



Science & Technology
Facilities Council



Imperial College
London

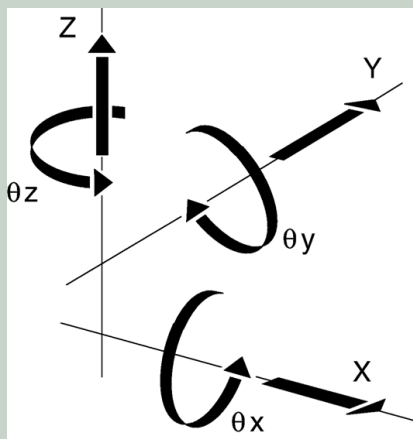
WARWICK



Meeting with RAL Inspection

9th February 2011

Inspection of RFQ Weld Models



What are the parts to be measured?

12 parts in total:

6 major vanes and
6 minor vanes

Parts make 3 assemblies

Each assembly is made from:
2 major vanes and
2 minor vanes

How big?

Assembled they form a cube of approximately:
250mm x 250mm x 250mm

Material:

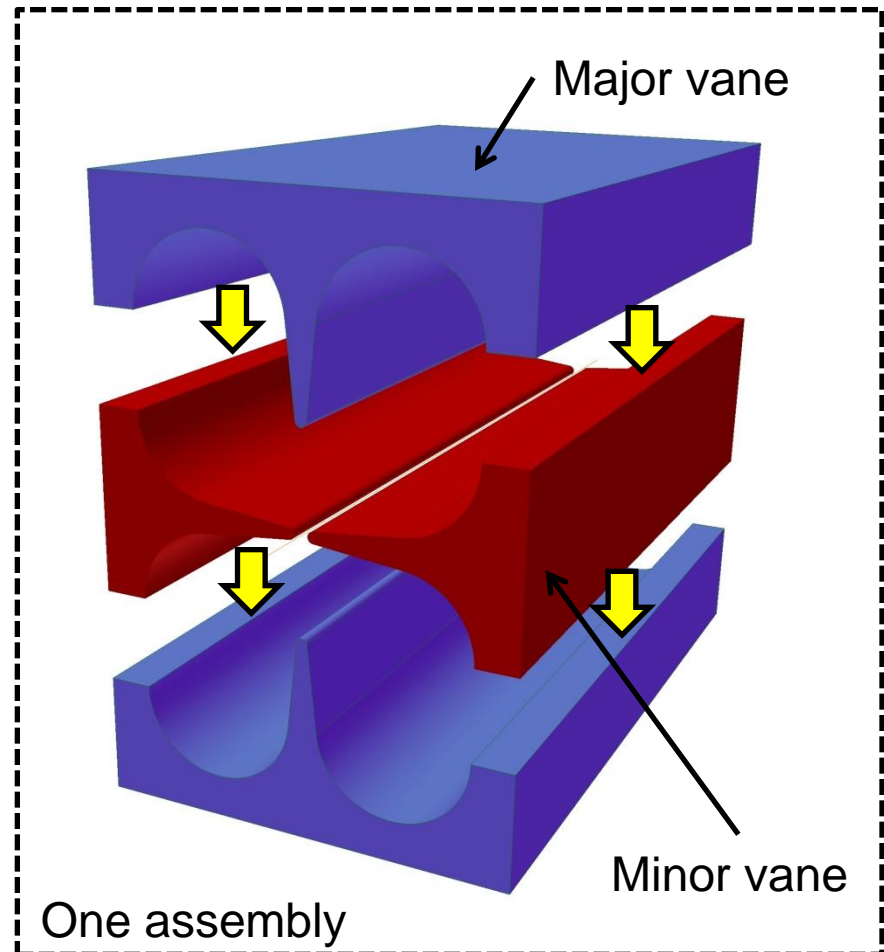
Oxygen Free Copper

General:

Please keep clean
And free from scratches

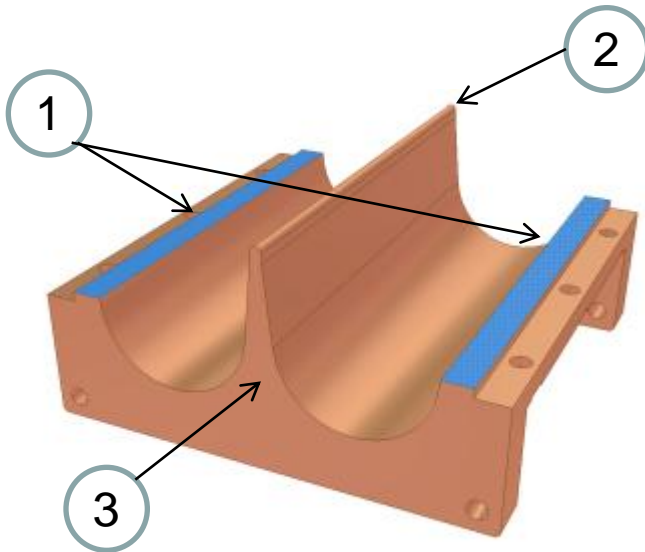
Contact:

Pete Savage (Imperial) 0207 594 7817
Phil Wise (RAL)



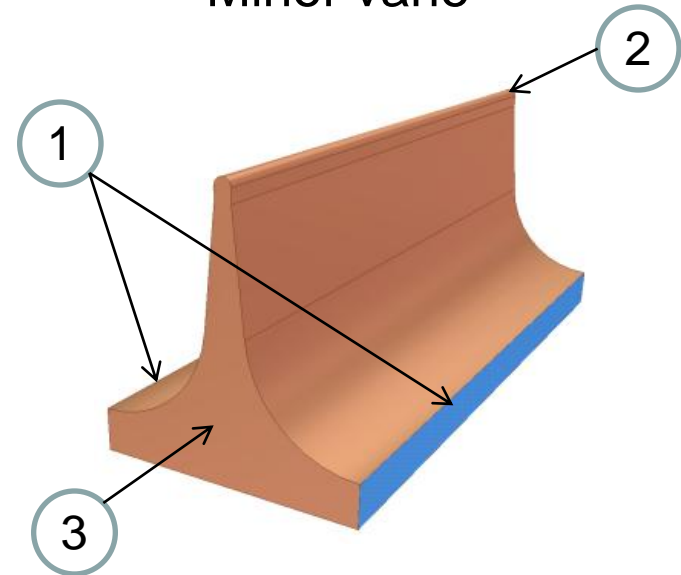
Datum features

Major vane



- 1) Interface surfaces
- 2) Vane tip radius axis
- 3) One end face

Minor vane



- 1) Interface surfaces
- 2) Vane tip radius axis /
defined by mid-point of
(1)? - discuss
- 3) One end face

What do we want to measure? - Major vane

5 features to measured per part.

Features 1 to 4 measured at 3 points along the length – a set of measurements 5mm in from either end and a set in the centre.

Feature 1: Interfaces

These are the faces where the assembled parts meet.

- 1.1) Are they flat?
- 1.2) Are they parallel to each other?
- 1.3) Are the coplanar with each other?

Feature 2: Vane tip

It defines the centre line of the parts.

- 2.1) What is the radius?
- 2.2) Where is the centre of radius?

Feature 3: Large radii

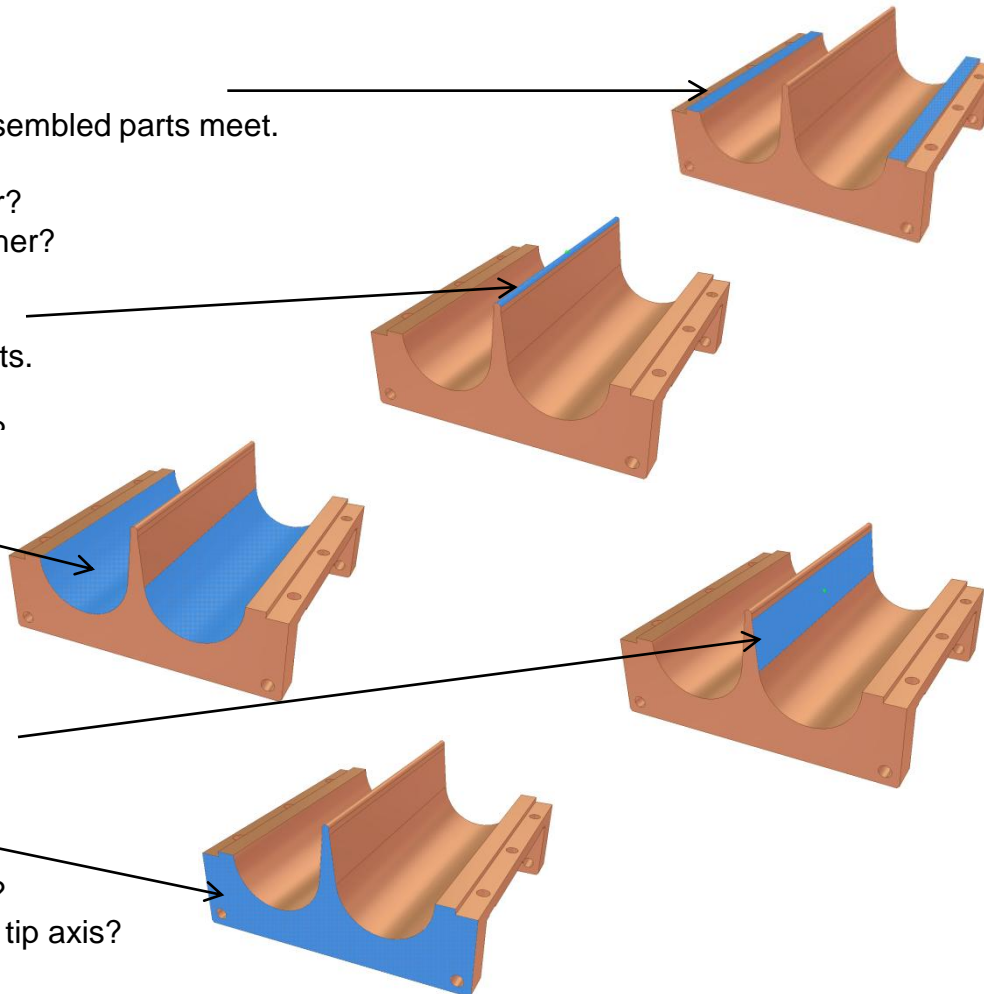
- 3.1) What is the radius?
- 3.2) Where is the radius centre?

Feature 4: Vane angle

- 4.1) What is vane angle?
- 4.2) Where is vane angle face?

Feature 5: End faces

- 5.1) Are they flat?
- 5.2) Are the parallel to each other?
- 5.3) Are the perpendicular to vane tip axis?
- 5.4) What is the total length?



What do we want to measure? - Minor vane

5 features to measured per part.

Features 1 to 4 measured at 3 points along the length – a set of measurements 5mm in from either end and a set in the centre.

Feature 1: Interfaces

These are the faces where the assembled parts meet.

- 1.1) Are they flat?
- 1.2) Are they parallel to each other?

Feature 2: Vane tip

- 2.1) What is the radius?
- 2.2) Where is the centre of radius?

Feature 3: Large radii

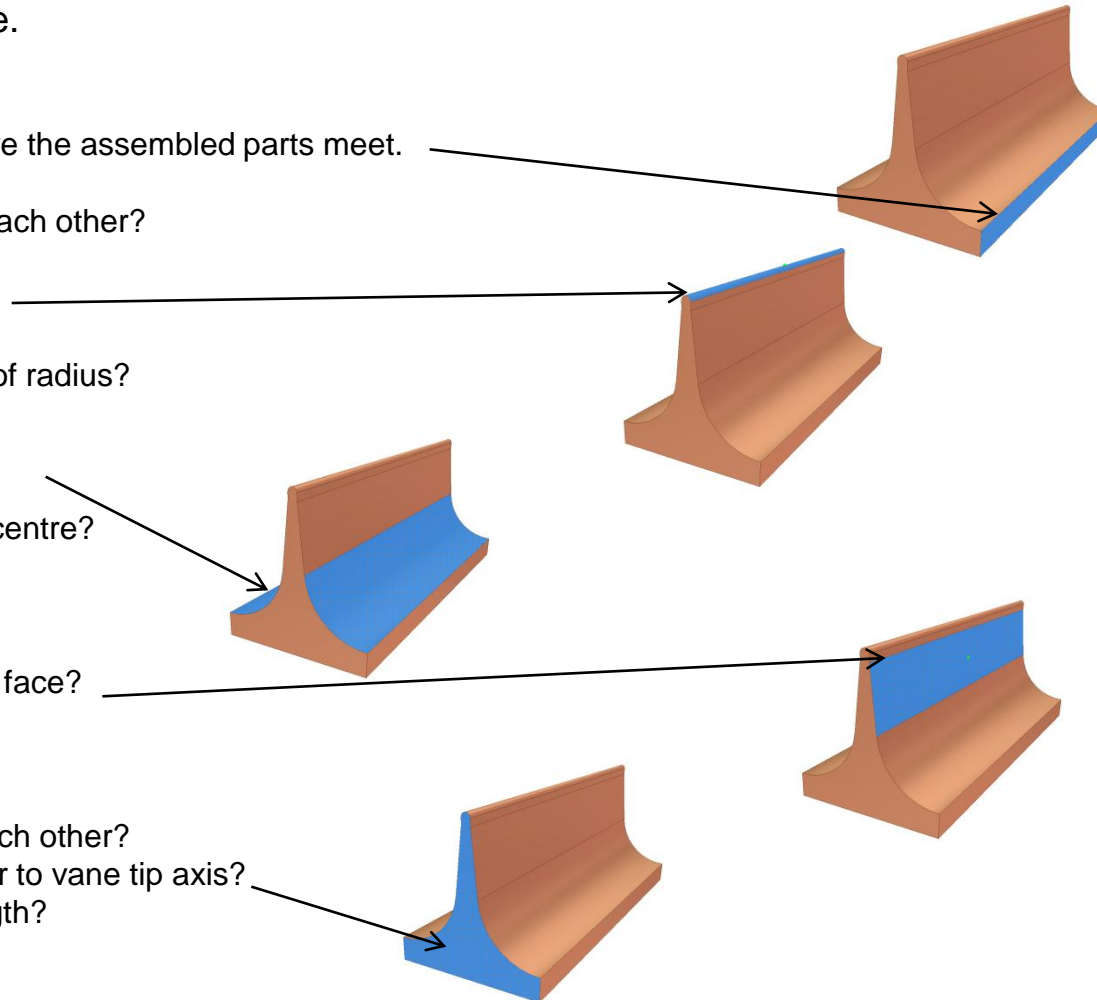
- 3.1) What is the radius?
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Feature 4: Vane angle

- 4.1) What is vane angle?
- 4.2) Where is vane angle face?

Feature 5: End faces

- 5.1) Are they flat?
- 5.2) Are the parallel to each other?
- 5.3) Are the perpendicular to vane tip axis?
- 5.4) What is the total length?



Overall goal

The three assemblies will be joined using techniques involving heat.

The techniques are:

- 1) Vacuum brazing
- 2) Laser welding
- 3) E beam welding

The material has been hot rolled and the parts have been machined. They will therefore have built up internal stresses.

The heat from the assembly techniques will relieve the stresses causing the parts to distort.

We will want to assess the level of distortion.

To successfully transport beam (along the small volume between the vane tips) the assemblies must have dimensions and good alignment.

