

1-1-2017

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Recommended Citation

Wenger, Pete (2017) "Material Operations and Craft," *Oz*: Vol. 39. <https://doi.org/10.4148/2378-5853.1562>

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Material Operations and Craft

Pete Wenger, Patkau Architects

Playful Ways

Patkau Architects, over the past few years, has initiated and pursued a series of experimental projects. The results are broadly varied in appearance, but are nonetheless unified by an effort to discover formal and structural identities through playful work with materials. That work was recently collected and published under the title *Material Operations*, identifying the procedural continuity. The projects are procedural in the sense that they are more derived from physical transformations than preconceived notions and, for that reason, seem a fitting subject for the question of craft in design. It is an awkward fit, however, in part because the signification of the word craft is overgrown in contemporary use, but also, because the procedures themselves are hardly the point of *Material Operations*. They are tactics for priming discovery, for finding ideas. Discovery is the point and it is not obvious what that has got to do with craft, unless it is a craft like the HMS Beagle, or the Enterprise. There may be, however, constructive antinomy here, between an approach to the unknown, discovery, and a well-known approach, craft. With that possibility in mind, I will focus on a few selections from *Material Operations* and reflect on the impact that craft has had on the work. We shall see if the work puts any useful pressure on the word or not.

I mentioned playful work just now but, if it weren't such an odd formation, workful play would be closer to the

mark. Playful work is itself an ill-fit pairing that simultaneously violates and expands the meaning of its parts, but it is undoubtedly gaining popularity in the so-called creative economy. So, it may sound common enough but it's worth remembering just how different these ideas are. Across lines of volition, consequence, intent, and knowledge, among others, play and work are as contraposed as could be. It is possible to choose an activity, about which you know nothing, which adds up to nothing, and for no other reason than for the pleasure of doing it. That is one description of play. Work, like it or not, is something else: deliberate, goal oriented, specialized, compensated for. Yet there is a growing sense that you can have it both ways and maybe there is something to it. Perhaps it is not only meaningful but effective to awaken our most vulnerable and curious selves in order to accomplish something of generally recognized material value. However, me, the seductiveness of that duality smacks of a delusional nostalgia, the dream of returning to a less fraught state of being, while smuggling the ruby sweetness of modern fruits back into the Garden. Play-as-work has issues that we are not going to solve here. I bring it up because craft suffers from a similar complex, which I will get to next. For our part, play is an appropriate description because, on the whole, *Material Operations* are pursued for their own sake, like play, play that is full of very careful work.

Craft might be understood as just that, very careful work, but it is

swelling in the popular vocabulary just now and it is no wonder why. Between a cultural thirst for authenticity and a hunger for endlessly differentiated preferences, there seems to be a mutually-reinforcing pair of voids by which the word is being stretched and devoured. Both the hunger and the thirst tend to overinvest it with value. Won't you pay a bit more for *craft this-and-that*? Craft thus becomes, in effect, an adjective, a mark of distinction that means less and less the more it is used. It is tempting to look at it as a passing marketing phenomenon, a fad. But craft is not an adjective, it is a very modest noun.

Craft, n. 1. an art, trade, or occupation requiring a special skill, especially a manual skill.¹

It is worth respecting the fact that the idea of craft is significant to people, whether it stands for an earnestly well-made and useful thing or if it is a mere lure for passing desires. The concern, which is typical for things taken up by the thermals of popularity, is that the symbol rises while the experience that it represents falls. Particularly troubling is the notion that craft is an anachronism, even if a cherished one, because that leaves its true value—mastery, knowing how to do things well—out of what we are doing now and will do in the future. We are, irrevocably, making our world with every action. How well we do that is not a question that is going to pass with fashion and if we allow it to languish in the fiction of

a good, green past, I fear that it dies there. Suffice it to say that craft, in this essay, will be treated as a noun. There are depths to the word that are worth reaching without inflating it to something it isn't.

Work, Play, and Material

Architecture, if it is not too obvious to point out, employs craft at multiple levels, from conceiving to communicating to constructing. These are perhaps most evidently aligned in finished details, which could be thought of as architectural punctuation. Like the comma, and the period, and the intervals of emptiness that demarcate words, details are minor but necessary condensations of intent. They are how volumes, masses, forms, and surfaces are set in discrete and engaging relationships. Like the content of sentences and paragraphs that must be clearly constructed and assembled, it matters very little what the larger architectural identities are meant to be if their joinery is not articulate enough to be translated into the limited language of hands, tools, and machines. That is a language of action, of precise transformation of physical things.

Architectural skill and knowhow is inextricable from material potential, and that potential offers constraints that are available to guide design at any level. The earlier those constraints are integrated, the less risk there is between intent and possibility. Much of an architect's work has material consideration deeply imbedded in the thinking, often at a slight



The Winnipeg Skating Shelters are a thin shell of bendable plywood. Each segment is tailored to the orientation of local curvature. Image: James Dow

remove to keep possibilities open while ideas are being worked out. With *Material Operations*, we avidly break with that approach. We bring material potential all the way to the front of the process and deliberately ignore what we already know about the usual constraints.

We are playing with materials simply because materials are fascinating and there seems to be more to them than is typically employed. Each one comes marked by its making with intrinsic strengths and weaknesses. Sedimentary stone will bear compression yet is easily chipped or shorn. Wood is strongest if stood on end but can withstand some bending as it once did in the wind. Even steel is toughest in alignment with

the dies and rollers of the mill. When prepared as building products, extrinsic features such as proportional dimensions are applied. These respond to and capitalize on intrinsic qualities to optimize the material for specific uses. Working materials have both nature and nurture at play in their character and performance. We engage at that very basic level, looking closely at the relationship between intrinsic and extrinsic aspects to find ways to carefully misuse the material such that its strengths and weaknesses are thrust into expressive opposition.

Beginning

Material Operations began as a single project. *Skating Shelters*, a huddle of shapely wooden huts on the frozen

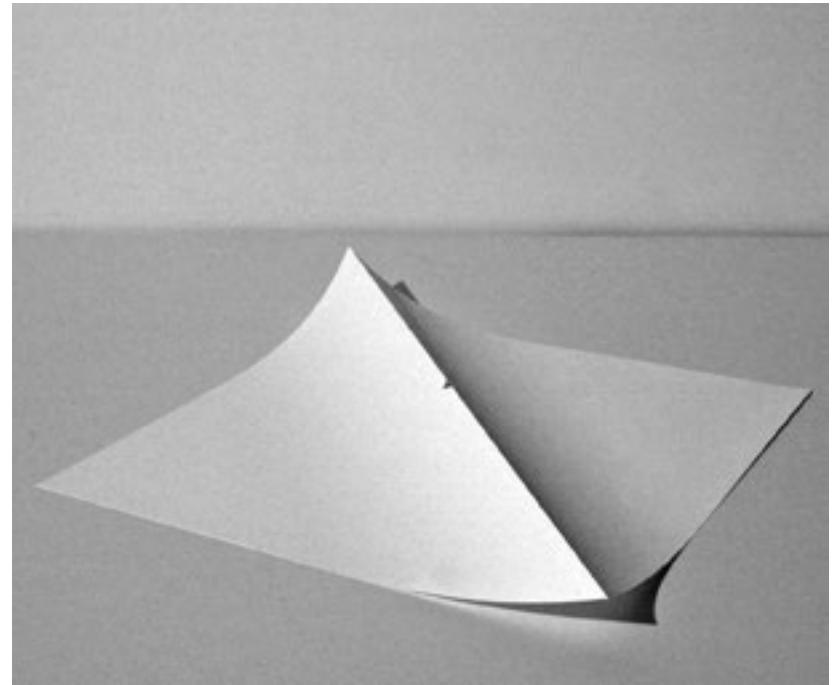
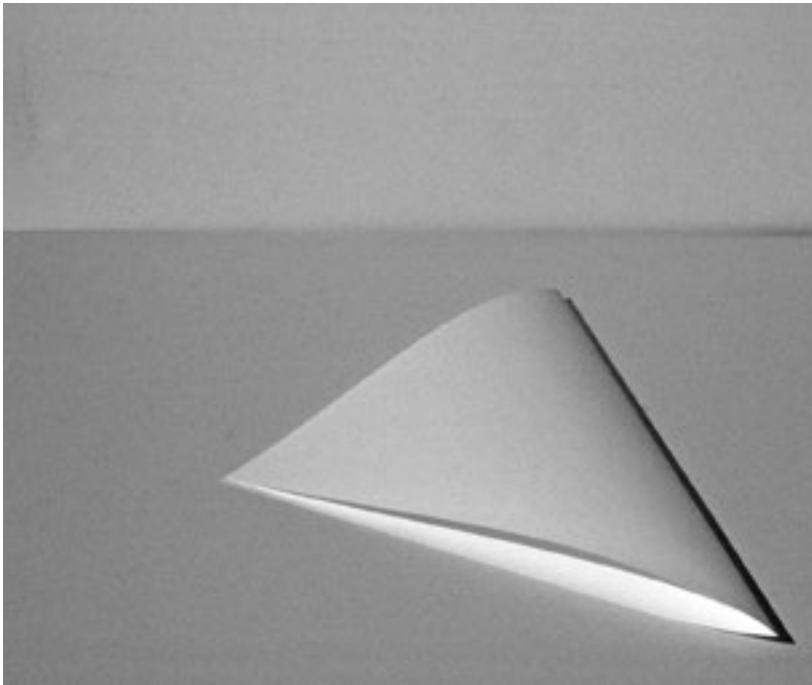
junction of the Red and Assiniboine rivers in Winnipeg, Manitoba set the model for an investigative approach. These delicate temporary shells unify form and structure in a single material, plywood, with their intimate volume inspired by small satchels made of flat sheets. Design proceeded with bending and folding different materials such as paper and wood veneer, each iteration a response to physical limitations until we worked our way up to full scale mock-ups.

Without prefiguring much more than a sense of scale, *Material Operations* begin with a particular material of manageable size. We freely deform it, break it, and bend it, just to see what it might suggest as a possible form. This stage is somewhat arbitrary but

not chaotic and it is exhaustively documented. We are not looking for a shape to represent but a state in which the object becomes provocatively self-structuring. There are only so many things any given piece of material will do, only so far it will bend before it folds or breaks, only so much it can take. The tendency for things to remain unchanged, however, allows for equilibrated conditions to arise. Finding those often means paying very close attention to the minutia of how they fail.

Getting Good Means Getting Lost

There is an embodied understanding that takes hold when you very carefully destroy something, the sort of understanding that is only later intelligible. That *something* you break may



not simply be a thing. It might be the extent of your existing knowledge, or outlook. Breaking that puts you into a troubling space, a risky space where it is hard to know what to do but is nevertheless the place where new knowledge, new skills, and abilities are found.

Craft, n. 2. skill; dexterity.²

As I stated above, the general purpose of *Material Operations* is to discover

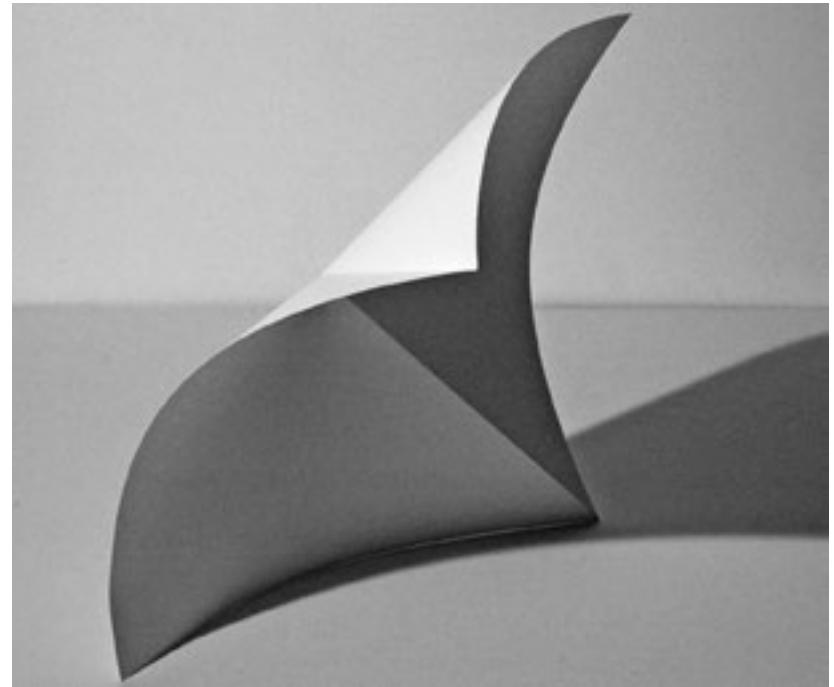
ideas. However, skill and dexterity do not seem all that related to ideas, or thinking for that matter. In fact, thinking often seems the enemy of skillful action. Excellent performers of all sorts, from musicians to machinists, report that the fruit of practice is a state of flow that is apart from and yet vulnerable to thought. It is enough to remember how sometimes our own thoughts lead us to flub and stumble in the most automatic acts, such as speaking and

walking. Just try thinking about each component movement in a single step while taking it. Somehow, we must get thinking out of the way, in order to do some things well. And yet, is there not also skill in thinking and in the enigmatic production of ideas? How does one get thought out of the way of thinking?

Critical thinking, objective, detached, circumspect reflection may be all too rare, but there is a sense in which it,

Top row: Onefold sequence in paper. A single crease is hyper-extended at a break-point. Curvature is the result of surface continuity resolving the countervailing biases of the crease and the break-point. Images: Patkau Architects

Bottom row: Steel does not share the pliant fibrous micro-structure of paper. It, therefore, cannot be broken sequentially. Various devices were contrived in order to perform the operations simultaneously. Images: Patkau Architects



as a practice, is also too careful and insular. Failure—also not something intuitively related to skill and dexterity—is typically regarded with aversion but there is a sense in which it is essential to new perspectives that only seem to crystallize when existing views prove insufficient. In this way, mental and physical training are not dissimilar. It is a matter of how skill and dexterity arise. In failure, actual limits are found as opposed to the imaginary bounds of timid or vain

preconception. It is in failure that the shapes of invisible obstacles are defined, as well as the slender gaps through which they might be skirted. If you are looking for something and you don't know what it is, failure is a place worth visiting. Be warned: enter at your most astute. Keeping one's eyes open when nothing is working is a craft unto itself, a skill for finding something possible but not yet understood. It is less like critical thinking and more like critical action.

Critical action may be something like a charged state of sustained trial-and-error, and that roundly describes our process. *Onefold*, among the earliest *Material Operations*, illustrates this perfectly. It is an experiment in minimalist steel folding inspired by the origamist Paul Jackson. Its curvatures are not quite designed. They are the result of the steel sheet trying to remain as flat as it was on the day of manufacture. The special fold that induces the sheet to spring into a complex vault is

essentially simple and yet there is no standard fabrication technique to do it. We had no means forward but to try it ourselves, repeatedly. To finally execute the fold in a 12-foot by 5-foot sheet required a custom device designed over numerous iterations at increasing scales. Early in those studies it became clear that steel cannot fold quite the way paper does because it is not fibrous. To understand the form and the process, we needed to start at the scale of our hands and resorted to



Onefold, a 5-foot by 12-foot sheet of 18-gauge stainless steel, permanently sprung into a vaulted form. Image: Patkau Architects.

thin plastic film as a physical simulator, to fortunate effect.

Because we are often trying to elicit and directly respond to anomalies—unexpected material behavior—the typical process of architectural representation is short-circuited. Projects may begin with a loose sketch but quickly depart from graphical representation, developing instead through physical models that simulate the forces at work and help us to conceive the form. This has the benefit of broadening our field of perception from the visual to the tactile and the proprioceptive. Curiosity confronts physical facts that disrupt and redirect the query.

Mutually Transformative Power
GNaum, a small pavilion constructed in Vancouver, builds on the findings of *Onefold*. It was my initiation to *Material Operations* and designed

entirely through physical models. From the full-scale execution of *Onefold* we learned both that plastic film is reliably predictive and that sheet steel, held in elastic bending, will retain a robust structure. However, I merely inherited that wisdom and frankly did not fully believe it until I did the work to see the thing stand before me. *GNaum* is composed of four very thin 12-foot by 5-foot stainless steel sheets, the largest we could get. Each is given three ordinary folds. The curvature is induced by forcing the sheets into a position where the bending in one is resisting the bending in the other. All four participate in a single integral shell. At the outset, there was a notion of how it might look and work but the final idea of the form was negotiated with the material.

Negotiating with material is something like a call-and-response. We

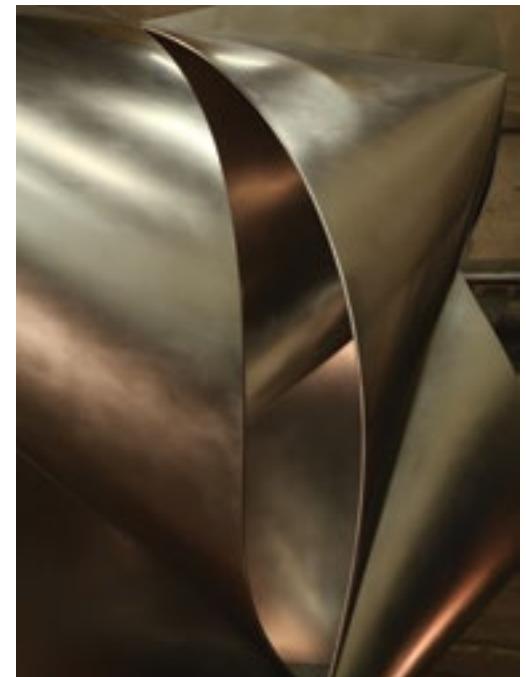
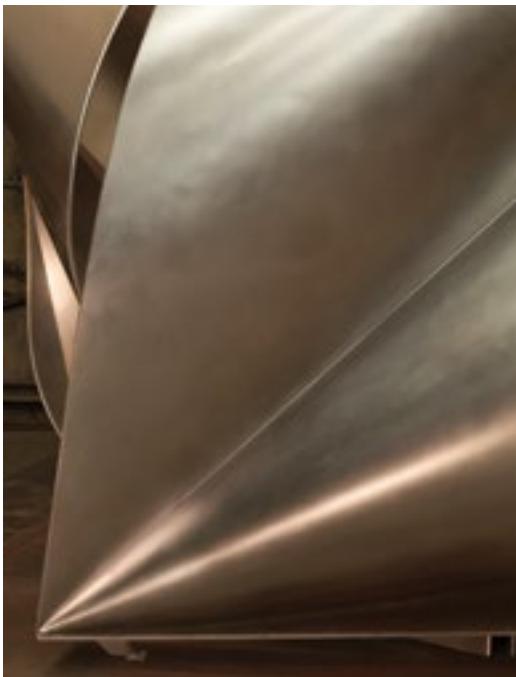
pose challenges to the material and it responds within its given limited range of potential. The idea transforms in accordance with that exchange. I often feel, when working out possible ideas with my hands, that I am not touching so much as listening. That is, I am experiencing less of a probing, expressive, searching sense and more of an open and receptive sense impression. This is strongest when I am unsure of what I am doing. In truth, it seems that I must be unsure to find the more remarkable solutions. It can be exceedingly fun and rewarding but getting there can be unpleasantly confounding, like losing the light in an unfamiliar place. The critical information you need to move forward while groping around may be very subtle. The hand needs to be accustomed to reception, not just tapping, scrolling, and clicking. That is not a dig at digital know-how, but an illustration of the difference

between hands that are primed to sense something new and hands so locked in patterns of output that they recede from attention until they are sore.

Hands are just an example, a model you might say, of a whole person. There is no reason to relegate a conversation about craft to the manual, though it must belong to effectiveness. What I become most curious about is not the skills themselves but the way the skills emerge and the sense that acquiring skill is itself a skill to be learned. I am fascinated by the way something unnamed emerges from an ambiguous place and how attention brings it forward in such a way that it might be known. This is, perhaps, a description of what it is like to discover, what it is like to draw something out of the possible and into the actual. As it turns out, this power to make something real is



GNaum complete in the metal shop. The integral structure was built, transported and installed as a single piece. Image: James Dow



GNaum details. Images: James Dow

at the very root of craft. The historical definition of the word is exactly that: *power*.

No doubt power is a thorny word, far more tangled than craft in the contemporary context. However, if you also investigate that word's origins, you'll find roots like potency and potential. These are words that speak of engagement with a fertile unknown, the future. What is *your* potential? You were likely told as a child to reach for it, but what is it? It is a strange idea. Potential is something that may be, but is not yet. It is definitively

unknown, so how do you aim for it? Maybe the first step is to accept that it is not inside of what you already know and to go looking elsewhere. What if this is craft at its root: the making of one's own self? Perhaps craft is more than just a handy set of well-oiled procedures. Perhaps it is the willingness to risk uncertainty and make things happen. Perhaps it is the practice of conditioning yourself to this very confrontation, to pay attention to transformation as it occurs. The power to make, in this instance, is as far from domination as you could get. It is more like dance. It is attend-

ing to what is happening, and moving deliberately in response to something that is changing just beyond the edge of predictability and taking an active part in that transformation. We have returned to that *something*. It may be yourself, your community, your environment, or just some piece of material. It might be all those things at once. This admittedly explodes the meaning of craft to an exceptionally wide horizon, but it rests on a single principle, that attention to the edges of understanding is the foundational tool in the ability to make something new.

Mastery and Discovery

Our most recent operation, on which I will touch only briefly, is as close to a dance with material as we have so far come. *Cut/Drawn* is a relatively simple sculptural process that yields very complex forms. It is all in the name. We cut plates of steel with specific patterns and draw them out in tension—several tons of tension. Again, we began with thin plastic simulations but quickly reached the limit of their fidelity. We are no longer sustaining elastic deformation but driving steel to permanent plastic deformation, in other words, fail-



GNaum is a small pavilion that frames views of the Vancouver North Shore. It is composed of four 5-foot by 12-foot, 18-gauge stainless steel sheets. Each sheet is folded three times. The curvature is caused by the spring-like elasticity of the steel sheets. Image: Patkau Architects

ure. Like the proverbial chain, steel tends to yield at its weakest point. *Cut/Drawn* allows the steel to give in to a pervasive transformation that is more like an ecstatic sigh than a collapse, like a time-lapsed video of a flower blooming. The idea emerged from a provocative question and a spark of material intuition that grew out of the preceding work. It was spontaneous but has taken well over a year of methodical work to mature.

Material Operations bring materials and making into the center of ideation. The need to express an idea clearly, therefore, demands careful attention to the process and production. So far, my take on craft has been intentionally biased toward spontaneous discovery and implicitly bound to an idea about attention. I've tried to sketch out an interpretation of attention as something dynamic and receptive that notices change and differences, as opposed to the more conventional notion of an imperturbable stream. Obviously, there is another, more steadfast side to all of this. It is not advantageous to be drawn away by every novelty that stirs your senses. Without sustained focus, nothing gets done and an overly diffuse field of interest, compared to a dedicated trajectory, covers little ground. The development of skill and knowhow cannot be a constant wandering in the dark and it takes relentless practice to achieve mastery. Mastery, masterful work, secured ability is probably what most people think of when they think of craft or craftsmanship. For me, the idea of craft is most interesting with the tension between mastery and discovery included. I think getting good is just as interesting as being good.

In an ever more rapidly evolving world, what is more useful, to learn a skill or to learn the skill of learning skills? Craft, or craftsmanship in this context, appears to me as a sensitivity to transformation and the ability to

act deliberately without certainty. To use it, you must cultivate attention because attention is how you reach out from your fragile little boat of assumptions to touch what is actually happening. With what you find, you gradually build for yourself a sturdier vessel. If only our models of education were so bent toward learning how to learn instead of conformity and regurgitation. There isn't an aspect of life that couldn't be improved this way, although it is worth remembering that attention isn't free. There's a reason that we say: *pay attention*. It is difficult and exhausting to do, but it is not a payment into nothing, it's an investment of care that others can draw upon and return. With any luck, our work, our play, will stir your work and your play. In that, something of value will have been crafted.

Notes

1. "craft." *Dictionary.com Unabridged*. Random House, Inc. Retrieved 5 April 2017. <http://www.dictionary.com/browse/craft>.
2. "craft." *Dictionary.com Unabridged*. Random House, Inc. Retrieved 5 April 2017. <http://www.dictionary.com/browse/craft>.



Cut/Drawn Number One, of a four-piece series, 1/4-inch hot-rolled plate steel, blackened. 36 inches by 36 inches by 86 inches. Image: James Dow