

# HANDS ON

THE VALUE  
OF BUILDING  
CULTURE



# *JOINT MATTER*

**Nicolai Bo Andersen & Victor Boye Julebæk.** This paper presents three pavilions built in wood. The designs of the pavilions are based on traditional building techniques which have been used historically in Denmark and in Ise, Japan. Both pavilions are informed by historic references and re-present experienced architectural phenomena. The ‘Hortus Conclusus’ pavilion was built in the summer 2018 by students from the Master’s Programme in Architectural Heritage, Transformation and Conservation in the garden of Design Museum Denmark. ‘The Apprentices’ House Pavilions’ were built during the spring 2019 by students from Campus Bornholm in Tejn on Bornholm and simultaneously by students at the Master’s Programme in Architectural Heritage, Transformation and Conservation in Copenhagen. It is argued that historical building techniques and traditional wooden joinery may present technical as well as aesthetic properties that may be relevant in today’s building practice.







**Joint Matter.** At the Master's Programme in Architectural Heritage, Transformation and Conservation at the Royal Danish Academy of Fine Arts, Schools of Architecture, Design and Conservation an integral part of the teaching is the 1:1 building workshop, which thematises three tectonic principles.<sup>1</sup> This paper presents three timber pavilions built as part of the curriculum, one in 2018 and two in 2019.

As part of the joint project 'The Apprentices' House',<sup>2</sup> two wooden pavilions were designed and built in the spring 2019. Both pavilions were designed by the authors as a re-interpretation of traditional building techniques. Instead of the traditional pitched roof, the two pavilions have a one-sided, tall pitch, giving the structures a tall, characteristic profile. One pavilion was built by apprentices from Campus Bornholm in front of the actual 'Apprentices' House' in Sandkås near Allinge, Bornholm (Fig. 4 and 6). 3. The other was built by students at KTR, KADK, on the waterfront in Copenhagen (Fig. 1-6). Both structures were built entirely from wood without the use of metal fasteners or nails. The two pavilions have exactly the same outer geometry, but while the Bornholm pavilion was designed with variations on joints traditionally used on the island,<sup>3</sup> the Copenhagen pavilion was instead designed with variations on joints traditionally used on Zealand.<sup>4</sup>

The 'Hortus Conclusus' pavilion was conceived for the Danish Design Festival 2018, and built in Designmuseum Danmark's courtyard, 'Grønnegården' (Fig. 7-9). The pavilion was designed by the authors in collaboration with Charlie Steenberg, Morten Gehl and Søren Vadstrup and built by students from KTR, KADK. Inspired by the traditional Japanese 'sage-kama' joint,<sup>5</sup> the structure was made entirely from wood without metal fasteners or nails. The foundations were made from reclaimed bricks and the roofing was reclaimed scaffold tarpaulin, otherwise intended for disposal. The U-shaped plan of the pavilion duplicates the geometry of the museum and the enclosed garden. The building complex, originally a hospital designed by Nicolai Eigtved and Laurids de Thurah 1752–1757, was dimensioned using the bed as module. In 1926, Ivar Bentsen and Thorkild Henningsen converted the hospital into a museum, using furniture by Kaare Klint and lamps by Poul Henningsen.<sup>6</sup>

All three pavilions were built using locally grown Douglas fir, a species introduced in Denmark during the 1860s. The material has prominent grain, with a warm, slightly yellow-reddish hue that turns silvery grey when exposed to weather. The Bornholm 'dovetail' joint was commonly used all over Bornholm from the mid-1800s.<sup>7</sup> Interestingly, the joint is similar to the wedged through half dovetail joint found in Japan.<sup>8</sup> According to Japanese architect Kiyosi Seike, this 'sage-kama' joint is possibly devised by ancient carpenters as the least destructive method of connecting the necessary stabilising rails to the posts.<sup>9</sup> In Japanese architecture, flexible joints have traditionally been used to resist strong lateral forces such as earthquakes or the high winds that accompany typhoons.<sup>10</sup> Also, because of the wedge the joint is easy to tighten and easy to disassemble. Lacking the diagonal braces common in the West, the 'sage-kama' is common in furniture such as cabinets, tables and chairs.

The three pavilions may have (at least) three sustainable potentials. First, the building material in itself may have a potential to store CO<sub>2</sub>. Through photosynthesis plants capture CO<sub>2</sub> that may be stored in wood and wooden structures, e.g. furniture and buildings, as long as they live and released to the atmosphere again when they decompose or burn. However, used as a general strategy for trapping CO<sub>2</sub> it requires a major shift in land use and management, including a stop to deforestation in favour of forest regeneration and a massive forest expansion.<sup>11</sup> Second, the pavilions may have a potential as a method to design for disassembly. As part of a strategy for circular economy (CE),<sup>12</sup> the construction method used in the two pavilions may inspire an architecture that allows the materials to be disassembled and reused in another context. However, the strategy of reuse is listed only third in the hierarchical list of nine R's: (1) Refuse, (2) Reduce, (3) Reuse, (4) Repair, (5) Refurbish, (6) Remanufacture, (7) Repurpose, (8) Recycle and (9) Recover energy.<sup>13</sup> This suggests that it is better to keep the materials in the building system as long as possible for instance by using wood protection by design to improve life expectancy. Third, the pavilions may have a potential in relation to the Sustainable Development Goals (SDG) as defined by the UN.<sup>14</sup> SDG 11 is about ensuring access to adequate, safe and affordable housing for all (11.1)

and sustainable and resilient buildings utilising local materials (11.c). SDG 12 is about the efficient use of natural resources (12.2) and reducing waste generation through prevention, reduction, recycling and reuse (12.5).

The 'Hortus Conclusus' pavilion was built as part of the exhibition 'Design X Change 2018'.<sup>15</sup> In relation to the Danish Design Festival 2018, Designmuseum Denmark hosted the annual exhibition in the courtyard 'Grønnegården' during the weekend 26–27 October 2018. The festival had a specific focus on sustainability and material reuse, thematising the 17 UN Sustainable Development Goals (SDG).<sup>16</sup> At the end of the exhibition the 'Hortus Conclusus' pavilion was disassembled, moved and reassembled at a school for mentally vulnerable children.

For a period of three months, the two 'The Apprentices' House' pavilions – like siblings – greeted each other across the Baltic Sea: similar but different. The Bornholm pavilion was part of an exhibition in connection to the People's Democratic Festival (*Folkemødet*) in Allinge 13–16 June 2019, thematising the 17 UN Sustainable Development Goals (SDG).<sup>17</sup> This pavilion, which is still located outside 'The Apprentices' House', is planned to be part of a future exhibition on craftsmanship and sustainability. In September 2019, the Copenhagen pavilion was disassembled, moved and reassembled at the 'CLIMATE – Change for a sustainable future' exhibition in the great exhibition hall at KADK as part of the 'Building Culture Reclaimed' contribution by KTR.<sup>18</sup> At the end of the exhibition, the pavilion was disassembled again, moved and reassembled, this time in southern Sweden, where it will be transformed into a guest house.

The three pavilions demonstrate how the re-discovery of a traditional building techniques, lost in modern building industry, may inspire apprentices and students of architecture to become aware of material qualities, tectonic principles and the value of craftsmanship. Also, the pavilions prove how a hands-on approach may be used when teaching architectural history and the characteristics of regional building culture. Even though the three pavilions are very simple and do not (yet) consider (important) aspects like thermal insulation, the pavilions demonstrate how a re-interpretation of traditional building techniques may point toward a contemporary sustainable building practice. It is a matter of the material properties and qualities themselves as well as the way the materials are assembled. Finally, the joint projects demonstrate how cooperation between schools and institutions, apprentices and students of architecture may inspire a sustainable building culture on many levels. In other words, joint matter.

1 Nicolai Bo Andersen, 'Sammenføjning – Stabling – Støbning', in *Om bygningskulturens transformation*, edited by Christoffer Harlang and Albert Algreen-Petersen (København: GEKKO Publishing, 2015), pp. 40–69.

2 'The Apprentices' House' (*Lærlingenes Hus*) project is a cooperation between Dansk Håndværk, who owns the house, and KTR, KADK, who used the house as a case study project in the spring of 2019.

3 Niels-Holger Larsen, *Bornholmsk byggeskik på landet* (Rønne: Bornholms Museum, 1983), p. 72.

4 Chr. Axel Jensen, *Dansk bindingsværk i renæssancesiden. Dets forhistorie, teknik og dekoration* (Copenhagen: C. E. Gads Forlag, 1933).

5 Kiyosi Seike, *The Art of Japanese Joinery* (Boulder: Weatherhill, 2017), pp. 119–120.

6 See: 'Historien og Arkitekturen', Designmuseum Denmark, accessed 18 February 2020, <https://designmuseum.dk/om/historien-arkitekturen/>

7 Niels-Holger Larsen, *Bornholmsk byggeskik på landet* (Rønne: Bornholms Museum, 1983), p. 72.

8 Edward S. Morse, *Japanese Homes and their Surroundings* (Dover Publications, Inc., 1961), pp. 14–15, and Kiyosi Seike, *The Art of Japanese Joinery* (Boulder: Weatherhill, 2017), pp. 119–120.

9 Kiyosi Seike, *The Art of Japanese Joinery* (Boulder: Weatherhill, 2017), pp. 119–120.

10 Kiyosi Seike, *The Art of Japanese Joinery* (Boulder: Weatherhill, 2017), pp. 119–120.

11 'Missing Pathways to 1.5°C. The role of the land sector in ambitious climate action', CLARA,

accessed 23 September 2019, <https://www.climate-land-ambition-rights-alliance.org/report>

12 'Advisory Board for cirkulær økonomi 2017: Anbefalinger til regeringen', Ministry of Environment and Food of Denmark, 10 July 2017, [http://mfvm.dk/fileadmin/user\\_upload/MFVM/Miljoe/Cirkulaer\\_oekonomi/Advisory\\_Board\\_for\\_cirkulaer\\_oekonomi\\_Rapport.pdf](http://mfvm.dk/fileadmin/user_upload/MFVM/Miljoe/Cirkulaer_oekonomi/Advisory_Board_for_cirkulaer_oekonomi_Rapport.pdf)

13 Nicole van Buren et al., 'Towards a circular economy: the role of Dutch logistics industries and governments', *Sustainability* 2016, 8, 647 (Summer 2016), <http://www.mdpi.com/2071-1050/8/7/647>

14 'The 17 Sustainable Development Goals', UN, accessed 23 September 2019, <https://sustainabledevelopment.un.org/>

15 'Design X Change – Designmuseum Denmark', Danish Design Review, accessed 18 February 2020, <http://danishdesignreview.com/kbhnotes/2018/5/31/design-x-change-designmuseum-danmark>

16 'The 17 Sustainable Development Goals', UN, accessed 23 September 2019, <https://sustainabledevelopment.un.org/>

17 'Om Folkemødet', Folkemødet, accessed 18 February 2020, <https://folkemoedet.dk/om-folkemoedet/om-folkemoedet/>

18 'CLIMATE – Change for a sustainable future // Architecture, Design and Conservation', KADK, accessed 18 February 2020, <https://kadm.dk/kalender/climate-change-sustainable-future-architecture-design-and-conservation>

Previous page, figure 1: 'The Apprentices' House, Copenhagen Pavilion'. Photo, Victor Boye Julebæk.

Page 40, figure 3: 'The Apprentices' House, Copenhagen Pavilion'. Photo, Victor Boye Julebæk.

Opposite page, figure 2: 'The Apprentices' House, Copenhagen Pavilion'. Photo, Victor Boye Julebæk.

Page 41, figure 4: The pavilions in split view, dot-dashed line separating. L: Sandkås R: Copenhagen.

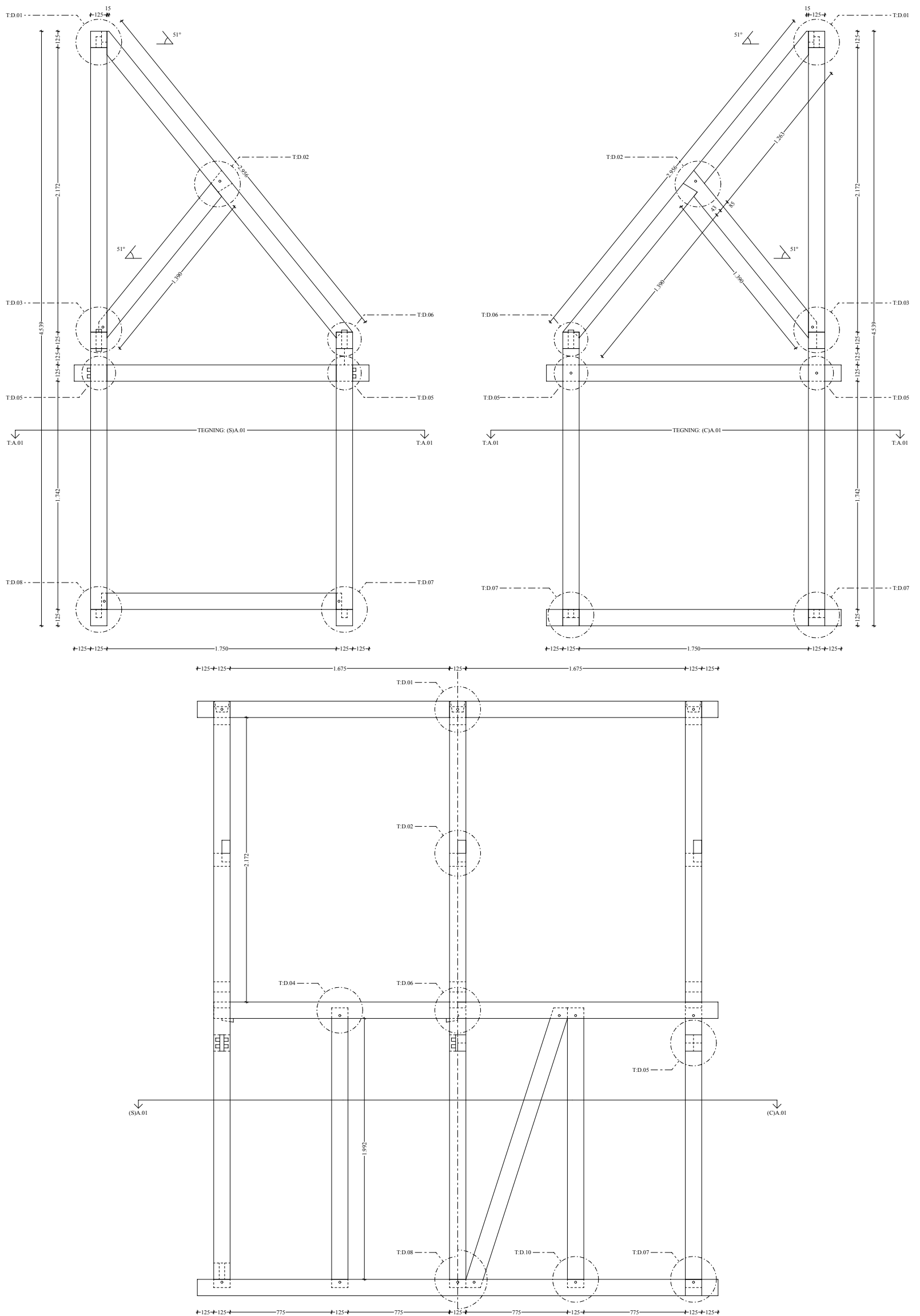












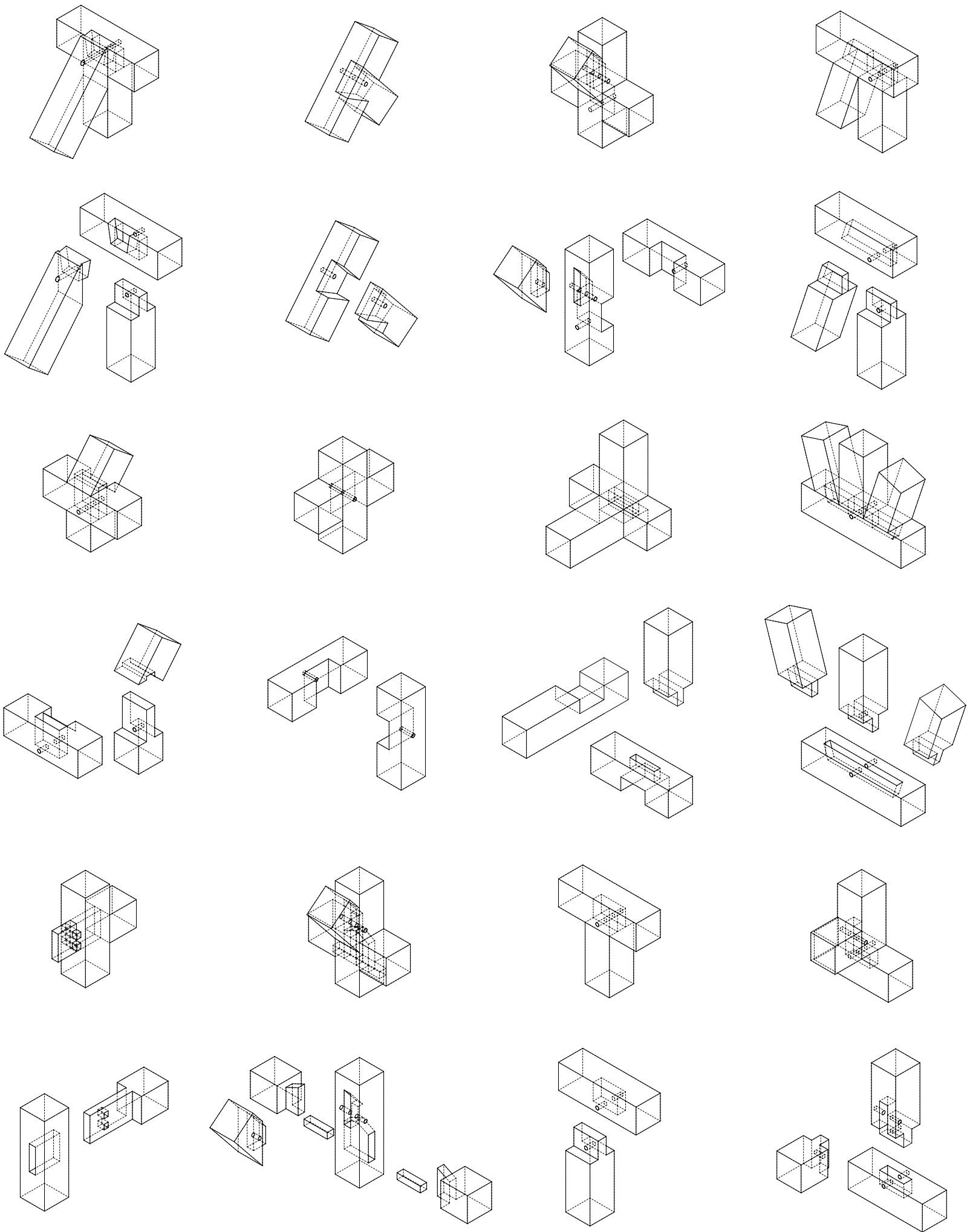












**Previous page, figure 5:** 'The Apprentices' House, Copenhagen Pavilion'. Photo, Victor Boye Julebæk.

**This page, figure 6:** 'The Apprentices' House Pavilions', isometric joint sketches.

**Opposite page, figure 7:** 'Hortus Conclusus' pavilion, Grønnegården. Photo, Victor Boye Julebæk.













**Opposite page, figure 8:** ‘Hortus Conclusus’ pavilion, Grønnegården. Photo, Victor Boye Julebæk.

**This page, figure 9:** ‘Hortus Conclusus’ pavilion, Grønnegården. Photo, Victor Boye Julebæk.





## **Hands On**     The Value of Building Culture

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