Dr Chengfeng Li is an associate professor in the College of Engineering at Swansea University. He was awarded a Royal Academy of Engineering Industrial Fellowship in 2016. This enabled a collaboration with Costain Group plc, financially supported by the Engineering Research Network Wales (ERNW).
**RESEARCH**
Temporary works (TW) refer to the parts of construction developed to enable permanent works to be built. Improving the stability and reliability of TW leads to more efficient construction and innovative engineering simulation technologies are helping to achieve this.

Through a Royal Academy of Engineering Industrial Fellowship, Dr Li used his expertise in computational engineering to help Costain address technical challenges in TW. Their research developed novel modelling techniques to enhance the stability of reinforcing bar (or rebar) cages that strengthen concrete. They also looked at new ways to model building information and fresh concrete flow in TW.

“The Fellowship provided an opportunity to get a clearer understanding of industrial practice and the need for advances in technology,” Dr Li explains. “I had previously worked with Costain and this Fellowship helped to broaden and strengthen this link.”

**IMPACT**
The Fellowship enabled Costain to access expertise in current engineering simulation technology, including computational solid mechanics and computational fluid dynamics. This led to improvements in understanding structural reliability and analysing risk in complex, high-value projects.

Costain will continue to access the latest research in this area through a variety of PhD projects. These include postdoctoral research in rebar cage stability and the use of numerical analysis methods for understanding reliability, risk and lifecycle performance in TW.

Dr Li also took insights from the collaboration directly into the classroom. “Several student projects were designed to build on my experience with Costain, including one that looks at structural optimisation of TW,” he explains. “In addition, I have added practical knowledge in areas such as self-compacting concrete into one of my modules, allowing students to learn about current practice in the construction industry.”

**PROFESSIONAL DEVELOPMENT**
First-hand experience of the demands and technical challenges in civil engineering and construction has also influenced the direction of Dr Li’s research. “It has been invaluable in helping me to plan my research in the short and medium term,” he explains. “I now have a strong relationship with Costain and we continue to hold regular research meetings. We have plans to continue working together and apply for joint funding.”

**ROYAL ACADEMY OF ENGINEERING INDUSTRIAL FELLOWSHIP SCHEME**
The Industrial Fellowships scheme provides an invaluable opportunity for early- to mid-career academics to undertake a collaborative research project in an industrial environment. The scheme aims to strengthen the strategic relationship between the university and the industry host by providing an opportunity to establish or enhance collaborative research between the two parties and enhance the quality of teaching.