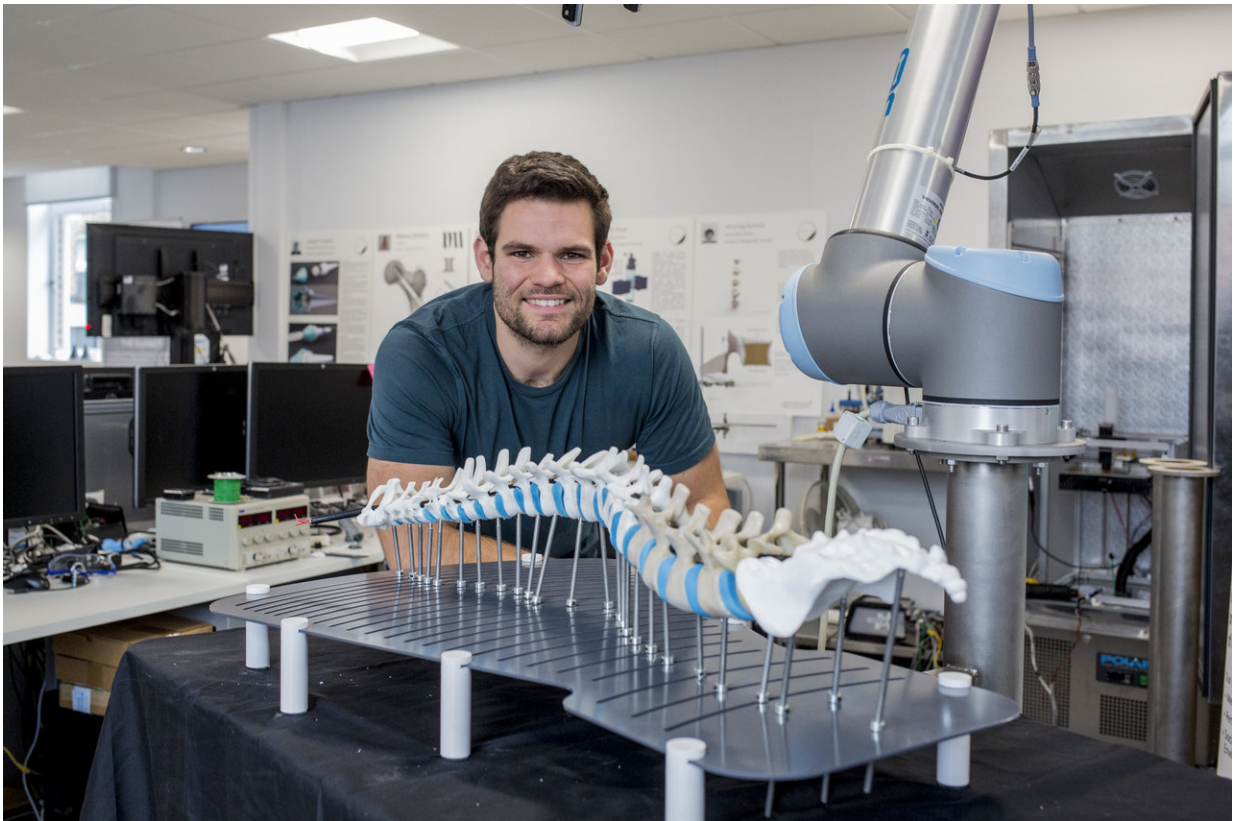


# 'Lifelike' 3D printed spine to help train spinal surgeons

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Credit: Nottingham Trent University

Researchers are 3-D printing replica human vertebrae which act and feel like real bone tissue to help train spinal surgeons before they go into live operations.

A project led by Nottingham Trent University aims to give trainee surgeons the "tactic knowledge" of how it feels to partly remove or drill into vertebrae before undertaking procedures on patients.

The models – which are created using powder printing technology to help achieve a lifelike porosity of real bone - feature hard outer layers and a softer centre.

"Consultants undertaking delicate and precise procedures like [spinal surgery](#) need as much knowledge and experience as possible as part of their surgical training before going into live operations," said Professor Philip Breedon, of the university's Design for Health and Wellbeing Group.

"One error can lead to catastrophic, life-changing consequences for a patient, so it's imperative that surgeons can prepare themselves thoroughly.

"This research will enable clinicians to experience how performing spinal surgery feels both physically and mentally, but in a safe training environment."

The project is in collaboration with consultant spinal surgeon Professor Bronek Boszczyk, of Nottingham University Hospitals Trust, who is a visiting professor at Nottingham Trent University.

The models are aimed at surgeons looking to perform procedures such as laminectomies, to relieve trapped nerves, which can involve the removal of bone tissue.

Individual models can also be created from CT scan data to provide accurate representations of people with complex conditions such as scoliosis.

Professor Boszczyk said: "This is an innovative project which has resulted in the development of spinal models which look, feel and behave like real [bone](#). These models will enable surgeons to practice very delicate procedures in a training environment which will give clinicians increased confidence before they undertake real spinal operations."

The models are made from poly lactic acid (PLA) and a binding agent and are coated in polyester. The softer inside is made from polyurethane. Discs between vertebrae are made from silicone.

The next stage of the research is to print replica bones which vary in strength to give surgeons an accurate experience of operating on people with conditions like osteoporosis. It is hoped that the technology will be used in the classroom within the next few years.

Postgraduate student Joseph Meeks developed the technology as part of his MSc in Medical Product Design.

Mr Meeks, 27, from Nether Edge in Sheffield, Yorkshire, said: "Until a surgeon goes into a live operation, he or she has very little knowledge of how it feels to perform spinal surgery.

"This research provides consultants with a realistic representation of spinal surgery which allows them to learn in a safe and calm environment.

"By better communicating these experiences, we can improve the skills of surgeons in the classroom and help enhance operative outcomes for patients in real life."

Provided by Nottingham Trent University

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