



## Modified Foundation Modelling of Dowel Embedment in Glulam Connections

<https://research.thinkwood.com/en/permalink/catalogue584>

Author: Karagiannis, Vasileios  
MÁLAGA-CHUQUITAYPE, Christian  
Elghazouli, Ahmed

Publisher: ScienceDirect

Year of Publication: 2016

Country of Publication: Netherlands

Format: Journal Article

Material: Glulam (Glue-Laminated Timber)

Topic: Connections  
Mechanical Properties

Keywords: Douglas-Fir  
Dowels  
Finite Element  
Spruce  
Embedment Behaviour  
Strain Concentrations  
Deformation  
Modified Foundation Models

Language: English

Research Status: Complete

Series: Construction and Building Materials

### Summary:

This paper examines the embedment behaviour of single-dowel connections in Scandinavian Spruce Glulam by means of experimental and numerical investigations. First, the experimental results of a series of single-dowel tests on samples of different geometry and grain directions are presented. The evolution of local strain concentrations around the fastener at increasing levels of bearing deformation, is reported in detail by means of non-contact field strain measurements and its implications are discussed. Detailed finite element simulations are also carried out and subsequently employed to highlight the main features of the response of doweled connections in glulam. A foundation model, initially developed for Douglas-fir (*Pseudotsuga menziesii*) timber, is upgraded and adapted for Scandinavian Spruce Glulam (*Picea abies*) elements subjected to loads acting perpendicular and parallel to the grain direction. The proposed model is based on the definition of equivalent material parameters for the crushing region around the dowel hole. To this end, relationships for the estimation of material characteristics as a function of the crushing volume are suggested. The validity and accuracy of the proposed modified foundation models are examined against the experimental results. It is shown the improved foundation model is able to simulate the embedment stiffness, capacity and inelastic behaviour of single-dowel connections on glulam with reasonable accuracy for strains of up to 8 %, and can therefore be used for design and assessment purposes.

Online Access: Free

### Resource Link

---

[https://www.researchgate.net/profile/Christian\\_Malaga-Chuquitaype/publication/282002886\\_Modified\\_foundation\\_modelling\\_of\\_dowel\\_embedment\\_in\\_glulam\\_connections/links/59d8e33a0f7e9b12b368628d/Modified-foundation-modelling-of-dowel-embedment-in-glulam-connections.pdf](https://www.researchgate.net/profile/Christian_Malaga-Chuquitaype/publication/282002886_Modified_foundation_modelling_of_dowel_embedment_in_glulam_connections/links/59d8e33a0f7e9b12b368628d/Modified-foundation-modelling-of-dowel-embedment-in-glulam-connections.pdf)