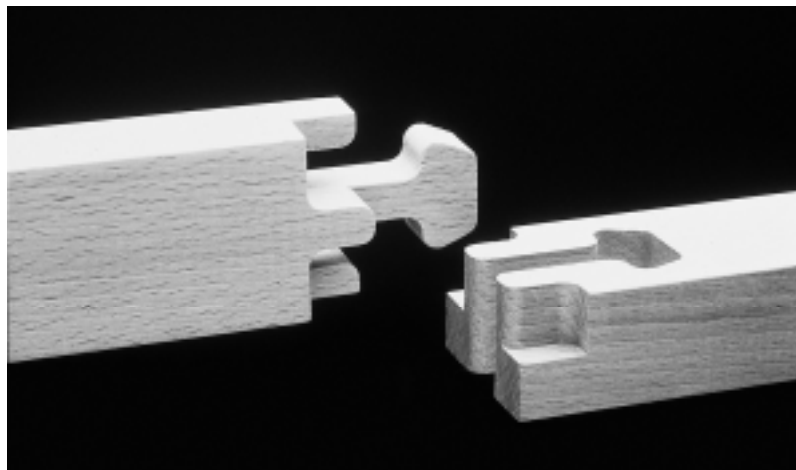




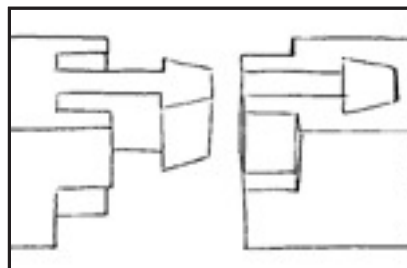
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It’s not a trick
digital wood joints

Gooseneck Mortise and Tenon
Joint with Stub Tenons.



Its model is the Japanese
Mechigi-Koshikake-Kama-Tsugi.



Traditional wood joints radiate magical fascination. Especially when they come from the Far East, from Japan. They are not only an expression of skillful craftsmanship that has been perfected over the course of centuries, but also inherent form-giving elements of traditional furniture and wooden buildings.

However, efficient methods of production as well as increasing use of wood materials and semi-finished products during the last centuries have diminished the importance of traditional wood joints in the craft.

Not nostalgia, but a look to the future should give its stamp to the student project “Japanese wood joints ... digital“. Prof. Jochen Gros, who was in charge of the project together with Friedrich Sulzer, has described this future as “electronic craft“. A craft that is characterised by the use of new technologies in the shape of CAD and CNC-routers.

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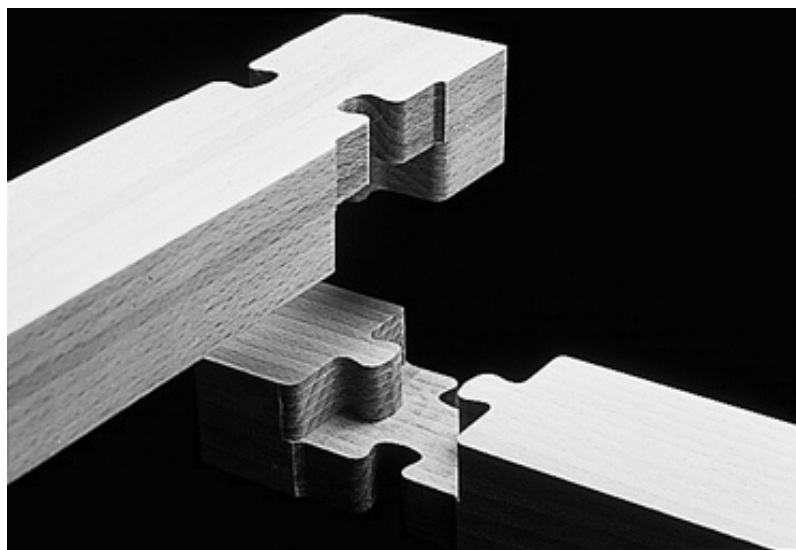
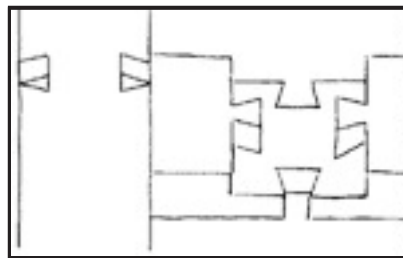
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Model for the CNC-compatible Dovetailed Cross Halving is the Shi-Ho-Ari-Kuni-Te, the Japanese common halving with offset dovetails. The transfer from traditional craft to CNC-compatible

Dovetailed Cross Halving expresses itself in the change from dovetail to CNC dovetail with its rounded corners.

CNC-compatible Dovetailed Cross Halving.

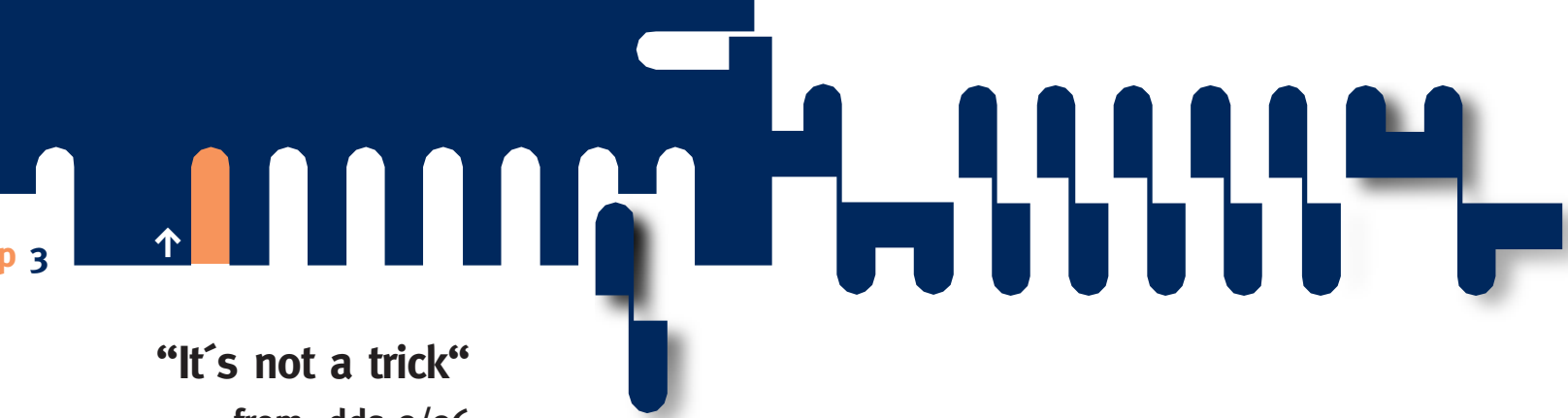
The instructed target of this experimental study project, which was carried out as part of the activities of the C...Lab at the Offenbach Design School,



was to revive the technical and esthetic qualities of traditional wood joints in computer-aided manufacturing. And, quite incidentally, the use of CAD and the college’s own CNC-router should be learnt by way of a concrete project.

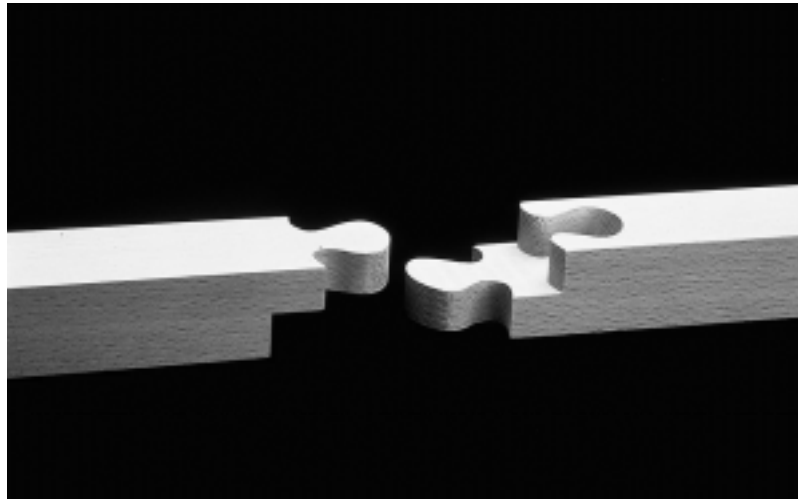
But first came the analysis of traditional Japanese wood joints: the material used, the technical specifications, the manufacturing process - Harald Welzel, a master joiner “on the Japanese path“, was invited to give a demonstration - as well as their uses in furniture and wood construction. Japanese wood joints were also contrasted to comparative European counterparts.

Special attention was given to the way traditional tools were used and the esthetic qualities thus achieved. Over centuries perfected abilities and tradition in the craft find their expression in esthetic harmony and perfection. According to Volker Klag of the project team, “the arising ornamental character of the wood joint is no end in itself, but functionally justified creation of adornment“.

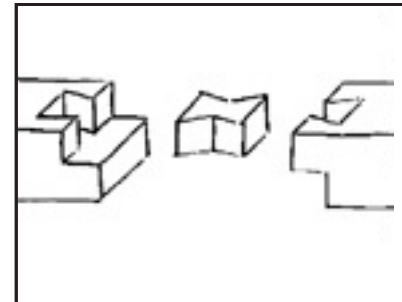
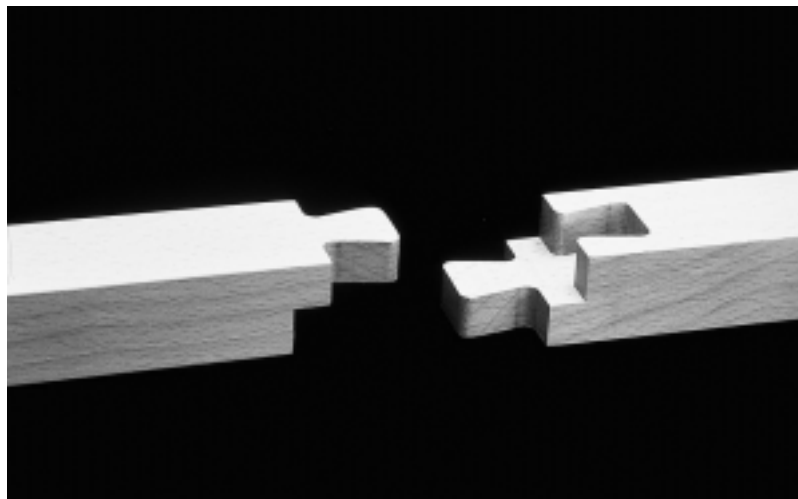


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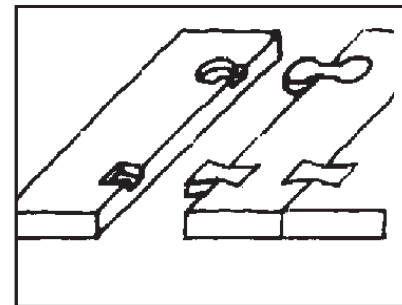
Symmetrical Double Dovetail Joint. Its model is the Ni-Mai-Ari-Tsugi, the double dovetail plain scarf



Double Jigsaw Joint.
Further development of the Symmetrical Dovetail Joint. The contour of the jigsaw tenon is a line drawn on the graphics tablet which is directly and accurately cut into the wood.



Plain scarf with dovetail keys.

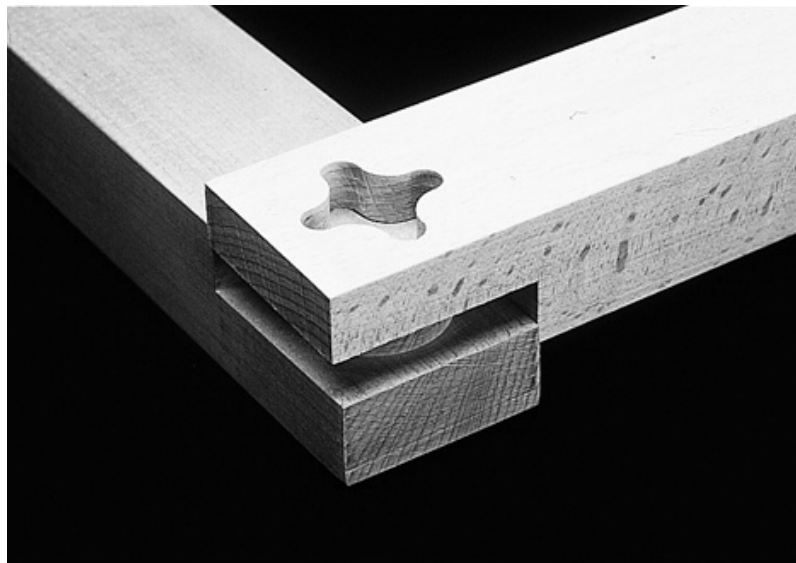
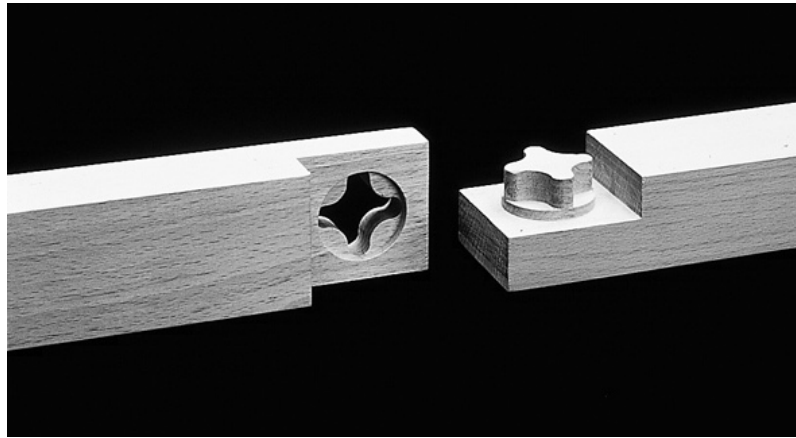


Double dovetails, also called the butterfly joint is used to join boards.

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Open and Hidden Cross Tenon. The cross tenon follows up the idea of creating an interlocking joint that can be used for lengthenings as well as for corner joints. The hidden variant follows the Japanese tradition with its obvious understatement. Only the expert can guess the skill and dexterity of the craftsman hidden in the interior of the joint.



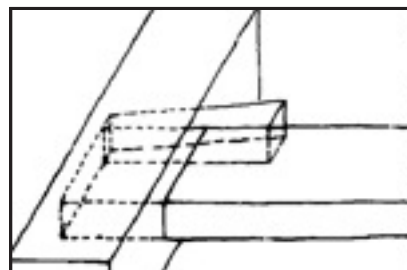
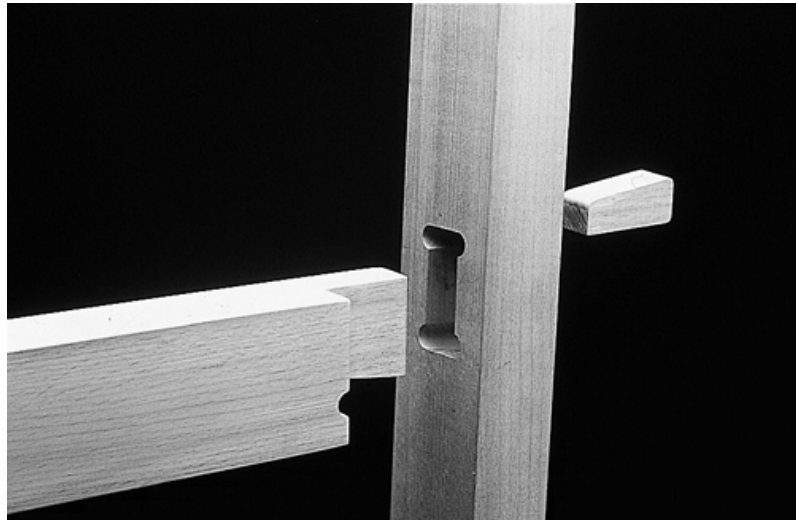
Harald Welzel, “master joiner on the Japanese path“ during his demonstration at the Offenbach Design School

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One-sided CNC Dovetail Tenon. Due to its form and power transmission the wedged dovetail tenon is characterized by a very high stability. The joint is easily taken apart by removing the wedge.

Model for the One-sided CNC Dovetail Tenon was the Japanese “Shitage-kama“.



As a second step, the team needed to become familiar with the digital tools: Marking-gauge, saw and chisel were replaced by CAD as well as the CNC-router; the scribing of the wooden pieces moved to the computer screen and the joiner’s bench was swapped for the router table.

Once acquainted with CAD and the CNC-router, the project team consisting of five students could start programming the wood joints. According to Ren Müller, it was not about “inventing the wood joints anew, but giving the existing a different form of expression“.

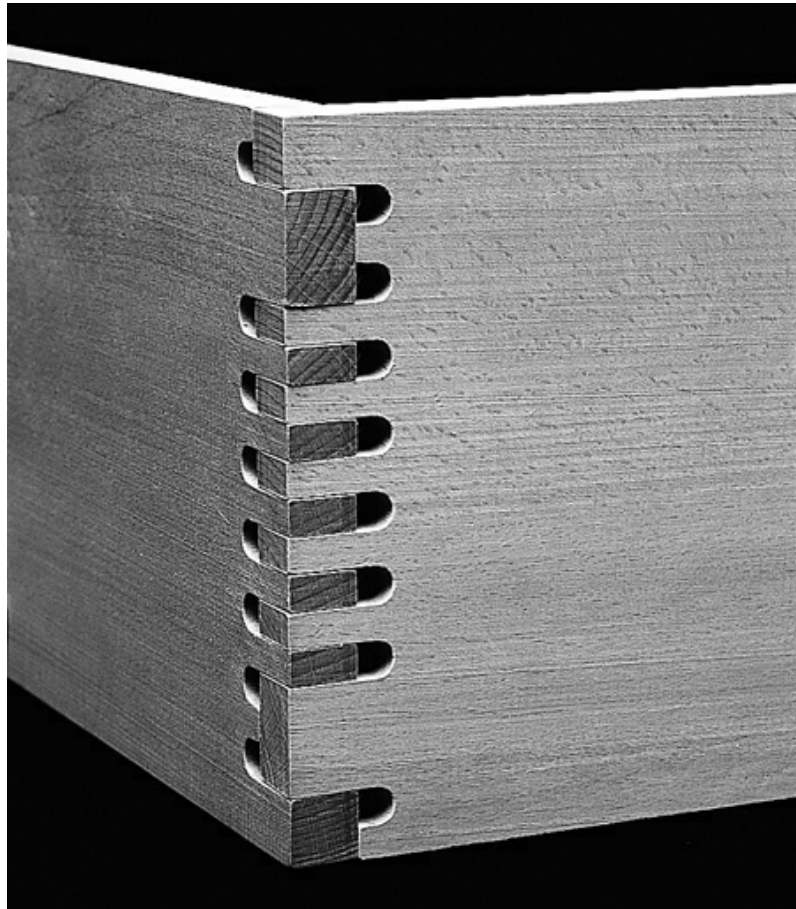


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Fingertip Tenon Joint. The sleek tenons demand for broader corner tenons at the ends which stop the joint from slipping through and thus guarantee a perfect fit.

Thus the Fingertip Tenon Joint is born.

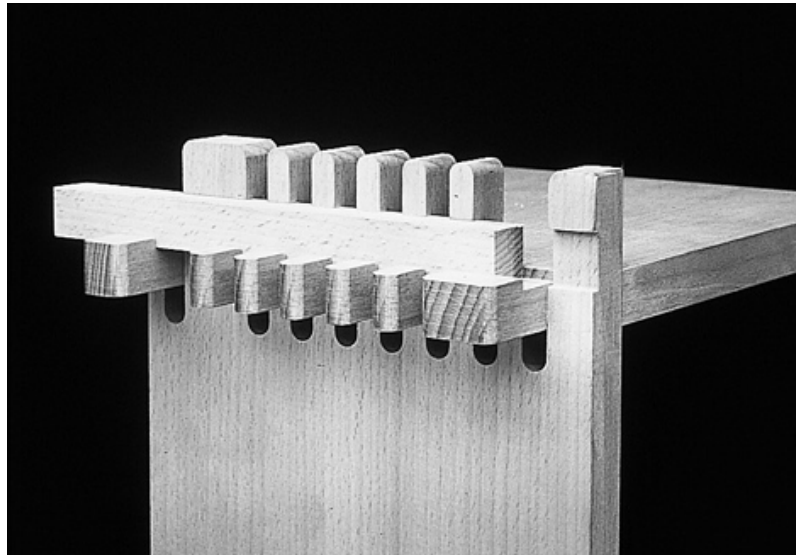


For the first digital trial runs on screen and at the CNC-router we followed closely our traditional models. Still, the results were not simply a direct transformation of the wood joints into the new production technology: Esthetic changes were apparent. These changes were acknowledged by adapting the original names of the wood joints.



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Fingertip Tenon Joint with Key. Once the tenons are intertwined, they are secured by a keyso that they will not come apart. The inspiration for the Fingertip Tenon Joint with Key was a Japanese decorative joint.



The Double Dovetail Scarf, the Japanese “Ryo-men-ari-tsugi“ for example, developed into the Double CNC-Dovetail Scarf with its rounded corners which are so typical for the CNC-router and in a further step into the Double Jigsaw Joint, a double plain scarf which rather reminds of a jigsaw piece and which can not be produced with traditional tools.

The Double Jigsaw Joint as well as the other digital wood joints created in the course of the project do not simply represent the new production technology and the esthetic changes coming along with it. New wood joints which are an expression of their time were created. A time which is able to combine the high tech future visions with qualities and traditions in the craft which have developed over the course of centuries.

Friedrich Sulzer

All illustrations:

C....Lab at the HfG Offenbach

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Illustrations of the Japanese models of the digital wood joints are shown in Wolfram Graubner's “Holzverbindungen” - Gegenüberstellung japanischer und europäischer Lösungen (“wood joints - a comparison of Japanese and European solutions”) published by DVA.



The German importer of Japanese tools, Rudolf Dick has published a video on “Japanese Wood Joints” with 4 interesting work situations.

The video can be ordered at:
Dick GmbH, PO Box 1127,
D - 94523 Metten

