

Impact story

Bridging the gap between physical and digital

The Turing's data-centric engineering programme and its collaborators are unlocking insights into the world-first 3D printed steel bridge, using innovative data science techniques and 'digital twin' technology.

- Dutch 3D printing company MX3D, in conjunction with a huge number of industrial and academic collaborators, unveiled the bridge at Dutch Design Week in Oct 2018.
- Bridge is a living laboratory for data scientists. The Turing and collaborators have been developing a 'digital twin' of the bridge to help analyse data from sensors fixed to it.
- Collaborators at Imperial College London have conducted extensive material tests and compared the results to those predicted by the digital twin. Culminated with successful 20-tonne load test on the completed bridge.
- Also developing a long-term structural health monitoring network to ensure that the bridge remains safe during its lifetime.
- Testing has been supplemented by Turing researchers using statistical approaches to understand the "intrinsically random" properties of printed steel.
- Bridge was installed over a canal in Amsterdam in July 2021. The Turing and collaborators will be involved in key long-term assessment of data from the bridge sensor system, to better understand and improve 3D printed infrastructure solutions.

Impact

- Aided the development and analysis of the first 3D printed steel bridge
- Fostered new collaborations between fields and researchers
- Pushes forward the use of digital twins in city planning and optimisation
- Helping MX3D better characterise other 3D printed materials

"The digital twin concept is highly complex...it only made sense to do it [with] the Turing"

Gijs van der Velden, CEO, MX3D



Load test on the bridge handrails in September 2018 by Arup, the Turing and Imperial College London.