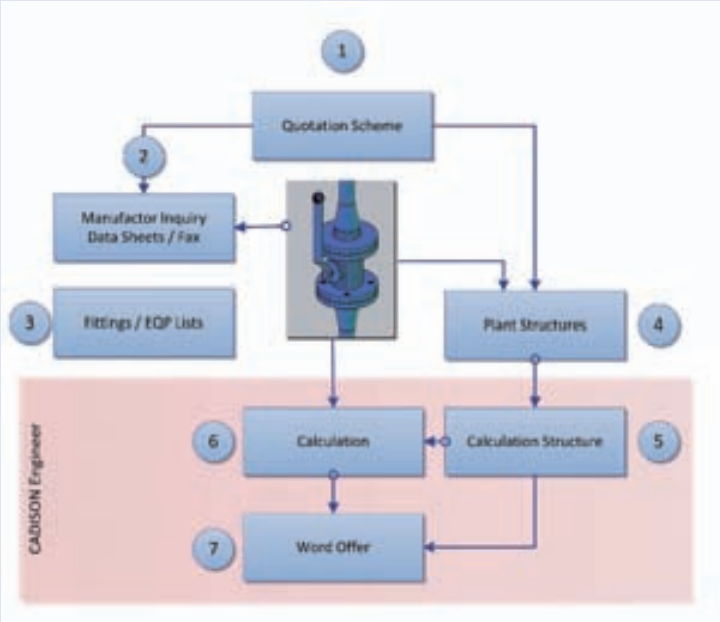
Disadvantages
- Multiple data inputs
- Error burst in case of manual data processing
- Time-consuming procedure through a high number of manual steps
- Use of standards is almost impossible

The Workshop consists of three parts:

Part 1: Basic principles
Part 2: Calculation with spreadsheet (following issue)
Part 3: Bid preparation – inquiry, bid report (following issue)

Bid preparation with CADISON®
To optimize calculation, superfluous manual steps must be reduced or even completely eliminated. The shown chart indicates the principle of the procedure. A difference is made between the graphic (PID-, 3D-, Electric-Designer) and non-graphic ranges (Project Engineer).

1. The bid scheme is prepared with symbols or assemblies from the central library.
2. The objects to be inquired are recorded in the list (report).
   Objects recorded with prices already are directly specified from catalogues.
3. The respective lists can be generated directly from the project or the drawing.
4. Valves and fittings are shown automatically or can be made visible in the plant structure with a few clicks.
5. Individual objects or complete plant structures can be copied from a previously defined calculation structure.
6. List prices are taken either from existing catalogues or completed by hand. Evaluation factors can be pre-set through the ”project structure“ (outline in chapters) or performance items so that the respective price can be calculated.
7. In the last step the calculation structure is evaluated through a report module und edited in a bid (Word).



A calculation matrix is required for illustration of a calculation. This matrix defines which factors are used for calculation. The matrix might slightly differ from bid to bid.

The following modes of calculation are possible in CADISON®:
· Price calculation
  Price fixing through list prices, factors, discount rates etc.
· On-line calculation
  Quotation price, actual price, Delta (even in %)
· Calculation on the basis of working hours
  Splitting into engineering, mechanical and electrical environment

Calculation Matrix

The calculation matrix defines how the calculation will be performed. CADISON® includes a general calculation matrix in the standard already. The matrix can be customer-specifically adapted by means of the object model.
The structure developed in Project Engineer will be found in the calculation and in the bid report in the same way again.

Of course, a pre-fabricated template (for project preparation) is used in this case (see the previous issue of CADISON WORLD), in which the project-specific data are adapted. The latter can be found even in the reports – e.g. as cover sheet, headline, footer etc.

In Project Engineer you can use different structure views for ”setting different cost views“. These views are pre-defined and are even ”clicked together“ depending on the mode of view. Of course, each object with all its features is a unique object in the system.

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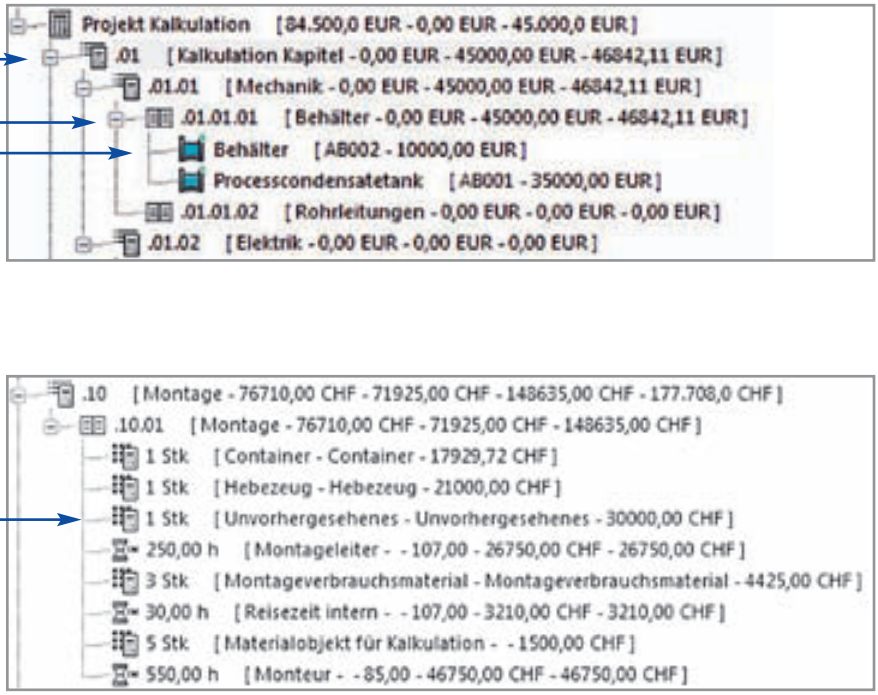
Even different detail views can be presented through different views.

Calculation structure

1. Project – Sum of all chapters in one project
2. Chapter – Sum of all performance items in one chapter
3. Performance item – Sum of all objects in this performance item
4. Object – Objects like pumps, tanks, pipes, fittings, time objects etc.

Objects can be included both in the (graphic) bid scheme or as non-graphic objects in the Project Engineer (see the structure image).

Consequently, the tank AB002 might appear in a number of configurations – depending on the mode of view.



Example: Calculation factors in the object "Tanks"

Description	Value	Unit	Action
Quantity	10	m	Manually
Calculation unit	100	€/m	Manually
Total calculation price	1000	€	Calculated
Surcharge rate	1%	Percent	Manually
Sum of surcharge rate	10	€	Calculated
Factor for risk allowance	1%	Percent	Manually
Sum of risk allowance	10.1	€	Calculated
Cost recovery factor	1,2		Manually
Sum of cost recovers	204	€	Calculated
Profit allowance	1%	Percent	Manually
Sum of profit	12	€	Calculated
Sale price of material	1236	€	Calculated
Overall factor	1.24		Calculated

Preparation of such a calculation matrix is obligatory. The calculation method for definite factors (yellow) is defined in the respective company standard.

Continuation

In the next issue of CADISON WORLD we'll demonstrate how a bid calculation is made in CADISON®.

Bid Calculation

The Best Practice workshop series **"BID Preparation"** demonstrates how you can achieve bid preliminary calculations in CADISON®. This workshop is divided into 3 main sections.

Part 1: Basic Principles (Covered in previous issue)
Part 2: Calculation with spreadsheets Part 2.1
Calculation with spreadsheets Part 2.2 (will be covered in following issue)
Calculation with spreadsheets part 2.3 (will be covered in following issue)
Part 3: Enquiry, Bid Report (will be covered in following issue)

How to calculate the cost for bid preparation is broken down into three sections: section 2.1 will provide the overview, section 2.2 discusses the calculation factors and section 2.3 will complete the calculation part with an example.

Introduction:
A sample example will be shown as an overview on how one can perform project preliminary costing within CADISON®. How to continue using the initial calculations in later stages for revision management, or utilize for capturing actual cost for better tracking of project.

The first question the user asks is how and where should I start? CADISON® "Commercial Extension" expands the CADISON® object model properties, which enables execution of the tasks for commercial and administrative purpose. User needs to check whether the "Commercial Extension" (which is included as part standard installer) is activated and CADISON® is re-initialized, if not activate and reinitialize .

CADISON® Commercial Extension provide the functionality, which is essential to execute simple cost arrangements and calculations. Furthermore, customer-specific adjustments can be made based on the available basic functionality and standardization at any time.

CADISON® supports two types of objects, graphical (eg. Valves, Fittings) and non-graphical objects (eg. Logical plant, Quotation). For the calculation you need both. A calculation framework you create with a costing structure under which you assign these objects can be summed up.

700-price	
Alternative fix price	0,00
Chapter feature	.04.01.01
Currency	EUR
Discounted list price	1800,00
Discounted list price total	1800,00
Item text long	
Item text short	
Item text short Int.	
Later purchase price form ERP	0,00
List price	1800,00
List price / unit	1800,00
List price total	1800,00
Order-text 1(fixed)	
Order-text 2 (var)	
Price to use	Latest purchase price form ERP
Product group neutral	
Project Discount	0.0%
Purchase Price	1800,00
Purchase Price total	1800,00
Quantity 1PCS	
Relevancy for costing	Transmit to Costing program
Relevancy for quotation	Transmit to quotation
Sales price	0.00
Sales price currency	EUR
Sales price total	0.00
Sort-criteria for positions/components	1
Sort-criterial for export	1
Supplier Discount	0.0%
Text-from for Quotation	

Figure 1: Calc Sheet (Object Properties)

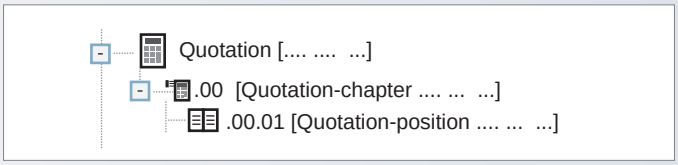


Figure 2: Basic Structure Calc

User needs to create CADISON® tree structure containing the non-graphical and graphical elements which represent the cost structure break down and the logical divison of the project. CADISON® uses this cost structure break down later to produce the bid reports at various levels of the tree elements. Each object has essential properties required for calculations, that will help you to get a more accurate description of the object. For e.g: this order text can be assembled from available properties as shown in Figure 3.

The tree view displayed in the Figure 3 shows the objects cost individually and the summed up cost of all sub elements at root element level. These can be adjusted individually.

In our case, the top level shows the overall costing of project, level 2 shows the next lower level, and the subsequent lower level shows the sum of the cost of CADISON® elements.

Figure 3: Simple Calc Structure

In the example below, all the objects listed are required for a calculation of the pumping station

Description	Planning	Object Class
Engineering Hours	not graphically	Time Object
Pumpe	graphically	Mechanical Object
Motor	graphically	Electrical Object
Screw material fort he pump mounting	not graphically	Material Object
Additional mounting material pump frame	not graphically	Installation material

Preparation:
Start the Project Engineer and open new window. Then apply "Quotation & Pricing" structure view filter to the right window. Now create a costing structure and you can build the same structure as you have modeled in Excel.

Principle Procedure:
Using Object Manager insert quotation object, insert quotation-chapter below quotation. Insert quotation position, other CADISON® elements under quotation-chapter to build structure as shown in Figure 2.

Below the quotation-chapter, additional objects can be linked/added. Simply drag the Objects from the left window into the right window in the corresponding tree position.

Task:
Create the below pump assembly as shown in Figure 4 in PID designer or alternatively create pump structure in the Project Engineer. This pump assembly should be constructed in such a way that it can be inserted into bidding report structure as an element. A request from the manufacturer should be necessary to create an enquiry specification (report function).

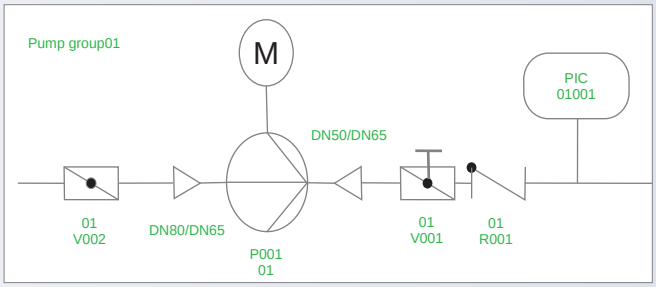


Figure 4: Example: Pump group

Now assign the pump group and a corresponding tree element to define the graphical and non-graphical components, assign the components to the prevailing market price. You should now see a price in the tree element for the pump station.

The next section 2.2 will discuss the calculation factors in the next issue.

Project Cost Estimation... Part 2.2 and Part 2.3

Part 1: Basic Principles (Covered in previous issue)
Part 2: Calculation with spreadsheets Part 2.1 (Covered in previous issue)
Calculation with spreadsheets Part 2.2
Calculation with spreadsheets Part 2.3

Part 1: Enquiry, Bid Report (will be covered in the following issue)

The Best Practice workshop series **"Quotation Costing"** with offer preparation will show how you can achieve this with CADISON®. In this workshop we would like to show how to perform project calculations for your offer in the CADISON® Calculation Sheet.
In the earlier articles (covered in previous issues) we provided an overview of the costing sheet. In this article, we will introduce to you 2 possible approaches.

Prerequisite:

- CADISON® Project Engineer
- Commercial Extension (VCS CEXT – available in the standard installation) – Simplified project calculation for an offer with price control after the order
- Commercial Extension (ITF CEXT – separate module available on request) – Project calculation with calculation factors for an offer with scrutiny after ordering

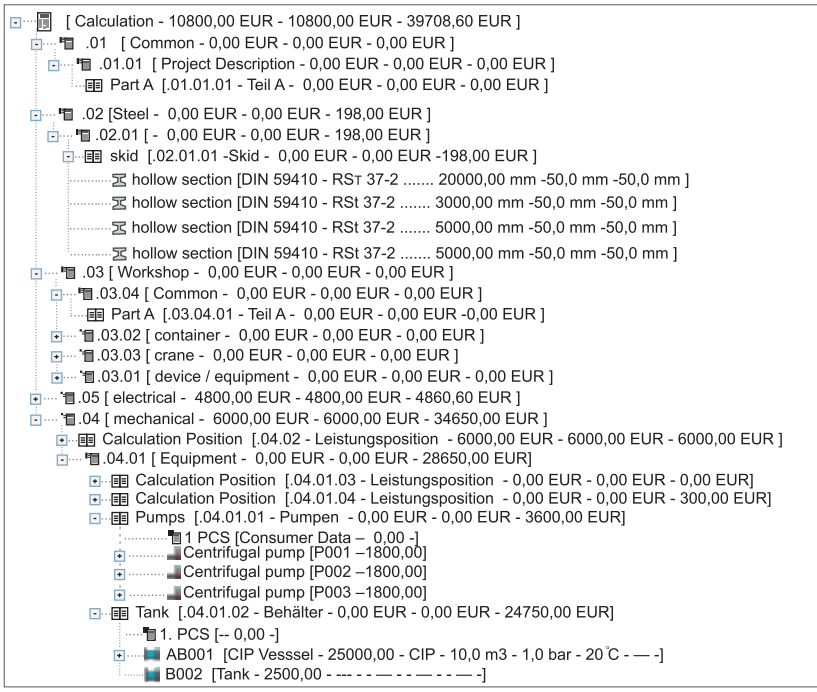
Calculating with the **"CADISON® calculation sheet"** is broken down into 2 sections here, Part 2.2 explains approach 1 with price control after the order and in Part 2.3 we show approach 2 where the project calculation can be performed with calculation factors. In both approaches (structural and object) simple examples are shown in the article.

Part 2.2 Simplified project calculation

In the illustrated dialogues (Object Inspector, Table View, and in the tree), the settings are configured so that only the necessary calculation views and properties are displayed. These can be individually designed and saved in a configuration.

Firstly, the costing structure is built-up - it can be created manually using the Object Manager or copied from a project template. The quotation chapter and the quotation position are the basis of the structure in the later offer which is printed as a Word document.

In this Example you see:
- General information
- Steel Construction
- Site Equipment
- Electrical components
  - Consumer
  - Cable
  - Cabinet
- Mechanical Components
  - Pump
  - Vessel



You can build-up your offer structure with the quotation chapter and quotation position as you do it today with Excel, only more elegant, more flexible and transparent. In the quotation chapter and quotation position, prices are summed up so that you always have an overview of the costs if you have entered the prices.

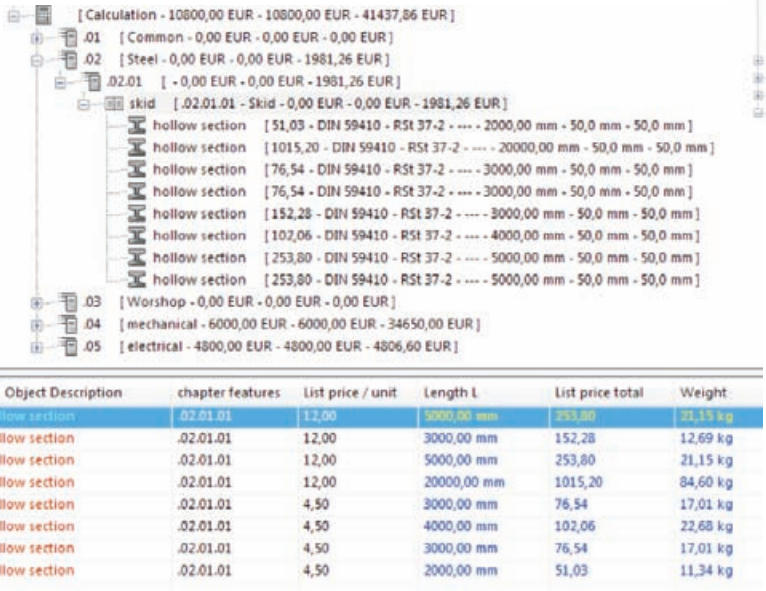
Data changes on tree level:

After you have created the calculation structure, you assign the objects to the respective structure that you can make by drag and drop functionality – open two windows and select the linked object and assign it to the desired structure.

(OR / AND) Data entry at the table level (e.g., steel)

Use the table function in which the selected objects can be

comfortably filtered in the table and then assign each quotation chapter with quotation position. In the adjoining e.g. the table and the tree was further modified in order to find the necessary information more quickly. This also demonstrates the high flexibility of CADISON® to retrieve desired information in different ways. The settings can be saved so that they are also available in the next project.



Object Description	chapter features	List price / unit	Length L	List price total	Weight
hollow section	.02.01.01	12,00	5000,00 mm	253,80	21,15 kg
hollow section	.02.01.01	12,00	3000,00 mm	152,28	12,69 kg
hollow section	.02.01.01	12,00	5000,00 mm	253,80	21,15 kg
hollow section	.02.01.01	12,00	20000,00 mm	1015,20	84,60 kg
hollow section	.02.01.01	4,50	3000,00 mm	76,54	17,01 kg
hollow section	.02.01.01	4,50	4000,00 mm	102,06	22,68 kg
hollow section	.02.01.01	4,50	3000,00 mm	76,54	17,01 kg
hollow section	.02.01.01	4,50	2000,00 mm	51,03	11,34 kg

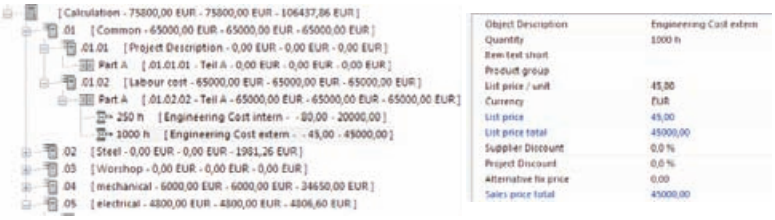
Data entry at the object level (e.g., Pump);

The selected Example shows the different properties that can be adjusted in the Object Inspector (red = catalog, black = editable, blue = calculated). Assuming that the Engineer writes the price in the purchase order into the field "List Price / Unit", the prices will change in the corresponding Quotation chapter and Quotation position.
Info: By pressing F5, you can update the Tree.

Chapter features	04.01.01
Object Description	Centrifugal pump
Manufacturer	KSB
Basetype/Series	Etanorm
Type	65-40/1450
Code character	P
Counting number	001
Media	CIP
Flowrate	3,0 m3/h
Pressure Design	...
Nominal power	1.50 kW
Relevancy for costing	Transmit to Costing program
Relevancy for quotation	Transmit to quotation
Quantity	1 PCS
Currency	EUR
List price / unit	1800,00
List price total	1800,00

Additional costs such as engineering costs (internal or external) or start-up costs can be included in the project calculation and can be disclosed separately.

In the example below, the costs have been included. On the calculation object, you see in the 1st line the result - 1st item is the labor costs and the 3rd item is the total cost of the project at this time.

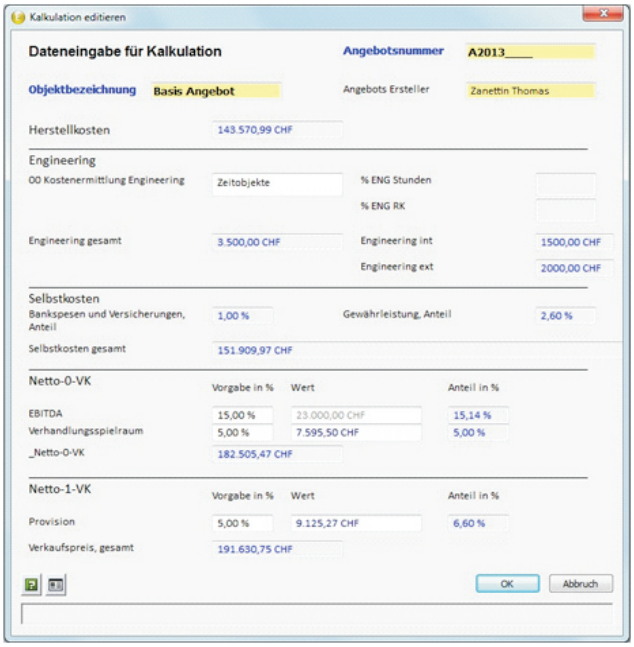


Part 2.3 Project calculation with calculation factors

With this type of calculation, almost all required facets of the project / offer calculations can be covered.
The big difference to the previous calculation method is a different object model - you now have more options in the calculation (e.g., factors for commission, fees, warranty as well as EBITDA amount), as well as in illustration & data input (dialog boxes). From CADISON® R13 onwards, the data can be entered using the configurable dialog. The yellow highlighted fields are executed as mandatory. The user is guided through the various dialogs for performing the calculation.

Depending on whether an object will be calculated and should be displayed in the offer, CADISON® supports the user by different settings, such as:

- Transmit to calculation program
- Transmit to quotation



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Project Cost Estimation... Part 2.3

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Working with different types of cost

With this calculation scheme, the adjoining types of costs can be calculated and displayed on the level of calculation.

405-Kalkulation, Allgemein
411-Herstellkosten
412-Engineering
413-Selbstkosten
414-Netto-0 VK
415-Netto-1 VK
416-DB Berechnung
420-Umrechnungsfaktor Verkauf
421-Umrechnungsfaktor Einkauf

The **Manufacturers Cost [Herstellerkosten]** is displayed in the calculation itself as a calculated field and is entered in the calculation chapters or quotation position.

When calculating the **Engineering Costs [Engineering Kosten]**, there are 4 different variants available:

- cost determination over time object
- cost determination over quotation position
- cost determination on percentage of sales / order value
- cost determination over time objects with additional costs as a %

In the calculation, you will see the **cost price [Selbstkosten]** which includes the add-on costs

- Material Costing
- Project miscellaneous costs (insurance, warranty, etc.)
- Transport costs

The determination of the **Net-0-Sales Price [Netto-0-VK]** (with calculation of EBITDA) is automatically performed.

Net-1-Sales Price [Netto-1-VK] is the selling price. This is calculated from the "Net-0-VK" plus the commission.
The commission can be assigned as a percentage or as a value in the calculation.

The **gross margin [DB-Berechnung]** calculation is output as a summary.

Working with foreign currencies

To work with different currencies and exchange rates, there are different options for the conversion factor.

- Base Currency
- Foreign currency

Connection to ERP system

In CADISON®, the calculation can also be done at the level of the "Latest purchase price from ERP", for which the CADISON® ERP interface is required.