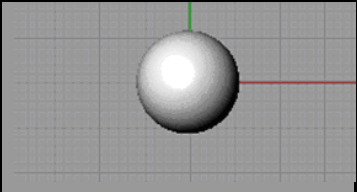
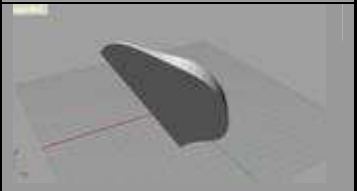
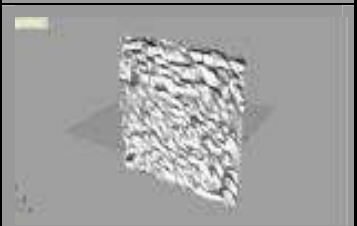


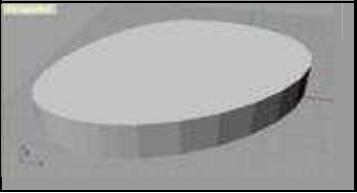


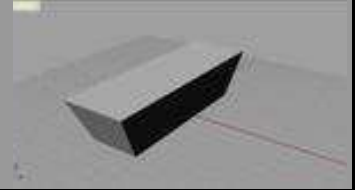
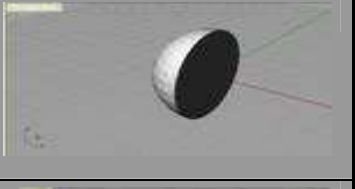






## Flaw Model Library

Kingston Computer Consultants (KCC) have produced a library of scalable artificial flaws for use with radiographic simulation packages. The artificial flaws are stl CAD files, which are super positioned over the stl file of a component in order to assess the detectability of the flaw at a specific location within the subject under test.

All the flaws have been finalised by comparing simulated radiographs to the standard reference digital images, contained in ASTM E2422 for aluminium castings.

The flaw library includes generic flaws (spheres) that incorporate the characteristic of size as a measure of severity of flaw. The library also includes models for a number of more complex common flaws, generated using the ASTM standard for Aluminium castings E2422 as a guide. Gas holes and foreign material inclusions are modelled in detail, and severe examples of gas porosity (round) and shrinkage cavity are modelled. Sponge shrinkage and elongated gas porosity are not modelled due to the complexity of the flaws. The resulting models are illustrated in the table below.

Flaw Model No.	Flaw Model Name	Description	Thumbnail Image
1	Generic Sphere	The generic sphere (model 1) was modelled to represent a generic flaw inclusion or void. In the simplest case, the flaw is perfectly spherical, and the size of the sphere is representative of the severity of the flaw.	
2	Wedge	The wedge (model 2) was modelled to represent a solid inclusion, such as a chip from a working tool. It is defined by predominantly flat surfaces.	
3	Crack	The crack (model 3) was modelled on shrinkage cracks that appear in castings due to thermal variations in the cooling process. The cracks progress along grain boundaries in the material and produce a rough, irregular and random surface.	
4	Spheroid	The spheroid (model 4) was modelled on a generic large size gas or foreign material inclusion within a casting. The shape surface is irregular, but the shape itself is generally spherical.	
5	Hopper	The hopper (model 5) was modelled to represent a solid inclusion, such as a chip from a working tool. It is irregular in shape, and is defined by straight surfaces and sharp angles.	
6	Ellipsoid Section	The ellipsoid section (model 6) was modelled to represent a solid inclusion, such as a chip from a working tool. It is defined by predominantly flat surfaces.	

7	Trapezoid Wedge	The trapezoid wedge (model 7) was modelled to represent a solid inclusion, such as a chip from a working tool. It is defined by predominantly flat surfaces and sharp angles.	
8	Semi Spheroid	The semi spheroid (model 8) was modelled to represent a solid inclusion, such as a chip from a working tool. It is defined by a flat surface and a curved surface.	
9	More Irregular Spheroid i	The “more irregular spheroid i” (model 9) was modelled on a spheroid, but to include some angular points and flat surfaces, as well as some smooth curved surfaces. This was created to represent more actively involved foreign material inclusions where the contaminant is more severe.	
10	More Irregular Spheroid ii	The “more irregular spheroid ii” (model 10) was modelled on a spheroid, but to include some angular points and flat surfaces as well as some smooth curved surfaces. This was created to represent more actively involved foreign material inclusions where the contaminant is more severe.	
11	More Irregular Spheroid iii	The “more irregular spheroid iii” (model 11) was modelled on a spheroid, but to include some angular points and flat surfaces as well as some smooth curved surfaces. This was created to represent more actively involved foreign material inclusions where the contaminant is more severe.	
12	Shrinkage Crack	The shrinkage crack (model 12) was modelled on shrinkage cracks that appear in castings due to thermal variations in the cooling process. The cracks progress along grain boundaries in the material and produce a rough, irregular and random surface.	
13	Clustered Porosity	The clustered porosity (model 13) was modelled on a random distribution of generally spherical gas voids.	
14	Textured Rectangular Prism	The textured rectangular prism (model 14) was modelled on a solid inclusion, such as a chip from a working tool. It is defined by irregular surfaces and sharp angles.	
15	Teardrop Wedge	The teardrop wedge (model 15) was modelled to represent a solid inclusion, such as a chip from a working tool. It is defined by predominantly flat surfaces.	