

The Digital Joint: The Evolution of the Craft Through Mediated Material Processes

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The research presents a series of wood joints fabricated using a computationally numerically controlled (CNC) 3-axis mill, and reflects upon the changing nature of wood joinery, and in turn the larger topic of craft as it applies to architecture with the introduction of digital fabrication methods. The CNC mill opens up the exploration of a material's surface in a way impractical if not impossible through analog means. Wood joinery becomes three-dimensional in its forms and surface boundaries. These complex surface effects are due, not to the end mill that is directly comparable to its analog brethren, but to the machine code that interprets and defines surface geometries, and ultimately vectors and speeds that the cutting tool follows through servo motors instead of the human hand. The final effects are the result of a dialogue between the material and the tool. With the use of the CNC mill as tool, material expression becomes not a static quality but a behavior in constant dialogue with the method and tool operating upon it. Because the tool is singular in the preparation of the joint rather than multiple as is the case with analog techniques (table saw, router, band saw, planer, drill press, mortising drill press, etc.) the resultant joint becomes a more direct expression of both the limitations (interior corners, single face material orientation) and opportunities (topographical surface geometries, absolute reproducibility) of the tool. The tool imposes itself on the material reading of the joint in a way industrial means have largely eliminated. These readings recall the deliberateness of hand tools embedded in works such as that of Michelangelo's Captives series or Noguchi's experimental stone sculptures: recordings in raw material of the manner in which they have been worked.

This mediated interpretation of materiality only highlights the highly processed nature of materials that industrial production techniques have determined and perfected for some time now. Manipulations through digital methods provide the opportunity to exploit material readings latent in wood, both as a natural material and industrial product. In this case the medium of plywood is shown to be a product not only structurally efficient, but materially expressive in its layered structure, something the precise control of a digital tool is able to reveal.

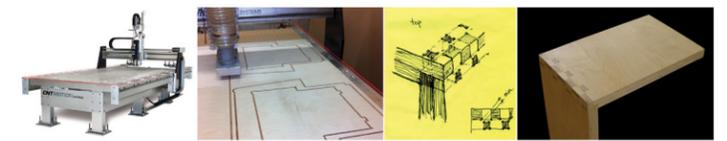
The affinity of digital milling for three-dimensional surface effects aligns with the very concept of the joint in woodcraft: the strength of the joint is directly proportional to the amount of surface area boundary shared by the pieces being joined. The joint's dependency on surface becomes an extension of the larger preoccupation with surface in contemporary digital fabrication, but one that embodies both its function and effect. Furthermore, in contrast to ornament that is decorative or representational, joinery insofar as it may be understood as a form or ornament becomes so through being integral to the fabricated artifact.

THE DIGITAL JOINT: THE EVOLUTION OF CRAFT THROUGH MEDIATED MATERIAL PROCESSES

Advances in digital technology have opened the door to new experiments and interpretations in the process and expression of making things. The research investigates the use of a 3-axis computer numerically controlled (CNC) mill in rethinking wood joinery across scales of making, from furniture to architectural components. The joinery explores the logic of the CNC, with attention to parameters and constraints of operation to propose new possible details and finding new expressions in wood. In comparison to more traditional joinery which relies on an array of analog hand and power tools, certain joinery details become difficult while new opportunities become available due to the precision as well as sequential nature of the CNC milling operations.

Within the scales of architecture, the joint occupies a transitional role: it is the detail that bookends the smaller scale and articulation of material logic, yet makes linkages with furniture and other design disciplines operating at this smaller scale. Wood joinery in particular operates from a different premise than the larger scale of architecture, concerned as it is with the interrelation of form and space: the effectiveness of the wood joint lies largely in the absence of space. In both the design and execution of wood joinery, structural integrity depends on the reconnection and alignment of surfaces in order to transfer forces and minimize stresses.

This critical difference poses separate challenges and opportunities for the role of representation in joinery: how may representational techniques play a role in understanding what is at its heart an opaque construct?



JOINERY STUDIES MATRIX

	GHOSTED	SURFACE + EDGE	EXPLODED AXON	MILLING PATHS	"JELLYFISH" PHOTO	FINAL MILLED JOINT
SINGLE MORTISED FINGER NARROW						
SINGLE MORTISED FINGER WIDE						
SINGLE MORTISED FINGER KEPT						
SINGLE MORTISED FINGER HALF-ROUND						
DOUBLE FLAIED DOVETAIL WIDE						
DOUBLE FLAIED DOVETAIL NARROW						
OPEN FINGER NARROW						

DESIGN MANIFESTATIONS:

