

## Parametric Batch Optimization

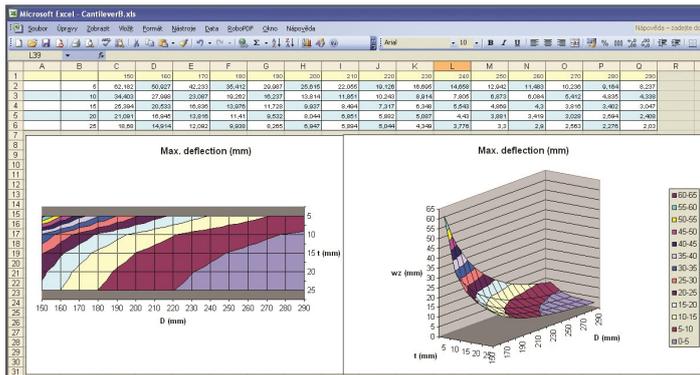
esa.23

Using incremental steps in parameters the user can easily optimize structures. The user defines a SCIA Engineer project and parametrizes it. In SCIA ODA he is able to run this specific project; the result being a complete output data set from which he can select his optimized set of parameters and export them to a spread sheet like MS Excel for further analysis.

### Highlights

Repetitive calculations of a project prepared in full SCIA Engineer done in simplified SCIA Oda environment

Simple export of optimisation results to MS Excel (tm) for further processing (e.g. graphs, complex tables, VBA scripts)

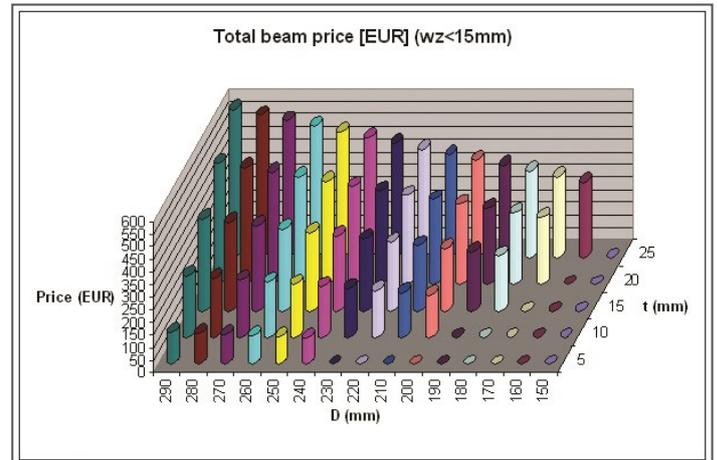


This module enables the user to perform repetitive calculation of a project prepared in the full SCIA Engineer within the simplified SCIA Oda environment. The aim of these repetitive calculations is to compare different variants of the same project and find for example the cheapest, most rigid, most lightweight, etc. solution.

### Principle

The core principle is that one or more parts of the analysed structure are parametrised. Then the ranges within which individual parameters can vary are specified. Finally, the batch processor runs the calculation for every combination of parameter values. The result is a clear table that summarises selected results for all the analysed cases.

|    | D (mm) | T (mm) | Uz,mm (mm) | Mass | wz (mm) | Price |
|----|--------|--------|------------|------|---------|-------|
| 1  | 150.0  | 5.0    | -42.2      | 89   | 12.2    | 0     |
| 2  | 150.0  | 10.0   | -34.4      | 177  | 34.4    | 0     |
| 3  | 150.0  | 15.0   | -25.4      | 250  | 25.4    | 0     |
| 4  | 150.0  | 20.0   | -21.1      | 307  | 21.1    | 0     |
| 5  | 150.0  | 25.0   | -19.7      | 365  | 19.7    | 0     |
| 6  | 200.0  | 5.0    | -25.6      | 130  | 25.6    | 0     |
| 7  | 200.0  | 10.0   | -13.9      | 234  | 13.9    | 109   |
| 8  | 200.0  | 15.0   | 5.9        | 342  | 5.9     | 246   |
| 9  | 200.0  | 20.0   | -6.0       | 444  | 6.0     | 320   |
| 10 | 200.0  | 25.0   | -6.9       | 539  | 6.9     | 368   |
| 11 | 250.0  | 5.0    | -12.9      | 191  | 12.9    | 109   |
| 12 | 250.0  | 10.0   | -6.9       | 296  | 6.9     | 213   |
| 13 | 250.0  | 15.0   | -4.9       | 435  | 4.9     | 313   |
| 14 | 250.0  | 20.0   | -3.9       | 567  | 3.9     | 438   |
| 15 | 250.0  | 25.0   | -3.3       | 693  | 3.3     | 499   |
| 16 | 300.0  | 5.0    | -7.4       | 192  | 7.4     | 131   |
| 17 | 300.0  | 10.0   | -3.9       | 298  | 3.9     | 257   |
| 18 | 300.0  | 15.0   | -2.7       | 507  | 2.7     | 379   |
| 19 | 300.0  | 20.0   | -2.2       | 699  | 2.2     | 497   |
| 20 | 300.0  | 25.0   | -1.8       | 849  | 1.8     | 610   |



### Preparation of the project for optimisation

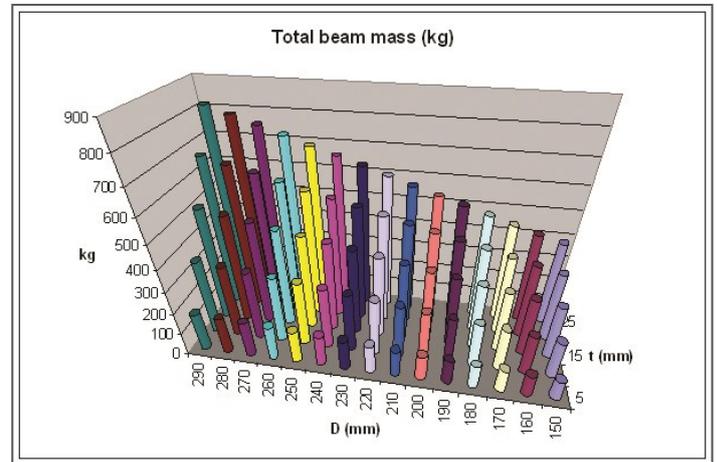
Firstly, the user must prepare the model of the structure-to-be-analysed in the full SCIA Engineer. The required parts of the structure must be parametrised (e.g. cross-section depth, span-length, load-magnitude, etc.). Then, the user must open the XML manager and define input and output tables. The input table is always the table containing the defined parameters. The output table can contain internal forces, calculated deformations, bill of material, code-check results, etc. Both the input and output tables must be exported into external XML files. Finally, the project must be saved as a standard esa-project file.

## Preparation and execution of the batch run

Secondly, both the esa-project file and the two XML files must be read into the SCIA Oda environment. Here, the ranges for individual parameters are specified (e.g. that the span-length can vary from 3 metres to 6 metres with 50cm step). Moreover, it is possible to define additional constants and formulas that can be used for further post-processing of calculated results. For example, one constant can represent the price of 1kg of the used material and the formula can calculate the total price of the whole structure. The formula can be even more complex and can for example eliminate all the calculated variants where the deflection exceeds a specific value. All the results obtained from the calculation of the project and from the specified formulas are summarised in a clear and simple table.

## Advanced processing of the results

In order to make the optimisation an even more productive tool, the results can be exported into the comma separated value (CSV) format file or into an MS Excel (tm) format file. This enables the user to prepare 'state-of-the-art' tables and 'eye-catching' graphs.



### Required modules

esa.00

esa.11

esaod.00