



The
University
Of
Sheffield.

CYGNUS

Basic Vessel Concepts

Trev Gamble

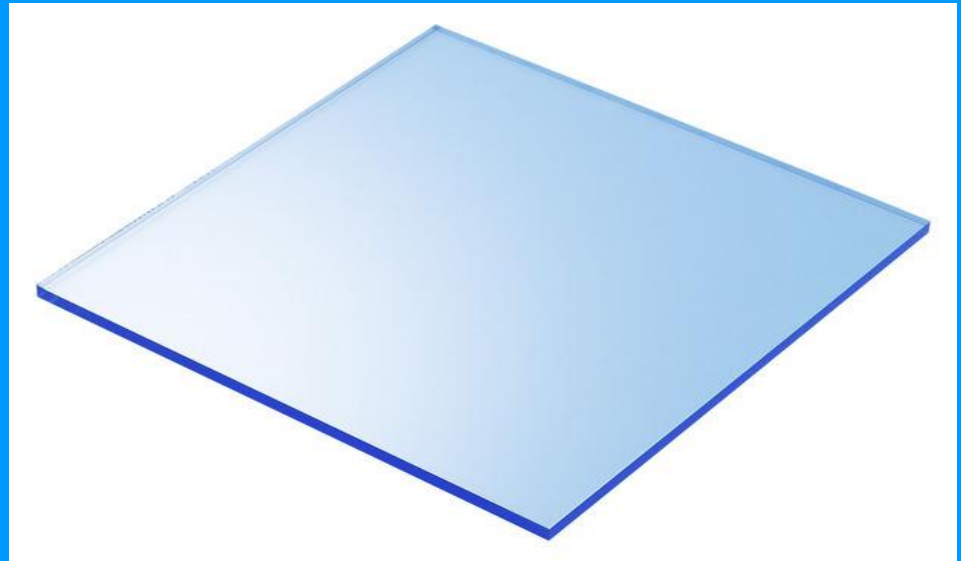
Sheffield University

Rectangular 2.2m^3 Vessel

Material: Predominantly Perspex

Perspex available in 2 x Forms

- Cast
- Extruded



Cast

Low minimum run/order quantities

Thousands of standard and custom colours available

Extensive range of available thicknesses (available in thicknesses greater than 25mm)

Enhanced chemical resistance

Less prone to chipping/Fracture during machining

Slightly higher service temperature

More suitable for use involving continuous contact with Liquids

Enhanced long-term mechanical properties



Extruded

Lower cost

Improved thickness tolerance (+/- 10%), Cast (+/- 30%)

Reduced Dirt, Lint or particulate contamination in the sheet

Cements and thermoforms faster



Perspex: (Cast & Extruded)

Mechanical characteristics and precautions

Combustible

Limited impact resistance

Age deterioration (8-10 years)

Creep (Temperature related)

Permeability (Gas)

Solvent based Stress cracking and propagation

Profiles can be achieved by Thermoforming



Vessel Engineering issues

Leak Tight

Location

Access

Physical size of individual components

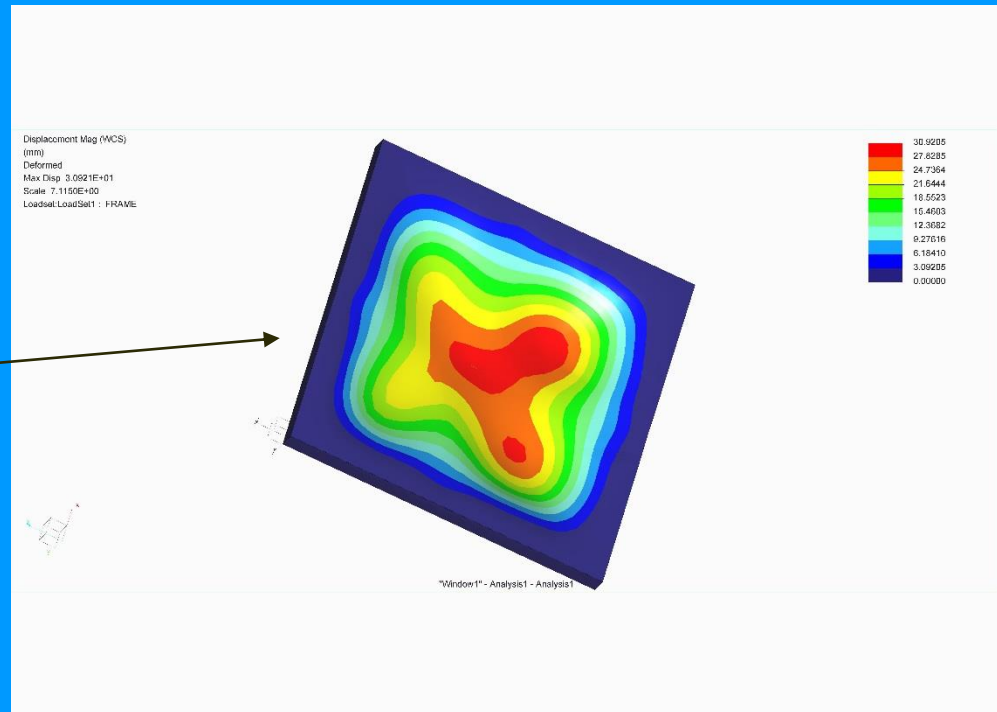
Logistics



Vessel Structural Integrity

Assuming a $2.2\text{m}^2 \times 30\text{mm}$ Thk Cast Perspex Sheet
Pressure = 1 Bar
Simply supported

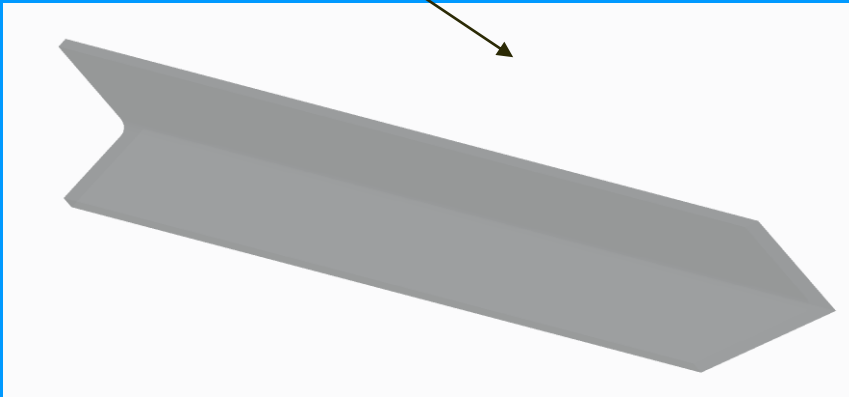
Max Distortion 30mm
Definite Fracturing



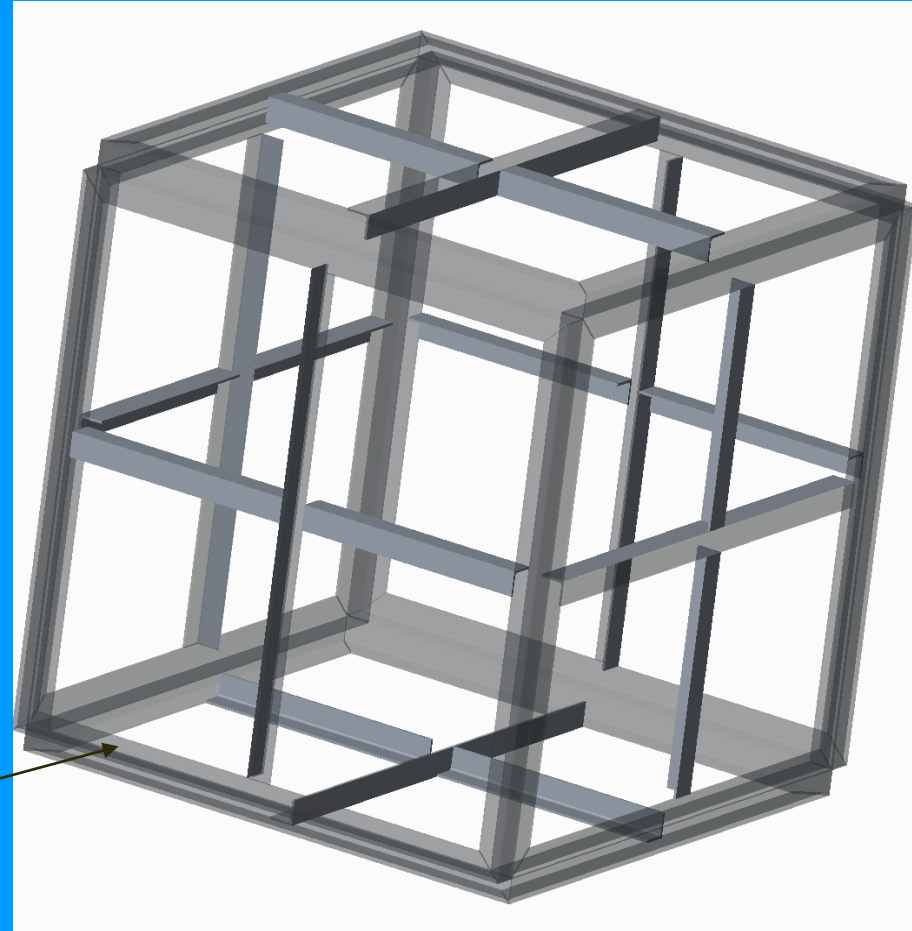


Additional support structure Essential

100 x 100 x 10mm Stainless Steel
Equal Angle

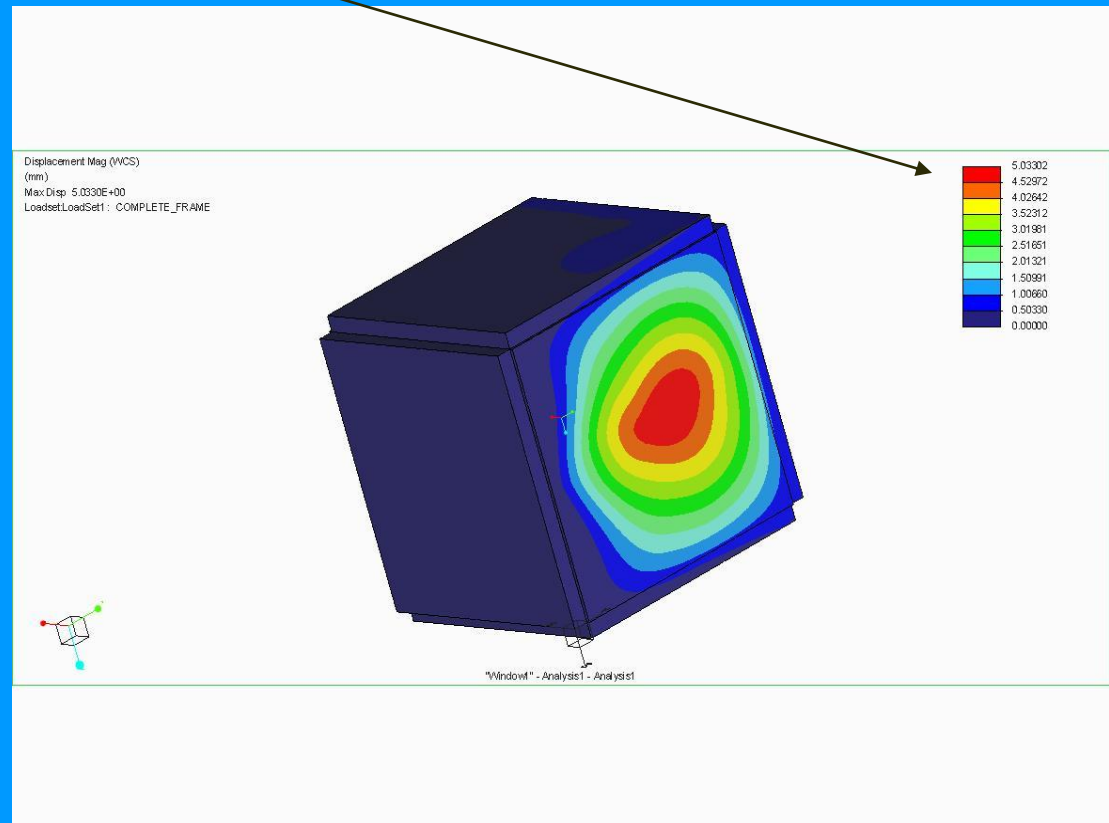


100 x 100 x 10mm
Stainless Steel Skeletal Equal Angle Frame





Additional support structure Benefiting the Design Enhancing the Structural Integrity Distortion Reduced, Now 5mm





SUMMARY

Further Engineering Design Required

Not feasible to transport 2.2m² Sheets to desired locations

1/ Reduce sheet sizes

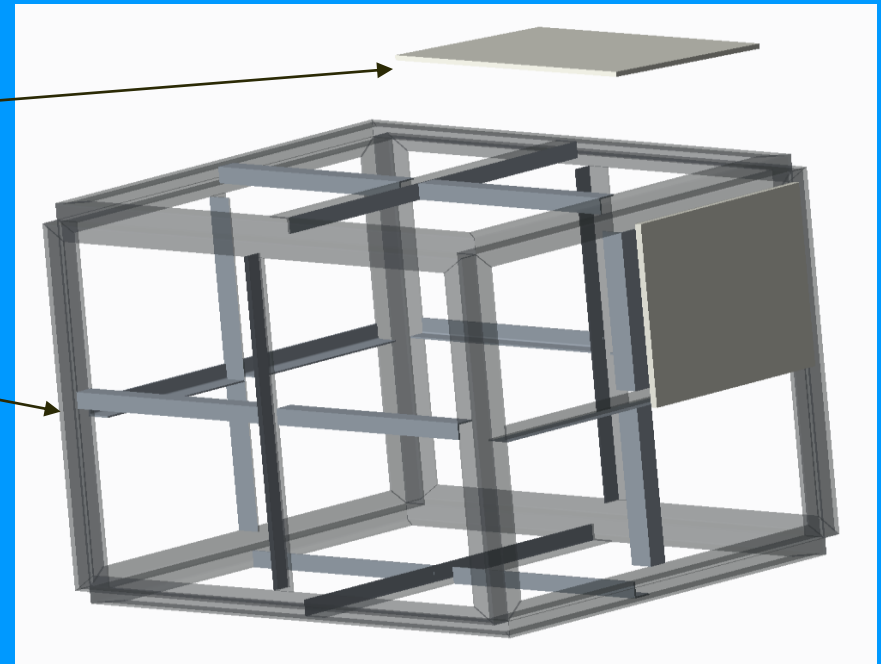
2/ Benefiting the Logistics

3/ Reduces distortion on individual sheets

4/ Skeletal Frame also becomes modular, assemble on location

Individual Panels

Modular Frame



How to achieve a sealed chamber,
Utilising this concept ?



Thankyou

Questions

