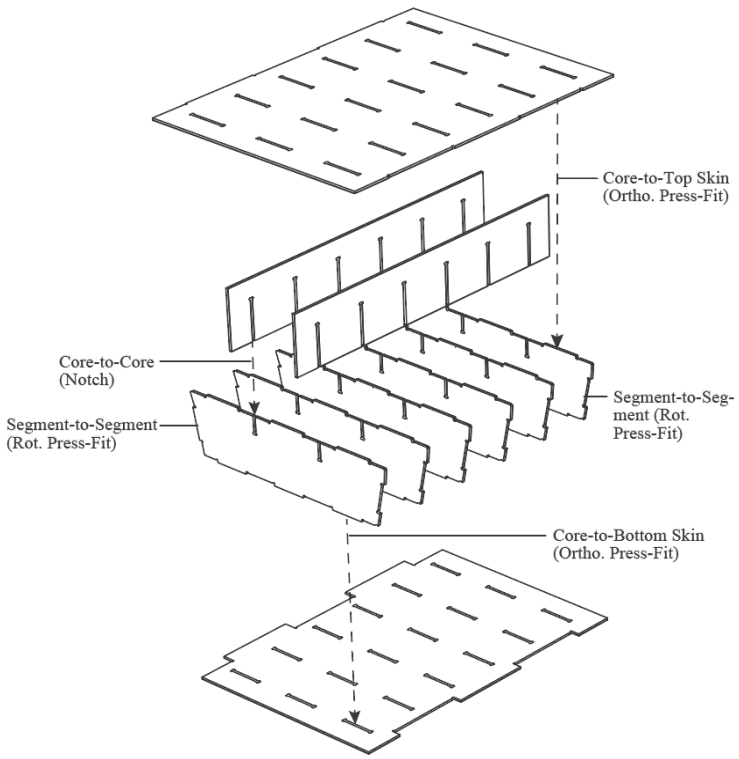
Joe Gattas
Folded Structures Lab, University of Queensland
Joe is a civil engineer and Lecturer at the University of Queensland. His research involves using origami design techniques to invent and improve thin-walled structures and devices. There are numerous applications of origami shell structures, including deployable and modular housing; energy-absorbing packaging and barriers; and lightweight automobile and aircraft components. He is also interested in all aspects of design, making, and coding, and pursues a large number of projects that relate to one or all of them. He completed a Doctor of Philosophy in Engineering Science at the University of Oxford in 2013.

Yousef Alqaryouti
Folded Structures Lab, University of Queensland
Yousef Alqaryouti is a Structural Engineer and PhD candidate at the University of Queensland with particular interests in structural engineering, digital fabrication, modular housing, and lightweight structures. Prior to enrolling at the University of Queensland, he worked for six years as a structural design engineer for different global consulting engineering companies. He received an M.Sc. degree in civil engineering/structures with distinction from the University of Jordan (2014) and B.Sc. in civil engineering with distinction from the Hashemite University (2010).



DIGITAL FABRICATION OF TIMBER-COMPOSITE SHELL STRUCTURES

Joe Gattas, Yousef Alqaryouti

September 20th - 22nd, 2017
Rhinoceros, Grasshopper

Computer-aided manufacturing uses automated workshop machines such as computer-numerically controlled (CNC) routers, laser cutters, or waterjet cutters to produce building components. Such machines have a precision and speed which enables more complex components than would be achievable by traditional manufacture, and this has led to the design of structural systems with integral attachments in the manufactured parts. These are typically in the form of mechanical joints between elements, for example through a fine control of connection tolerance to achieve friction-only fit, or through interlocking geometry which prevent the movement of two parts in all but one direction to prevent disassembly. Integral mechanical attachments thus remove the need for tools or skilled labour during assembly and so enable the delivery of innovative structures which are easy to construct and are highly cost-efficient.

This workshop will allow participants to develop an integrated, end-to-end digital design and fabrication workflow for production of timber-composite shell structures. It will include the following activities:

- parametric design of integral mechanical joints suitable for different CNC cutting machines;
- calibration of joint parameters to account for manufacturing tolerance and desired mechanical behaviour, for example friction-only fit; and
- digital fabrication of thin-walled structural sections, sandwich plate components, and sandwich shell components.

Participants are recommended to have a basic understanding of Rhino/Grasshopper parametric 3D modelling tools on commencement. They are also required to bring their own computer with a Rhino/Grasshopper installation.