

Content and Objectives

The focus of this Training School will be on the reinforcement of timber structures using self-tapping screws and glued-in rods. Trainees will learn how to undertake structural design of reinforcement for different situations. The programme will have a design-build-test format.

Topics:

Introduction to self-tapping screws – types and characteristics

Introduction to glued-in rods – types and characteristics

General design rules

Design of reinforcement for:

- Notched, double tapered, curved, pitched cambered beams
- Beams with holes
- Flexural and shear enhancement of beams
- Compressive stresses perpendicular to grain
- Connections

	Monday, 8/12	Tuesday, 9/12	Wednesday, 10/12	Thursday, 11/12	
8:30-9:00	Registration				
9:00-10:30	Annette Harte, NUI Galway <i>Reinforcement of Timber Structures</i>	Albino Angeli, Rothoblaas <i>Screw properties & Reinforcement of connections</i>	Dave Smedley, Rotafix <i>Introduction to bonded-in rods for reinforcement of timber structures</i> <i>Characteristics of materials, selection criteria. Site constraints. Case studies</i>	Robert Widmann, EMPA <i>Design models for bonded-in rods</i> <i>Different design models for BIR will be presented and discussed. On base of some examples the calculated performance of BIR will be compared.</i>	
	Helmut Stoll, SPAX <i>Screw properties, common design rules.</i> <i>Reinforcement for compression perpendicular to grain</i>	Roberto Tomasi / Ivan Giongo, University of Trento <i>Theory of timber composite structures with semi-rigid connection</i>			
10:30-11:00	Coffee break				
11:00-12:30	Jorge Branco, University of Minho <i>Analysis and reinforcement of notched joints</i>	Roberto Tomasi / Ivan Giongo, University of Trento <i>Case studies of floor refurbishment techniques via timber-concrete and timber-timber composite structures</i>	Ian Jones, Ian Jones and Associates, Consulting Engineers, UK <i>Reinforcement of timber members using bonded-in rods</i> <i>Design methods for flexural strengthening of beams, beam end repair and truss end repair. Case studies.</i>	Karol Sikora, NUI Galway Robert Widmann, EMPA LAB TESTING: <i>Pull-pull tests of bonded-in rod specimens. The results will be compared to literature values and design models</i>	
	Philipp Dietsch, TUM <i>Tensile stresses perpendicular to the grain – typical details and standardized approaches for reinforcement</i> <i>Typical details in which tensile stresses perpendicular to the grain occur. Approaches to reinforcement in combination with a design method. internal reinforcement and external reinforcement techniques.</i>	Roberto Tomasi / Ivan Giongo, University of Trento <i>Reinforcement with inclined self-tapping screws</i>			
12:30-13:30	Lunch break				
13:30-14:15	Philipp Dietsch, TUM <i>Design of shear reinforcement for timber beams</i> <i>Design methods for timber beams, featuring shear reinforcement. Design approaches for the uncracked and the cracked (failed) state. Effect of reinforcement on moisture induced stresses in timber elements.</i>	Roberto Tomasi / Ivan Giongo, University of Trento <i>Internal stress in timber elements due to self-tapping screws</i>	Ian Jones, Ian Jones and Associates Karol Sikora, NUI Galway LAB TESTING: <i>Testing of unreinforced beam and beam reinforced with bonded-in rods – MOE, MOR</i>	All trainers DESIGN WORKSHOP: <i>Design of BIR reinforcement for timber reinforcement</i>	TOUR of ENGINEERING BUILDING, NUI Galway
14:15-17:00	Karol Sikora, NUI Galway Helmut Stoll, SPAX LAB TESTING: <i>Beam with notch – tested with and without reinforcement</i>	All trainers DESIGN WORKSHOP: <i>Design of beams for reinforcement in tension perpendicular to grain, shear reinforcement, compression perpendicular to grain</i>			All trainers DESIGN WORKSHOP: <i>Design of a timber composite structure</i>