

Use Case 15c: Scanning during construction

Purpose

In tunnel construction the excavated rock or soil surface forms an integral part of the final tunnel structure. Under excavation can result in insufficient structural thickness, or over excavation in excessive material quantities. Apart from the structural aspects, many contractual systems in underground works differentiate between technically necessary over-break, unexpected geological over-break and over-break due to poor working practices and adjust payment accordingly.

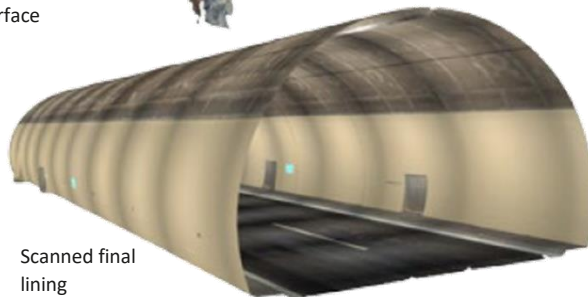
Current photogrammetric, laser and hybrid laser/photogrammetric scanning techniques have revolutionised measurement in underground works, allowing instant precise recording of the surfaces at any stage in the construction cycle.



Scanned rock surface



Scanned support surface



Scanned final lining

Dibit Messtechnik

This use case covers the scanned geometry of underground surfaces and is considered separately although related to 15b (geological documentation) and 17 (damage recording) which may use similar techniques.

Use case 15c is for the exchange of precise geometric data from the scanning application to an evaluation or recording/documentation software. This allows accurate quantities to be determined as well as the divergence between the as-designed alignment and the as-built alignment.

Requirements for IFC-Tunnel:

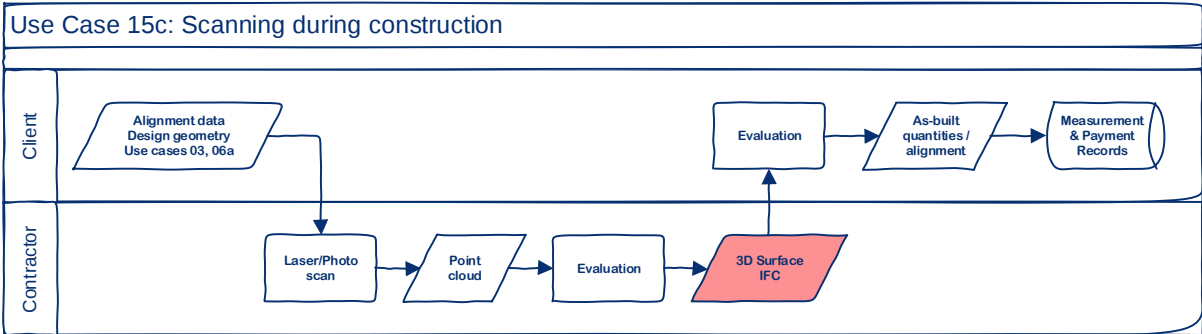
There are two exchange scenarios, the first is the exchange of alignment and geometry for input into the scanning software, the second is the exchange of as built geometry from the scanning application to the evaluation/viewing software. Alternatively, if no return exchange takes place, elements

of an IFC model can be referenced by links to the scanning application.

Geometry:

Data from scans is usually a points cloud with pixel colour. IFC could potentially be extended to include points clouds, though IFC might not be the most suitable format to transport the native point cloud data. Potentially Linked Data approaches linking the IFC model with other applications or formats for points clouds may be more suitable. The processed points clouds can be exchanged using existing geometry descriptions such as 3D faces.

The geometry should at least be related to the stationing along the tunnel axis and if possible, to the tunnel block layout. The tunnel alignment and planned geometry should be exchanged as this is part of the control of the scanning equipment.



Semantics:

Semantics play a minor role for this use case, except information required for traceability purposes, but spatial containment is important for locating the scans.