Project Goal: Develop a design aid tool for greenhouse structures

Requirements:

• Simulate the loading conditions on the structure based on its location and crop loadings. The simulation must conform with the NBCC instructions.
• Ability to customize the steel sections used and determine its feasibility to hold the loads. This is to conform with the instructions of CISC and based on the Handbook of Steel Construction.

Engineering Basis:

• Used a combination of uniformly distributed and concentrated loading conditions to determine the structure behavior
• Local buckling considered to determine yielding stress of steel section
• Shear, moment and axial capacities are considered for each steel section based on the section steel class (1 to 4)
• End conditions of beams and posts were considered

Results: Microsoft Excel based design-aid tool

• The tool is based on the Handbook of Steel Construction by the CISC and the NBCC to simulate the loading conditions and design the cross sections required.
• The tool will be used mainly by the sales staff of Paul Boers Ltd. to significantly increase their average of 38 quotes per week. This will help increase the number of projects Paul Boers Ltd. undertakes, increasing its revenue.
• The user will deal with two interfaces, an input sheet where the user can define the greenhouse size, expected snow load, wind speed, crop load and other specifications. Second is the “results and design” where the user will be able to redesign the steel cross sections based on the loads on the structure.

Testing / Implementation:

• Build and FEA model and compare it to the design-aid tool outcome
• Use the tool to design previous greenhouse project and compare the outcome to the actual design