Pneumatic forming of hardened concrete for double curved shell structures

Background
Double curved shell structures are strong and material saving structures. They can be built with exceptionally big diameters. The state of the art in the construction of shell structures is characterised by high labour input. Therefore shell structures may not be built too frequently unless labour-saving construction methods are developed.

Technology
The novel cost-saving construction method is starting from individual flat plate segments. The challenge of forcing a flat plate into a double curved shell structure requires large strains in the middle plane of the flat shape. The novel method solves this problem with pneumatic formwork using wedge-shaped air cushions.

Advantages
- Quick and cost-saving construction
- Shell structures with diameters up to 52m
- Free form geometry
- Suited for a variety of casting materials
- No residues of formwork material

Potential applications
The construction method is especially suited for shell structures in event and sports venues, for pedestrian and bike bridges, viaducts for large and small wildlife passage as well as bowl and basin shaped geometries for industrial buildings like solar collectors.

Figure 1: Inflated dome – pilot construction realized in 2017 by the Austrian rail operator ÖBB as a wildlife crossing over railroad tracks.

State of development
Proof of concept, simulation, test shells with diameters of 13 m and 26 m, pilot wildlife crossing Koralmbahn with a diameter of 52 m.

IPR
Patents granted in AT, DE, ES, FR, PT, TR (EP 2785933)

Options
license agreement, sale, R&D cooperation

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