

# 建築材料工学研究室

SDGs達成に向けた取り組み



キーワード・研究テーマ Keywords・Research Themes

- 木質材料  
Timber materials
- ボルト接合  
Bolted joints
- 締付け管理  
Tightening control
- 応力緩和  
Stress relaxation
- 圧縮木材  
Compressed wood

## 木質材料の建築構造物への有効利用および施工法に関する研究

Study on effective utilization of timber materials for building structures and construction methods



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Subject Teacher MATSUBARA Doppo

PROFILE

職位 Position	准教授・大学院准教授 Associate Professor・Associate Professor at Graduate School	担当講義科目 Charge of Subjects	建築材料、施工法Ⅰ・Ⅱ Building materials, Construction methodⅠ・Ⅱ
大学院 Graduate School	社会環境科学コース Social Environmental Science Course		
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研究概要 Research Outline

木質材料の材料特性を十分に理解し有効利用することで、新しい木質構造接合部や接合部のボルト等の締付け管理法に関して研究を進めています。

We are conducting research on novel timber joints and tightening management methods for bolted timber joints by effectively utilizing timber materials.

進行中の研究内容 Research Contents in Progress

- 1 ボルトやラグスクリューを木材に締付け過ぎると、木材側が損傷し、接合部の機能が発揮されなくなる恐れがあります(図1,2参照)。これを防止するための適切な締付け管理法に関して研究を進めています。

Over-tightening bolts or lag screws to the timber member cause the timber joint to lose its performance (See Fig. 1 and 2). We are conducting research on appropriate tightening management methods to prevent this problem.

- 2 圧縮木材の変形復元・応力緩和特性やボルトの締付け力を活用して、新しい“剛”な木質構造接合部の開発をめざして研究を進めています。

We are conducting research to develop novel “rigid” timber joints by using the deformation restoration / stress relaxation characteristics of compressed wood and bolt tightening force.

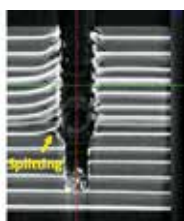


図1  
ラグスクリューをねじ込んだ時の雌ねじ部破壊状況(X線CT像)

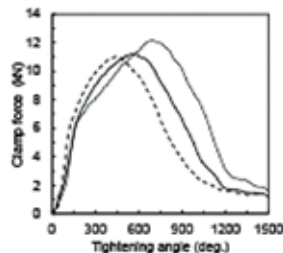


図2  
ラグスクリューの締付け力と回転角の関係の一例

最近の研究実績 Recent Research Results

〈論文／Published Papers〉

- Matsubara D, Teranishi M, Wakashima Y. (2022) Elastic interaction in multiple bolted timber joints. J Wood Sci 68 : Open Access
- Matsubara D, Teranishi M. (2022) Evaluation of elastic stiffness in bolted timber joints for applying turn-of-nut method. J Wood Sci 68 : Open Access
- Teranishi M, Matsubara D. (2022) Pretension loss in bolted timber joint under external tensile load. European Journal of Wood and Wood Products 80 : 817-827
- Wakashima Y, Ishikawa K, Shimizu H, Kitamori A, Matsubara D, Tesfamariam S. (2021) Dynamic and long-term performance of wood friction connectors for timber shear walls. Engineering Structures 241 : https://doi.org/10.1016/j.engstruct.2021.112351
- Teranishi M, Matsubara D, et al., (2021) Nonlinear finite-element analysis of embedment behavior of metal washer in bolted timber joints. J Wood Sci 67: Open Access
- Matsubara D, et al., (2020) The load factor in bolted timber joints under external tensile loads. J Wood Sci 66: Open Access
- Wakashima, Y, Shimizu H, Kitamori A, Matsubara D, et al., (2019) Stress relaxation behavior of wood in the plastic region under indoor conditions. J Wood Sci 65: Open Access
- Matsubara D, et al., (2019) A novel method for estimating ultimate clamp force in lag screw timber joints with steel side plates. Trans Mat Res Soc Japan 44: 109-113