



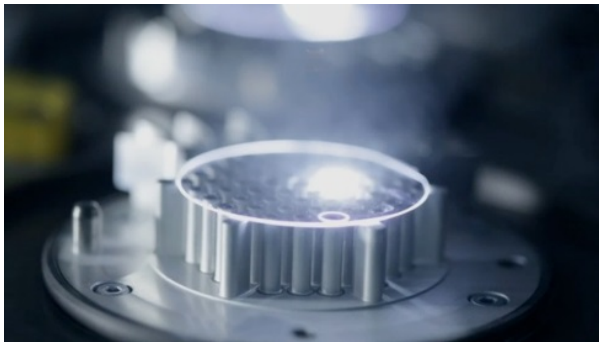
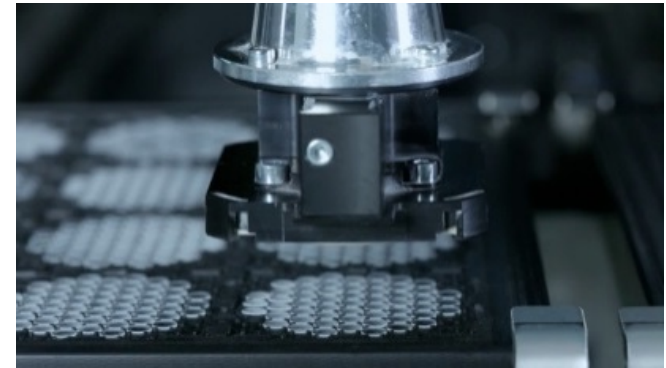
# Materials and Manufacturing

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# In-house facilities

- Vacuum forming
- CNC Roland MDX 540 3 axis machining with 4<sup>th</sup> axis bolt on
- CNC router 2 ½ axis
- Glass casting
- Slip casting
- Additive machines
- Traditional fibreglass lay up area
- Material testing equipment
- Material selection software
- Autoclave for carbon fibre lay up
- Vacuum casting
- Laser cutting
- Waterjet cutting
- CNC cutting table

# iPhone Assembly



# Vacuum casting



Prifysgol Cymru  
Y Drindod Dewi Sant  
University of Wales  
Trinity Saint David

**Swansea  
College of Art**  
Founded 1853

*Trawsnewid Addysg; Trawsnewid Bywydau  
Transforming Education; Transforming Lives*

# Vacuum casting

## Introduction

Vacuum casting allows the production of small batches of high quality mouldings in a range of polyurethane resins that replicate the performance of engineering plastics without the high costs of hard tooling associated with injection moulding.

- Ideal for functional testing and/or marketing
- Cost effective
- Low volume runs
- High quality
- Fine detail and accuracy
- Range of properties can be achieved to mimic the final product
- No requirement for expensive hard tooling



# Vacuum casting

## MATERIAL SIMULATIONS

- ABS
- POM
- Elastomers (Range: 25 - 95 Shore A)
- Nylon inc Glass Filled
- Polypropylene

## PRE-PRODUCTION APPLICATIONS

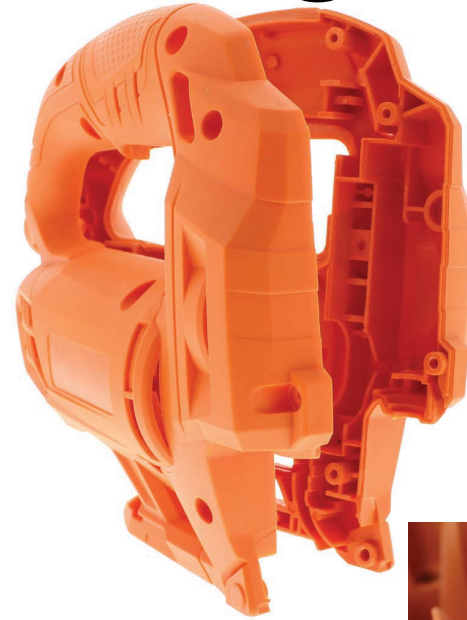
- Marketing
- Functional testing
- Thermal and air flow testing
- Assembly line trials



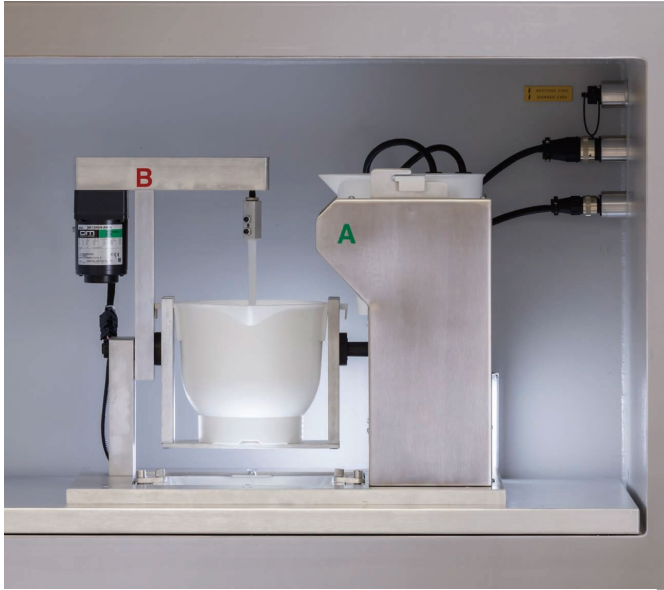
# Vacuum casting

## PROPERTIES

- Heat resistance
- Colours and tints
- Fire retardance
- Flexibility and rigidity -Flexible polyurethane casting resin grades range
- UV stability
- Insert options
- Water clear
- Range of finishes from grades of spark texture, smooth matt and satin to a high gloss finish.



# Vacuum casting



# Vacuum casting

## PROCESS FEATURES

- Ideal for small runs of highly accurate prototype
- parts
- Short lead times to production
- Cost effective, with no requirement for expensive tooling



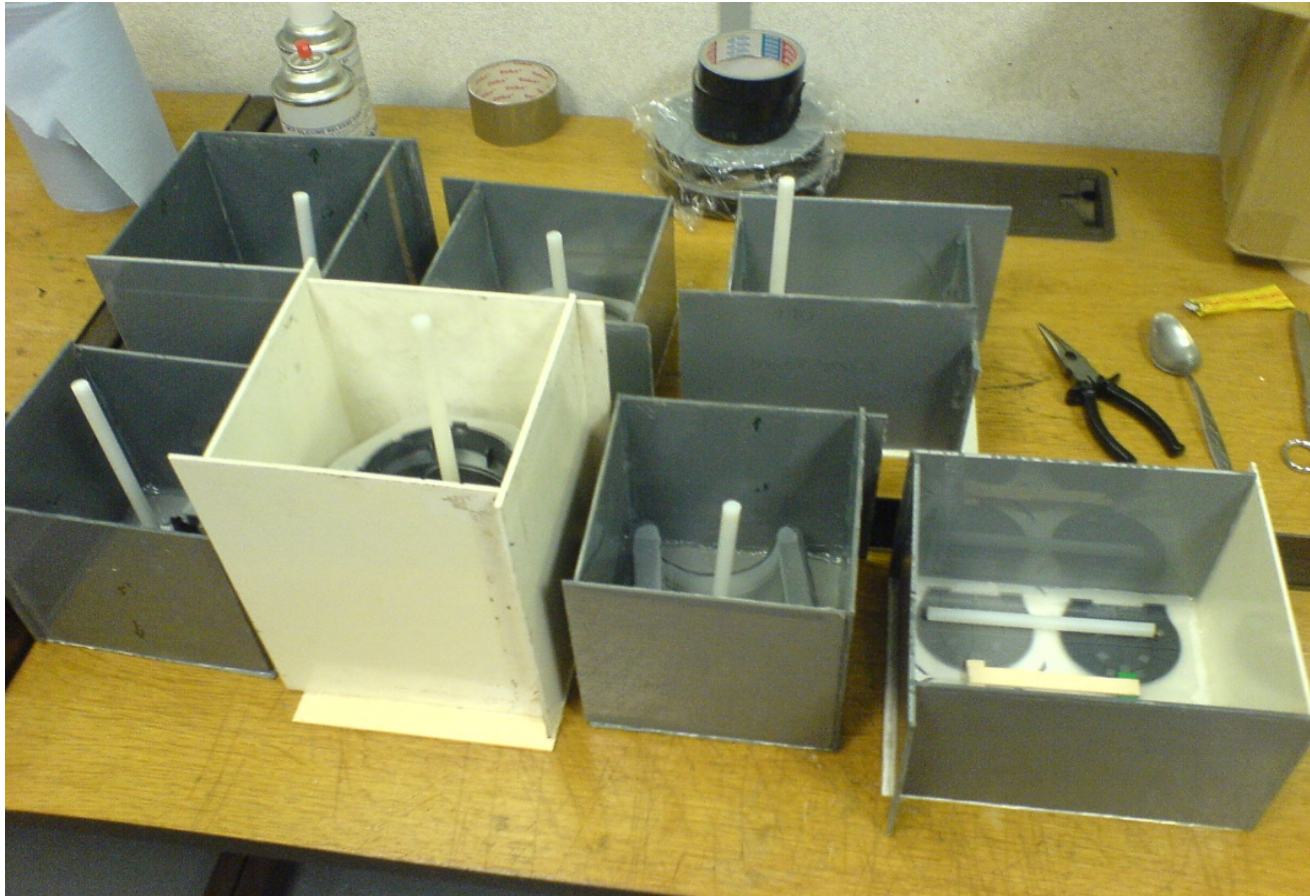
# Vacuum casting process

## *Prepare master part*

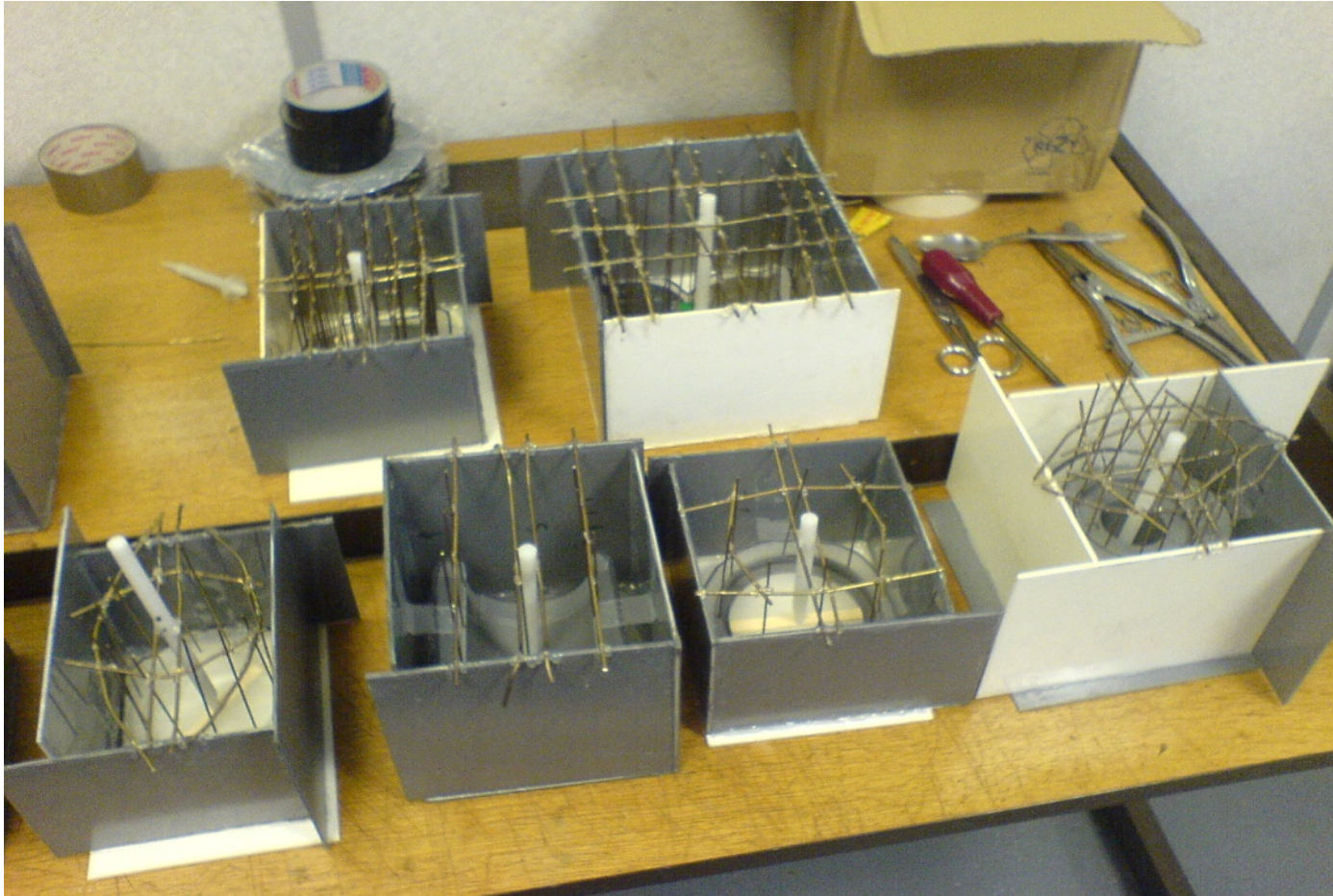
- Build master part or use existing product/component
- Remove layer lines if 3D printed or make repairs to original faulty part
- Decide on split lines
- Tape part
- Build casting box
- Add sprue and risers
- Add air escape holes
- Suspend part in casting box



# Vacuum casting process



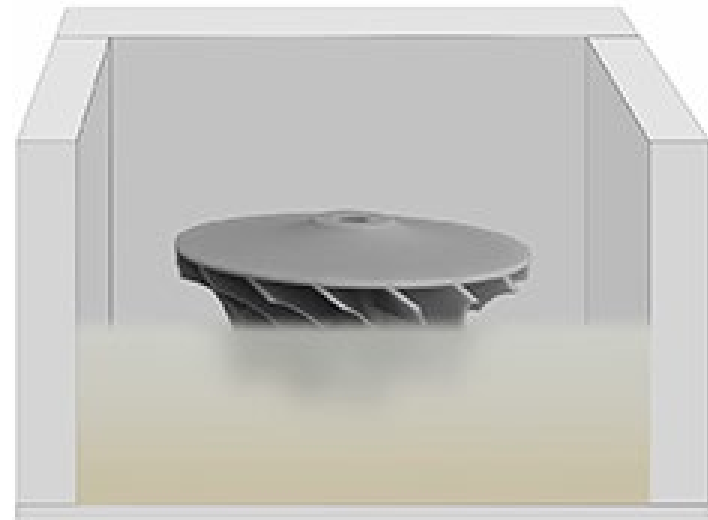
# Vacuum casting process



# Vacuum casting process

## *Making the mould*

- Calculate volume of casting box
- Mix 2 part vulcanised silicone
- De-gas in vacuum casting chamber
- Pour into casting box
- De-gas in vacuum chamber
- Place in oven 40 degrees



# Vacuum casting process

## *Preparing the mould*

- Remove silicone mould from box
- Cut into mould on split line
- Remove master part
- Prepare silicone mould for casting
- Spray release agent into the mould
- Tape up and place back in oven at 70 degrees



# Vacuum casting process

## *Producing the casting*

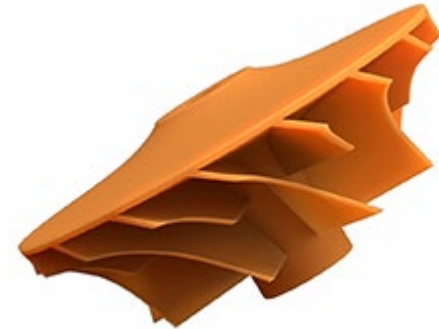
- Weight master part including sprue
- Weight out 2 part polyurethane resin part A and B
- Add pigment and place into vacuum casting machine
- Place silicone mould and connecting tubes into vacuum casting machine and de-gas
- Mix 2 part polyurethane resin and pour into mould
- Release air when mould is full
- Place back into 70 degree oven



# Vacuum casting process

## *Finishing*

- Remove silicone mould from oven
- Open up mould and remove casting
- Take off sprue and air runners and leave to cool
- Prepare silicone mould for next casting



# Vacuum casting



# Manufacture design exercise

take an object explain its manufacturing process and re-manufacture it in 2 alternative manufacturing processes.

1hr exercise with 2 min presentation.





# Thank You



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