

Results from Element Matching

Project name: Project name

Construction site located at: 63.4097, 10.4683

Summary of results

Total score	Score without reuse	Savings	Substitutions
2183.96 kg CO2 equivalents	2183.96 kg CO2 equivalents	0.0%	0.0%

The 'Maximum Bipartite Matching' algorithm yields the best results, substituting 0/38 demand elements (0.0%). Using 'GWP' as the optimization metric, a total score of 2183.96 kg CO2 equivalents is achieved. For comparison, a score of 2183.96 kg CO2 equivalents would have been obtained by employing exclusively new materials. This results in a total saving of 0.0%. Note that impacts of transporting the materials to the construction site is accounted for and contributes to 3.2% of the total score. Open the CSV-file "Project_name_substitutions.csv" to examine the substitutions.

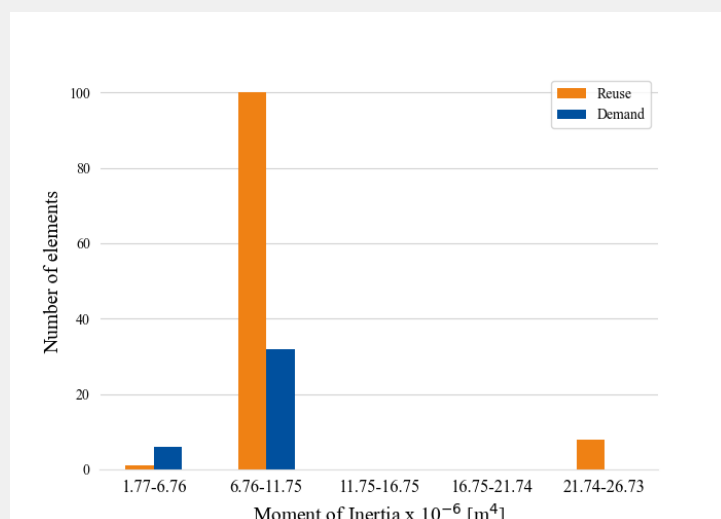
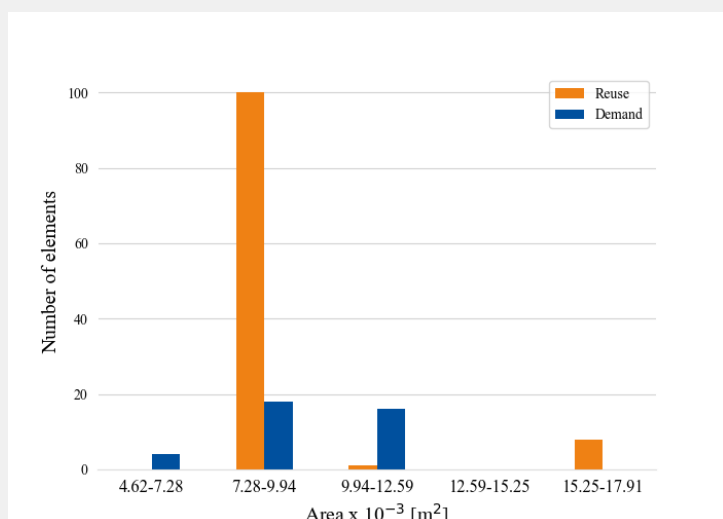
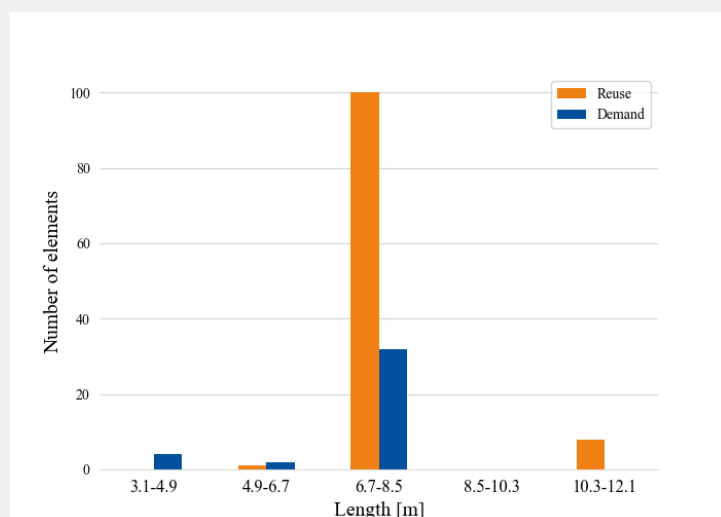
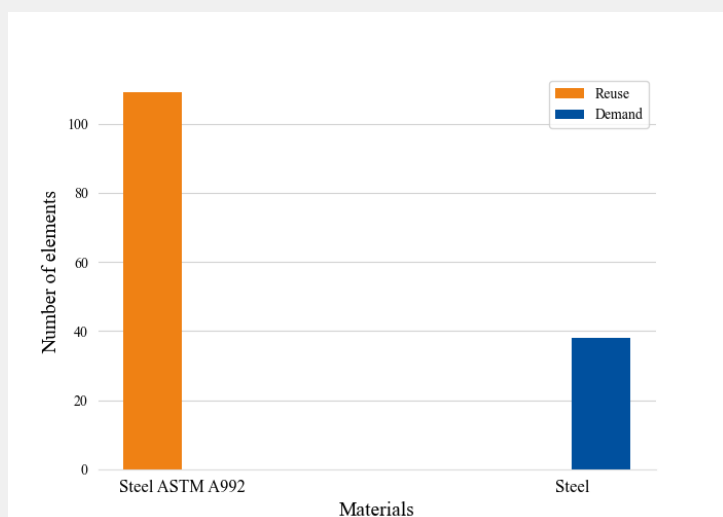
Constants used in calculations

Constant	Value	Unit
Density timber	491.0	kg/m ³
Density steel	7850	kg/m ³
GWP new timber	28.9	kg CO2 equivalents
GWP reused timber	2.25	kg CO2 equivalents
GWP new steel	800.0	kg CO2 equivalents
GWP reused steel	4.0	kg CO2 equivalents
GWP transportation	89.6	kg/m ³ per tonne

Information about datasets

Elements	Filename	Number of elements
Reused	SUPPLY_DATAFRAME_SVERRE.xlsx	109
Demand	DEMAND_TEST_FILL_CLOSEST.xlsx	38

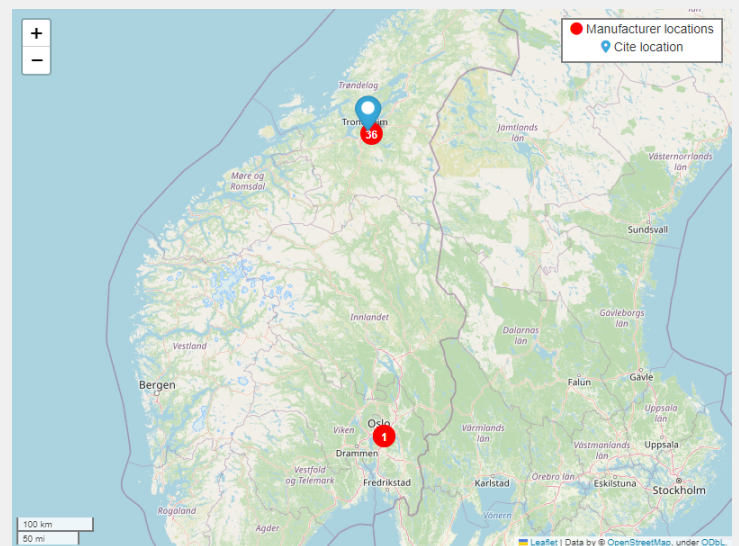
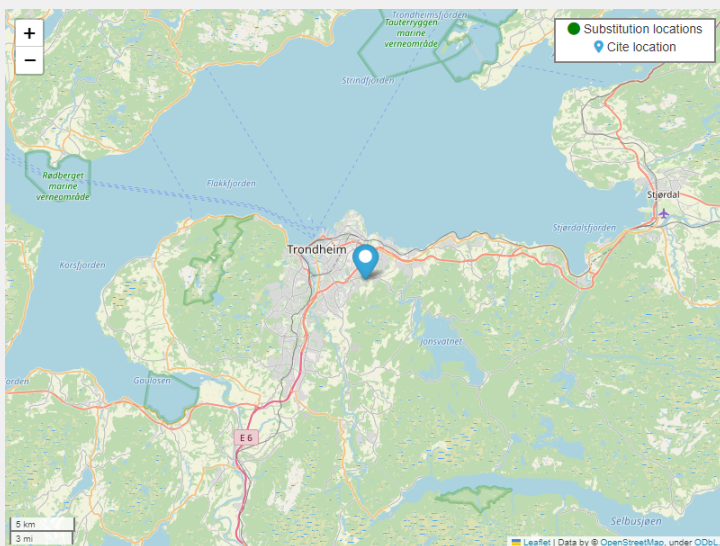
The files contains 109 reuse elements and 38 demand elements. The graphs below depicts some of the properties of the elements, including length, area, moment of inertia and the material distribution.



Impact of transportation

Transportation score	Percentage of total score	Transportation all new
69.8 kg CO2 equivalents	3.2%	69.8 kg CO2 equivalents

All calculations in this report take impacts of transportation of the materials to the construction site into consideration. Transportation itself is responsible for 69.8 kg CO2 equivalents. This accounts for 3.2% of the total score of 2183.96 kg CO2 equivalents. For comparison, the transportation impact for exclusively using new materials would have been 69.8 kg CO2 equivalents. Two maps are included to show the location of the suggested substitutions of reused elements and the manufacturer locations where new elements can be obtained. The numbers on the maps indicate the number of elements present at each location.



Performance of algorithms

Name	Total score	Substitutions	Time
Maximum Bipartite Matching	2183.96 kg CO2 equivalents	0.0%	0.02s
Greedy Algorithm Plural	2183.96 kg CO2 equivalents	0.0%	0.124s

The design tool is runned with 2 algorithms, namely: Maximum Bipartite Matching, and Greedy Algorithm Plural. The Maximum Bipartite Matching yields the lowest score, as shown in the table. The substitutions by this algorithm are completed in 0.02 seconds.