



IPRO 312

Rapid Manufacturing of Casters

Sponsored by:

Colson Associates





OUTLINE

- Objectives
- Research
- Approach
- Concept design 1, 2 and 3
- Manufacturing concepts
- Conclusion



OBJECTIVES

- Satisfy “Special Rush Orders”
- All processing must be done In-Factory
- Adaptable design for fast processing
- Exclude wheels and brakes



RESEARCH

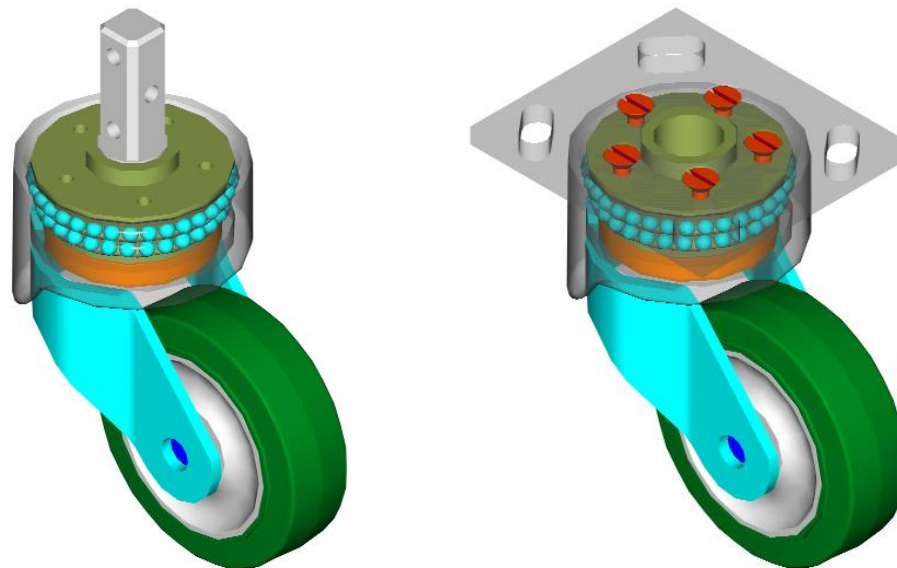
- Talk to existing experts
 - Plant visit to Albion
 - Drawings from Colson
- Understand performance requirements
 - Obtained copy of ICWM-2004 standard
- Investigate different caster components



APPROACH

- Divide into three groups
- Each presenting an alternative concept
- Reduce time consuming processes:
 - Heat treatment
 - Stamping
 - Welding
 - Coating

CONCEPT - 1





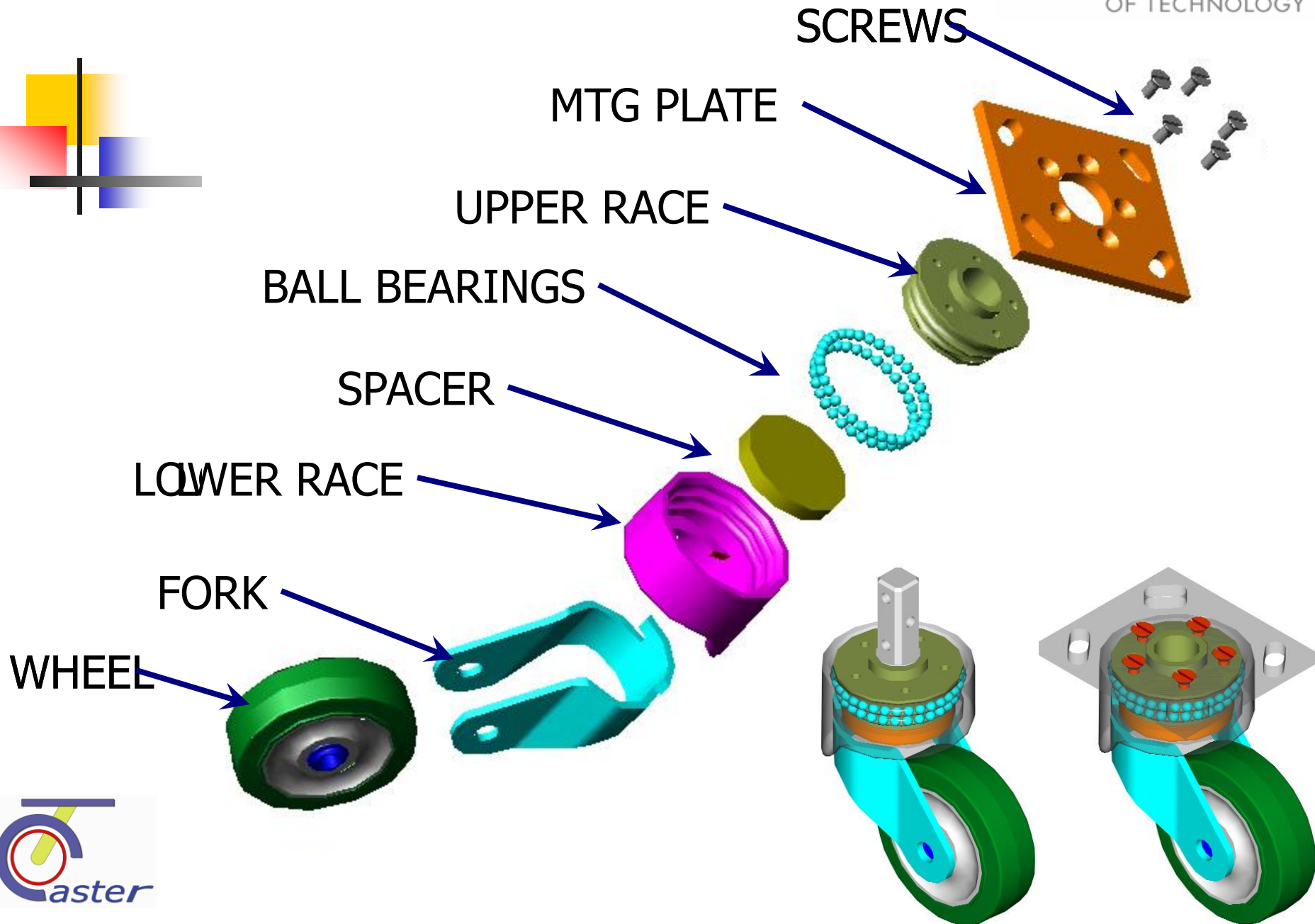
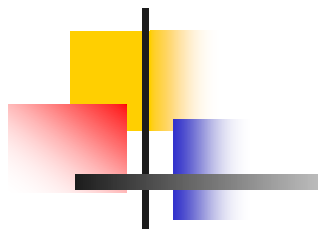
Goals

- Supply a familiar product for a well established market.
- Remove Process of Welding
 - Eliminate need for special fixtures
 - Reduce cost between use of skilled worker vs. assembler.
- Identify customer's special needs and accommodate them with a *FLEXIBLE* DESIGN



Customer's Special Needs

- Unique **Stem** Designs
- Varying Mounting **Plates**
- Different **Fork** designs
 - Accommodating varying types and sizes of wheels

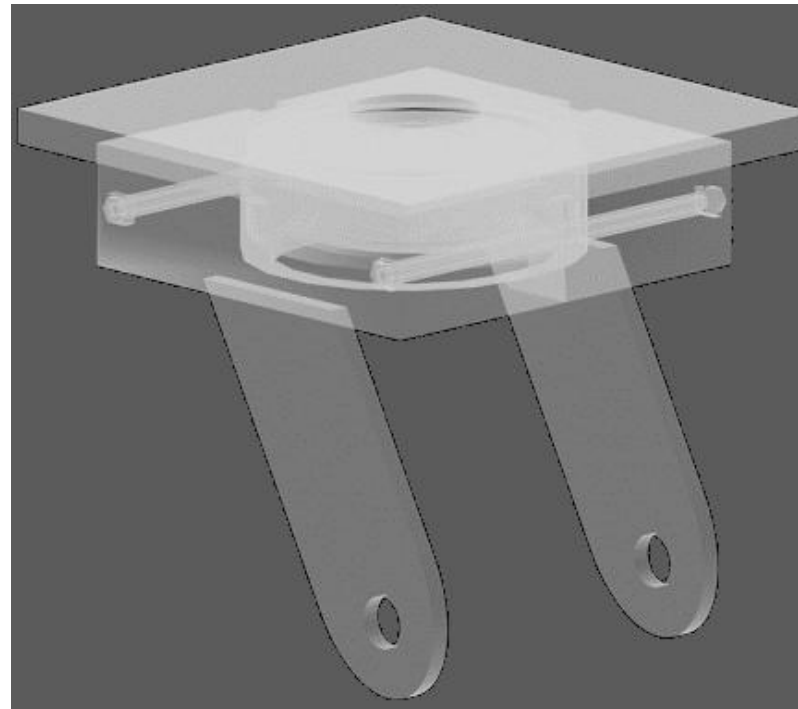




Advantages

- Flexibility to customize design:
 - Fork
 - Top plate / Stem
- No welding
- Multiuse of laser:
 - Heat Treatment
 - Cutting

CONCEPT - 2



Goals

- Standard bearings
 - No Heat Treatment
- Less manufacturing processes and machines



Top Plate

Inner Race

Queen Pin

Outer Race

Bearing Housing

Bolts

Fork

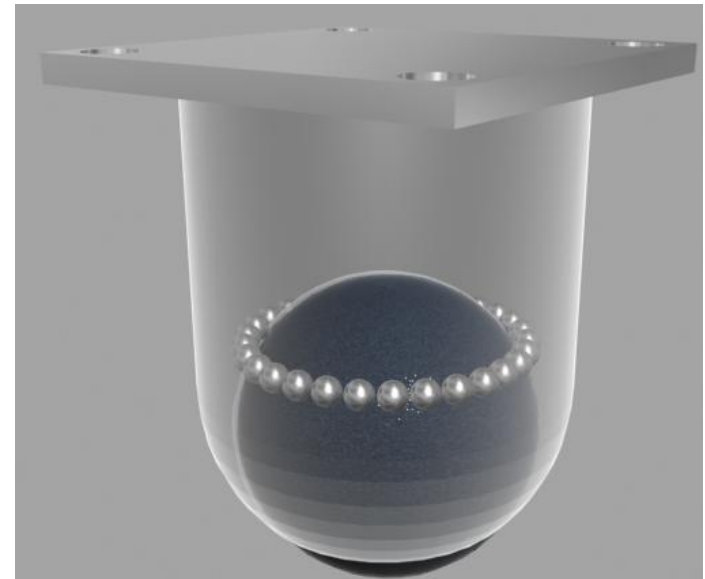
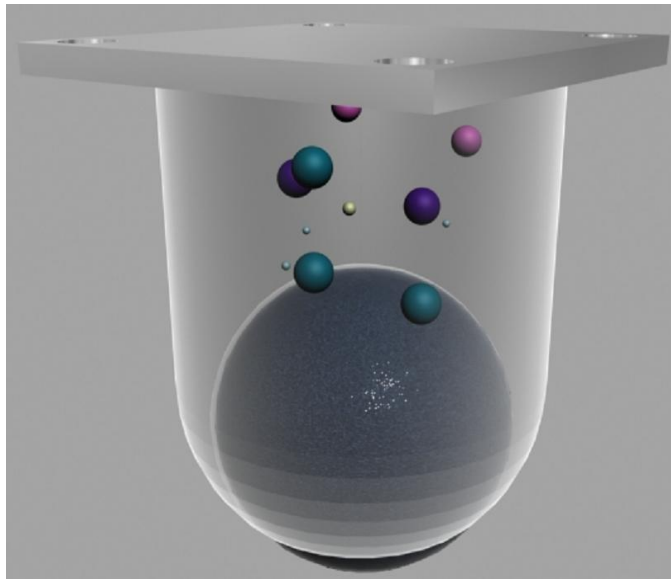




Advantages

- Removal of Heat Treatment:
 - Standard Bearing
- Less manufacturing processes:
 - Turning
 - Water jet or laser cutting
- No special tooling required for different products.

CONCEPT - 3





Goals

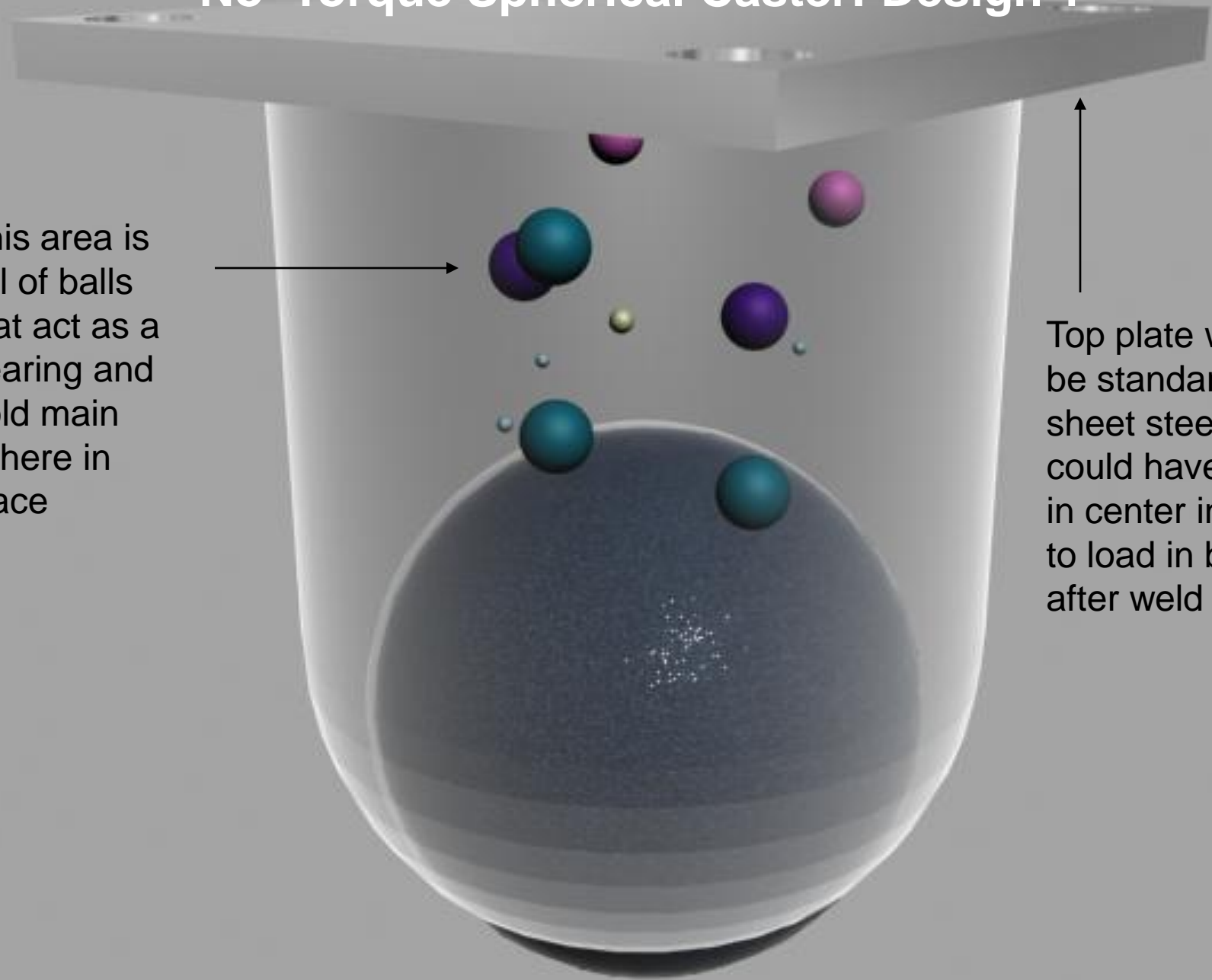
- Reduce lead time
- Focus on simplifying design
- Tried starting from scratch
 - Designed 2 possible concepts
- Less parts = Less failure points

No-Torque Spherical Caster: Design 1

This area is full of balls that act as a bearing and hold main sphere in place



Top plate would be standard sheet steel and could have hole in center in order to load in balls after weld



No-Torque Spherical Caster: Design 2

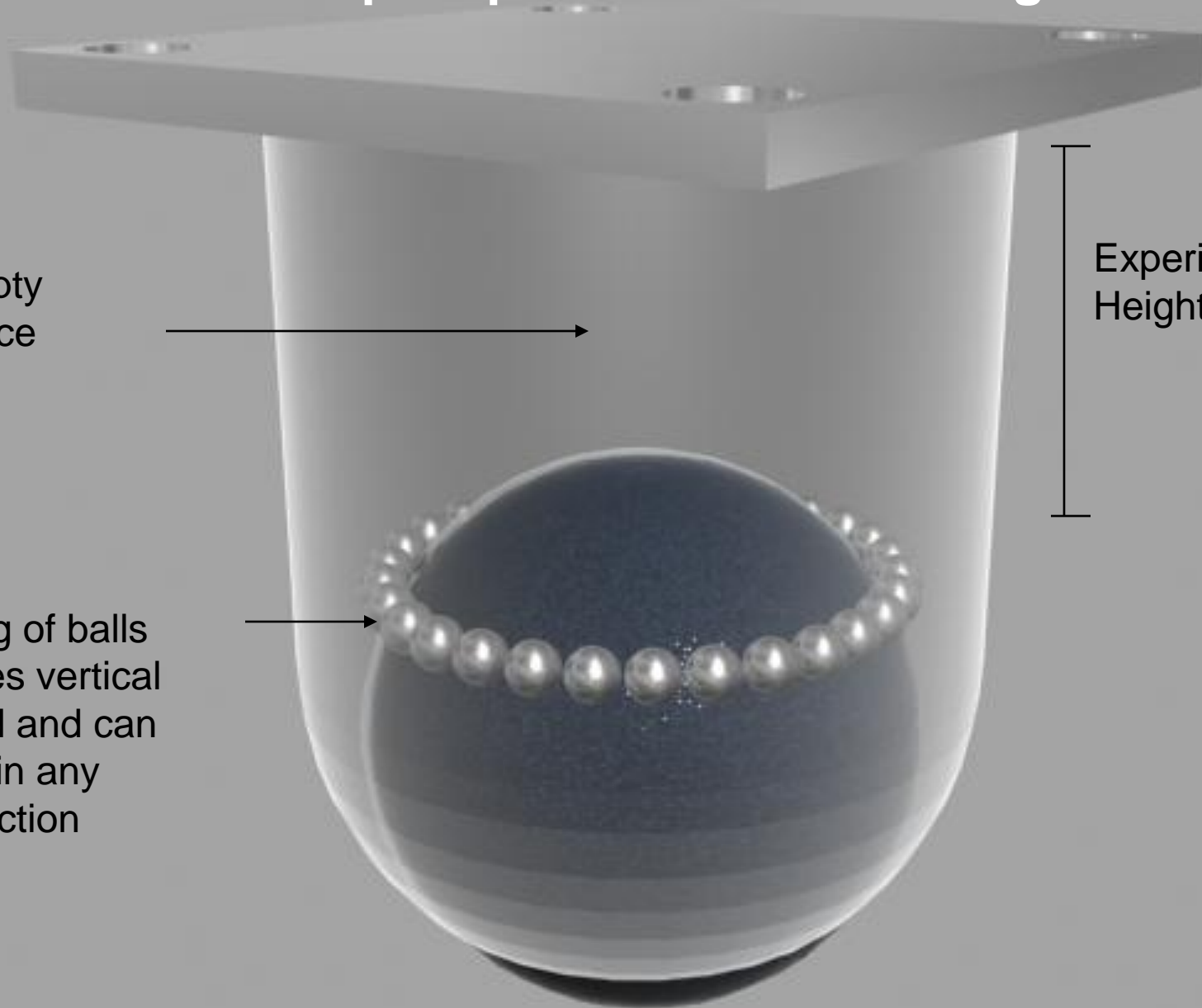
Empty
space



Experimental
Height



Ring of balls
takes vertical
load and can
roll in any
direction





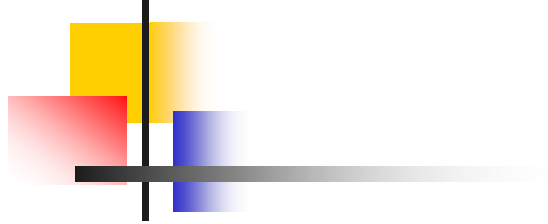
MANUFACTURING PROCESSES

- Reduced lead time
 - “In by 8 am, out by 5 pm”
- Customizable design
 - Computer programs
 - Flexible part designs
- No Outsourcing
- Sell one – Make one



FUTURE RECOMMENDATIONS

- Prototypes for caster concepts
- Cost analysis
 - Obtain new machines
 - Make caster from scratch
- Colson facility capacity investigations
- Testing
 - Safety
 - Durability



QUESTIONS