



sample & hold

**Arup cast glass**



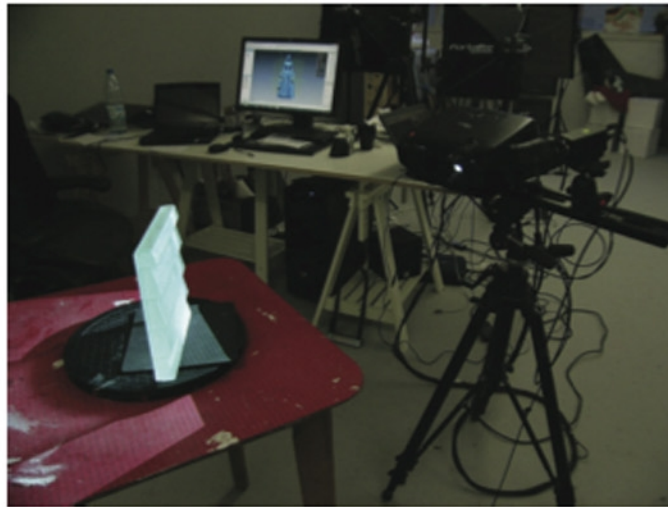


Figure 23. Technical setup for the 3D surface scan

#### 4.2.4. 3D surface scan

A 3D surface scan of the sample geometry has been undertaken, to derive a more reliable simulation description of the geometrical and optical properties of the cast glass.

The equipment used for the 3D scan is a 4D Dynamics Mephisto EX 3D scanner (Figure 23). This scanner uses structured light to obtain the 3D model, with a point accuracy of 50  $\mu\text{m}$ .

The 3D model obtained with the 3D surface scan is shown in Figure 24.

3D scan

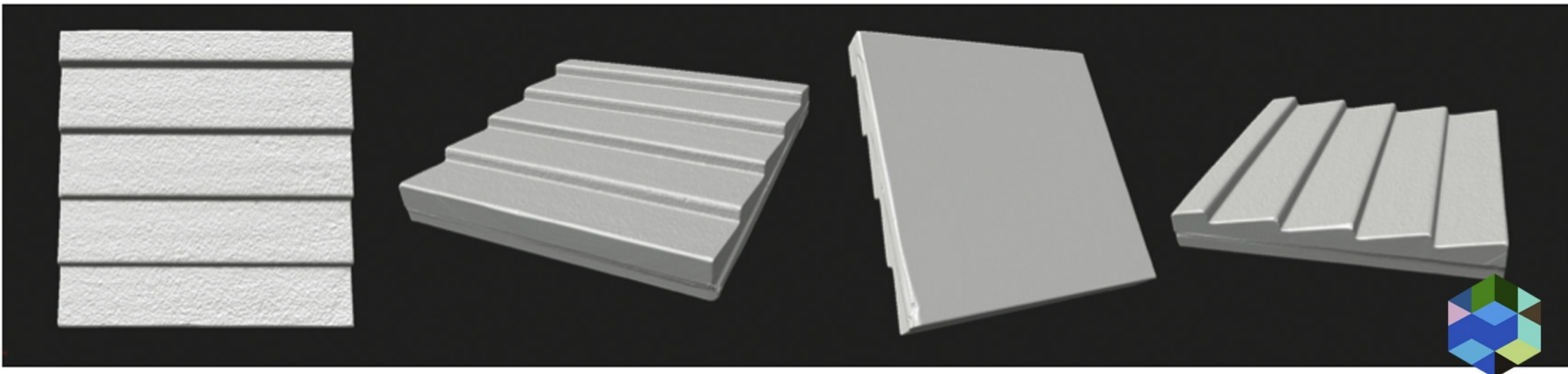


Figure 24. 3D model obtained with the 3D surface scan

#### 4.2.5. Textural characteristics

The 3D scan has been used to study the height and gradient (slope) distribution of the cast textured glass sample.

The height distribution plot (Figure 25) shows that the surface variation is contained approximately within 1 mm, with a slightly curved surface geometry (the middle of the sample is visible higher than the sides). This curvature can be related to the manufacturing process of the sample itself and might not be as apparent in larger glass panes.

The gradient distribution plot (Figure 26) shows that the cast glass perturbations are relatively smooth (darker areas are flat, lighter areas are more inclined). This means that the light will not be significantly scattered sideways, but more concentrated.

#### 4.2.6. Virtual 3D model

The 3D scan has been used to derive a modular sample for the lighting simulation, as shown in Figure 27.

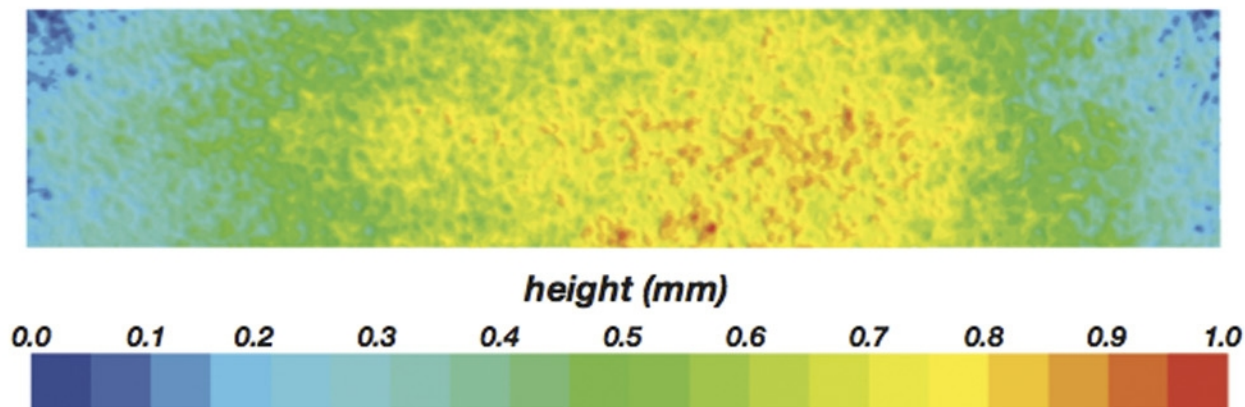


Figure 25. Height distribution of the cast glass surface

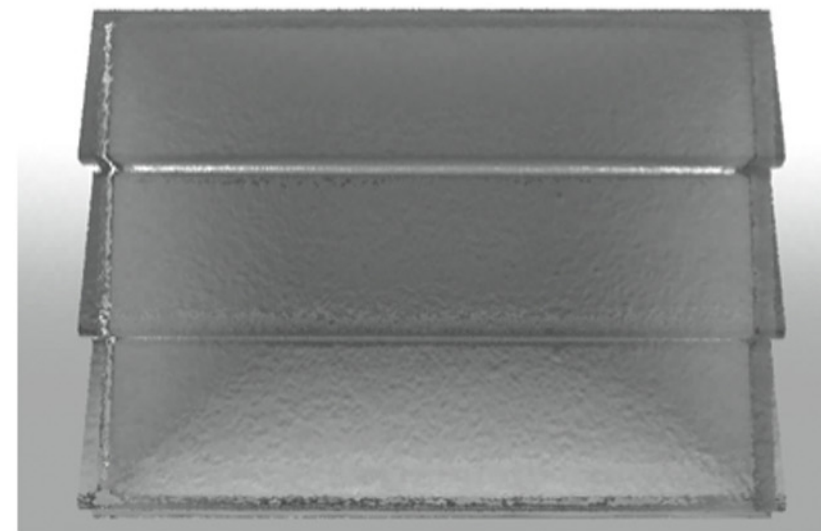


Figure 27. Photographed (small picture) and simulated sample under diffuse lighting conditions

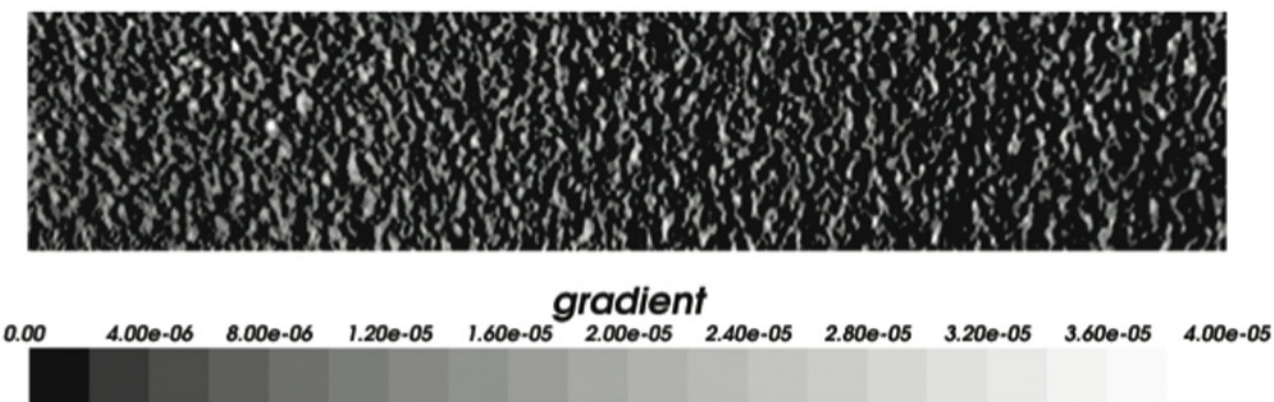
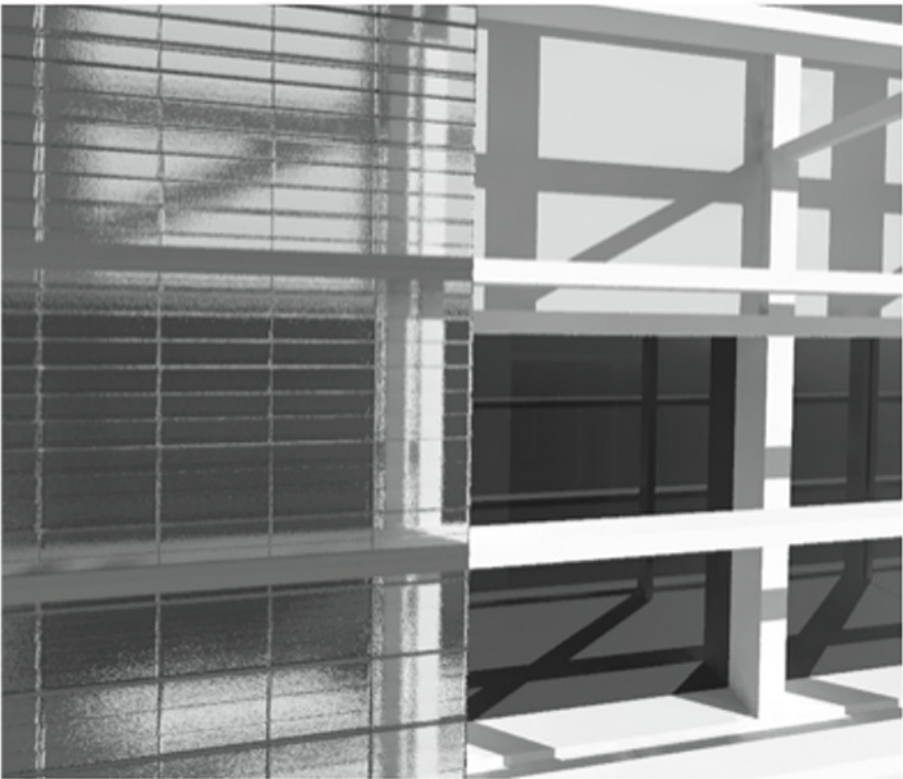
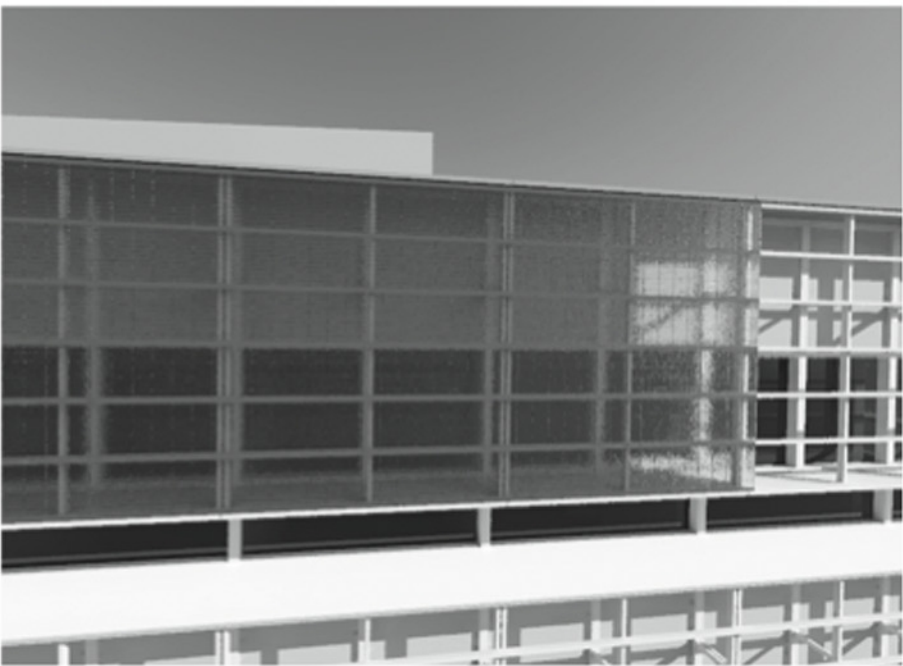


Figure 26. Gradient (slope) distribution of the cast glass surface





Virtual model



Figure 28. Building 3D model showing a portion of the façade with the cast glass virtual model

Francesco Anselmo, Lighting Designer, Arup

**"Absolute accuracy of the surface deformation was needed to assess the light redirection and scattering properties of this façade cast glass sample. I was impressed by the quality of the final 3D model. This allowed a better understanding of the geometrical properties of the surface, that could not be obtained otherwise. sample & hold supplied the model with different degrees of resolution at no extra cost, and this has been extremely useful to set up and run the simulations and analyses without wasting time with post-processing and resampling. Thank you!"**





sample & hold

[www.sampleandhold.co.uk](http://www.sampleandhold.co.uk) / [info@sampleandhold.co.uk](mailto:info@sampleandhold.co.uk)

all images copyright sample & hold and Arup 2011

