

Strange Tangents

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At a moment in time when designers, architects and makers have an unprecedented selection of high-precision machines, computational tools, and networks of information at their disposal, the term “craft” seems anachronistic and yet still somehow overused. Once synonymous with dexterous coordination between the hand and mind of the maker and grounded in the physical world, the term has been appropriated and misused for any number of pursuits. A reconsideration of “craft” is in order, as it is situated within contemporary design (and making) practices. While much labor has shifted towards digital production, particular relevance is only achieved through physical output. Irreducible to a specific product, “craft” is rather an active engagement moving between thinking and making (digital or otherwise) and emerges through a process of participation.

Consider David Pye’s notion of the “workmanship of risk.” Pye suggests that craftsmanship is closely related to the level of risk at stake for the outcome of work at any time during the making process. For Pye, workmen assumed more risk than designers, and in doing so they were the ones responsible for an object’s final level of craft. In a present setting, this could be said of both designers and makers (especially in small scale practices where the roles are somewhat conflated). The critical point between the two is that a feedback loop exists between the one participating (via thinking/making) and the work itself throughout the process. At any time,

skill, expertise, or even intuition can be inserted into the process to affect the outcome.

However, in contemporary design culture, a paradox exists between the potential freedoms afforded by new tools and technologies and the desire to prioritize fidelity between digital and physical. The stronger this desire for exactitudes or precise control, the less room there is to introduce variables and therefore participate in craft. Precision itself is not the problem—it is the inability or unwillingness to alter its purpose—complacency with prescribed usage. Ironically, the best way to find loopholes in the workflow is first through a mastery of fundamentals. The working methodology of the mainstream digital fabrication regime leaves no room for ambiguities and instead reinforces a closed loop approach where an object is designed, a material output is decided on, and sent to any number of machines for “fabrication,” sometimes preferencing the look or likeness over material integrity.

This approach to digital fabrication yields predictable outcomes and obscures potentials for intervention. Witness the myriads of 3D printed objects being touted as “digital craft,” with designs (or geometries) that don’t necessitate or even leverage the potentials of that medium. Unfortunately the desire to incorporate digital fabrication often appears to be driven by a superficial understanding of its potential(s) and is seem-

ingly only applied as a requisite or token part of a project. In these cases, digitally made does not equate to digitally crafted.

So where does “craft” exist in contemporary practice? The ubiquitous nature and saturate use of digital fabrication is somewhat generic on its own and largely devoid of cultural or individual influence. Craft on the other hand acknowledges place, technology, culture, etc. and therefore cannot be pre-conceived of or indiscriminately deployed. Digital, like traditional craft, exists by virtue of idiosyncrasies introduced or uncertainties allowed into an otherwise straightforward and predictable process. If mainstream digital fabrication is direct and prescribed, digital craft is circuitous and inquisitive. Intervening at any stage in the process (from writing specialized scripts to building custom machines) brings authenticity to the work and undermines the prescribed workflow that leads to predictability. Craft emerges through a continual feedback loop between designing, thinking, and making and requires push-back to exploit the potential limits of a machine, uncover its implicit capabilities, or explore a material process. Such an approach can and often veers projects off on strange but productive tangents.

The following series of project artifacts represent various attributes of digital craft, each one informed through careful considerations of

material, machine, and process. Individually, the projects have a specific focus, usually a peculiar joint or detail, the result of divergent explorations and ambitions. As a set, they begin to describe an attitude towards digital craft that outlines more of an approach that could be leveraged across diverse project types or scales. A selection of aspects of the approach follows.



Figure 1a. OT Stools (see text following page)

1. Of the Machine

Strikes a balance between expert control and an interest in testing of limits of machines, materials, etc. Exploits the capabilities of a given technology; (computation, machine tools, hand tools, robots, etc.) and occasionally demands more of a technology than its “intended” or prescribed use. Details or characteristics which emerge are therefore “of the machine” or “of the process.” (Figures 1a, 1b, 1c, and 1d)

The joinery incorporated in the *OT Stools* (oblique tenon) is perhaps only possible with the capabilities of a five-axis water-jet cutter. The intersection between each leg and the neighboring brace results in an oblique condition which is reconciled with a through-tenon joint. Five-axis cutting allows for an integral shoulder and a flush detail all from one single operation. Furthermore, the pin which ties the joint together (in this case a flat head cap screw) intersects adjacent parts at another oblique angle (limited by the maximum tilt of the water-jet head) and results in an elliptical (or conic-section) countersink—an operation that would be difficult if not impossible with traditional means. While this project references traditional joinery details, it builds on past knowledge by adapting the techniques specifically for contemporary fabrication methods.

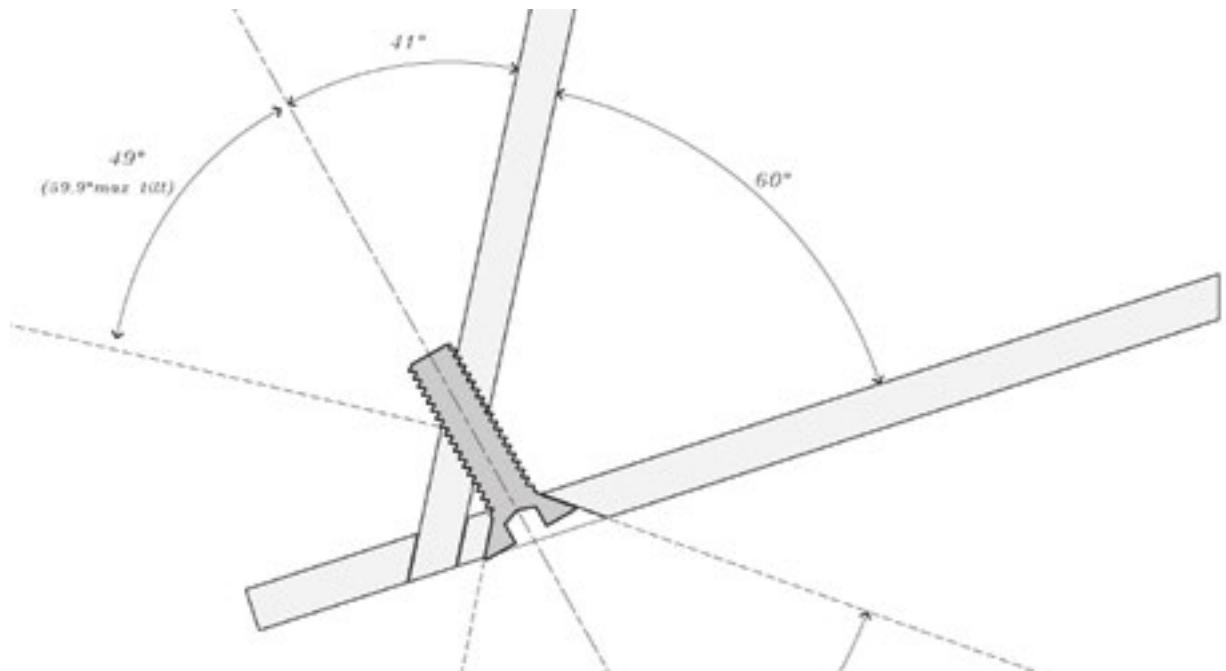


Figure 1b. OT Stools diagram



Figure 1c. OT stool

Designed specifically as an exhibition “object” for The Secret Life of Buildings Symposium (UT Austin, 2016), *Obliqua* builds on the principles of the *OT Stool* and amplifies the inherent qualities of obliquely intersecting components, only made possible with the use of a five-axis water-jet.

2. Hybrid-Craft

Gains added potency and transcends classification when allowed to merge between disciplinary practices and/or cross over technological modes. Re-situating or co-opting traditional craft techniques within a digital context opens up possibilities for novel explorations. Combining unlikely pairings of processes (i.e., 3D printing with traditional joinery) can produce results not attainable by either on their own.

This particular joint was part of a larger design study of parametric joinery types, *reSTOCK*, that looked at the potential efficiencies of combining off-the-shelf stock sections (steel tube, sections, dowels, etc.) with digitally fabricated nodes. A hybrid-craft method of working developed whereby the power of computation was complemented by the freedom and adaptability of analog processes. Computation was used to solve (and ultimately fabricate via 3D printing) complex geometrical intersections (every node was different)—something that would be very difficult to do by “hand.” Correspondingly, the ever-adaptable table saw and custom cutting jigs were used to produce the cruciform notches in the



Figure 1d. OT Stools



Figure 2a. reSTOCK

ends of individually unique wooden struts, a process very difficult to do with any digital method. The result is a balance between analog (the hand) and digital (the machine).

The LINEA studies use the interface, between two parts of a single material as a locus for various expressions of a single line “joint.” Modulations in the line (stitching, zig-zagging, etc.) give assorted functionality to the parts from sliding to “latching” to interlocking. By adding multiple layers, additional fastening options become possible. The LINEA Studies are not meant to be practical solutions to any perceived problem, but rather speculations on the relationship between expression and functionality of the “joint.” Figure 2b purposefully obscures the distinction between what was produced digitally (water-jet or laser-cut) and what was carried out manually (TIG welding and grinding).

3. Digital Lo-Fi

Allows for uncertainties or anomalies as a part of the process. Either inserting code to produce ‘randomness’ in a model or by working with temperamental materials where the outcome might be digitally indeterminate. Forces a reconciliation between expected (digital) and actual (physical) outcomes. (Fig. 3)

A rip cut is a fundamental type of cut in wood parallel to its grain structure. Because The RIP CUT Series incorporates bending and twisting of their wood members (stressing the wood



Figure 2b. LINEA Studies

structure) to give them form, they all share the need for a consistent parallel grain and thus the rip cut was the primary process in producing the components. They also use digitally fabricated “armatures” as a starting point for support. With this pairing, the limitations of the digital model to approximate the “final form become quite apparent as wood being a natural material, has limitations and potential flaws that must be embraced. The outcome has subtle variations or modulations that are digitally indeterminate. These projects aim to strike a balance between the craft and risk of working with such natural materials and the “control” and precision of digital fabrication methods. Technique is equally as important as digital precision.



Figure 3a. RIPCUT Series



Figure 3b. RIPCUT Series

4. Of the Geometry

Develops details and features to be topologically appropriate to a geometry. Digital tooling allows for a wide range of geometric explorations—details, features and interfaces should reflect that diversity. Details that develop “of the geometry” avoid imposing conventional standards and instead opt for their own inventive solutions.

The *GEODE Series* explores joinery and nesting between complex parts. Traditional edge detailing using flanges or rabbets to close and hide the joint prove unsuitable for such geometry. Instead a volumetric approach (more akin to masonry construction) was employed—where difference between complex forms is reconciled through a series of cutting operations, providing near perfect alignment and fit. The “joint” or interface between parts is generated by the geometry itself.

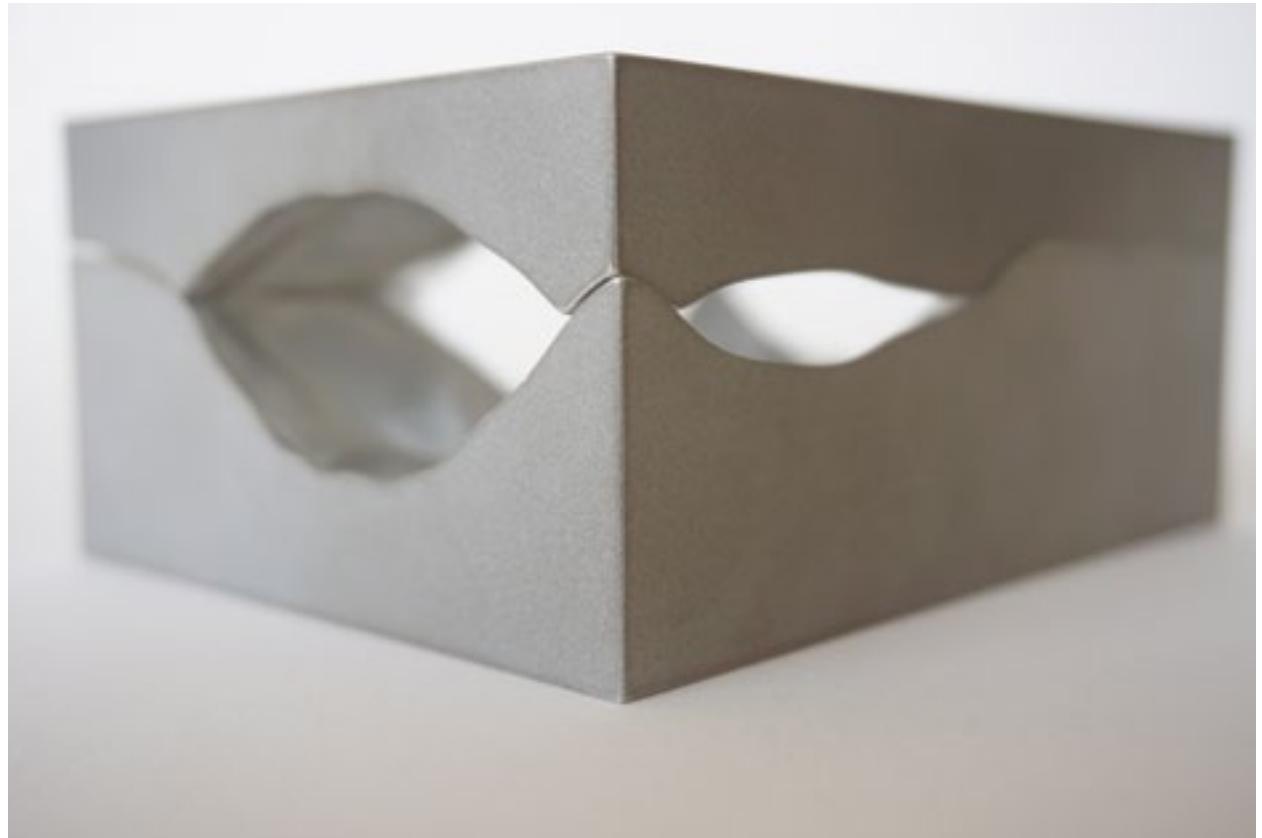


Figure 4a; GEODE Series

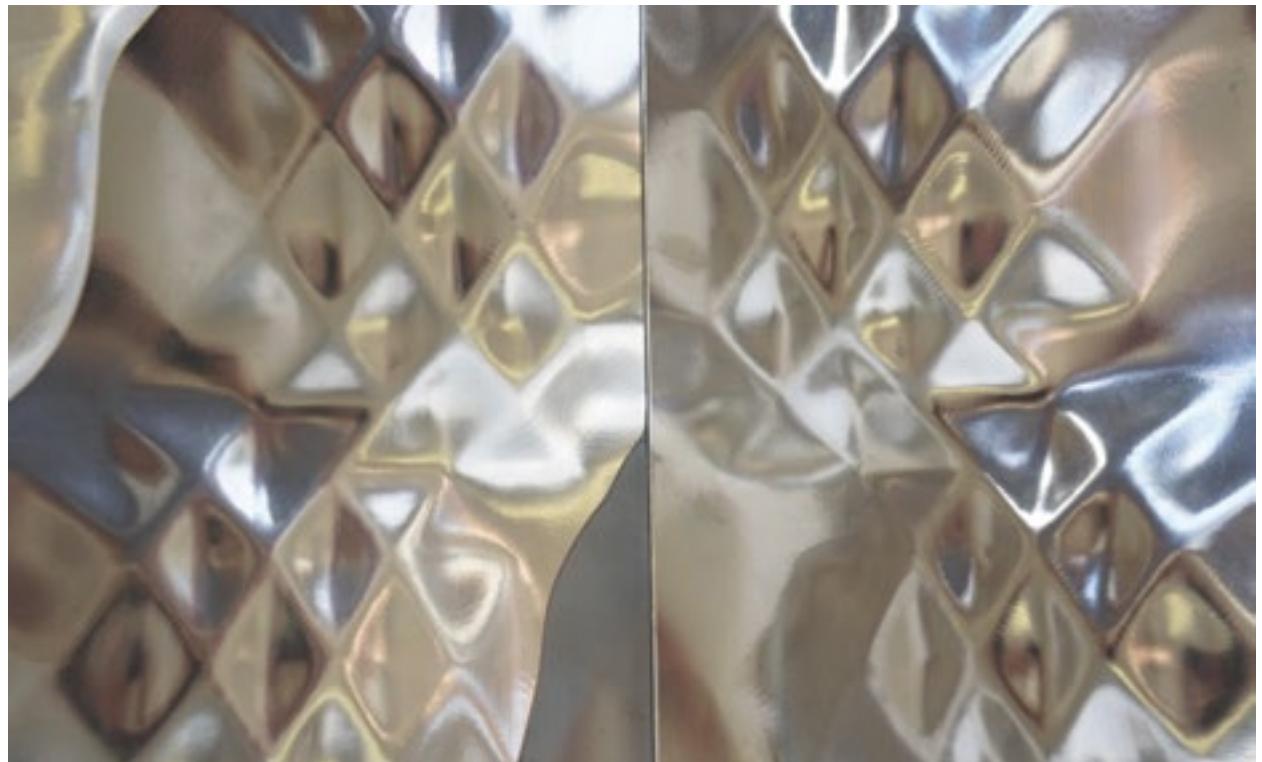


Figure 4b; GEODE Series

5. Of the Material

Reveals intrinsic material properties and leverages them productively. A “bottom up” approach—mining a material to first understand its properties before pre-conceiving a design, begins to hint at details that could emerge as a part of the material process. Working this way yields consistency between parts and whole or overall tectonic. Such work could be considered “of the material.”

Bayou-Luminescence was a collaborative project (with Igor Siddiqui of issstudio) done for the New Orleans DesCours event (2011) exploring material surface, structural volume, and lighting effects in an occupiable installation. While many processes (both digital and analog) shaped this project, one of the more compelling was the integration of connective “loops” and “fringe ties” within the cast urethane membrane panels. Allowing the connection and assembly method to emerge from the material process, not only kept the tectonic more consistent, but also eliminated the need for separate connection pieces.



Figure 5a. Bayou-Luminescence



Figure 5b. Bayou-Luminescence