Cameron Alexander, project manager at Harvey Builders; Joe Meppelink and Andrew Vrana, principals at the architecture firm Metalab; and Keith Jennings, CEO of Crow Corporation, a metal fabrication company, answer questions from guest editor José Solís and editor Raj Mankad.

Cite: What are the biggest changes in fabrication over the past five years?

Joe Meppelink: Our profession, the construction industry, lags tremendously. I don’t know if we want to put that in Cite. Digital fabrication and CNC production have been around since the 60s and 70s. People are just starting to dabble in two-D cutting, putting shapes on buildings.

Keith Jennings: Years ago, I did see some ways to apply what we do for our traditional clients—heavy industry, heavy equipments, oil and gas, drilling, hardware, components, boxes, enclosures, and various types of fabricator-stamped metal products—for other industries, including construction. I was curious.

Andrew Vrana: It also takes curiosity on the part of the designer to go out and mine this great city for all the capabilities that are out there. At Crow, they laser cut pipe so when explosives are set off in underground wells the distribution of force is released in a certain way into the core that causes tectonic things to happen. Well, these pipes are aesthetically beautiful things. We can use this machine they have and put it in the hands of artists to inform the perforation of pipes that change the way water flows in a fountain.

Cite: How can the obstacles to more innovative collaborations with fabricators be overcome?

Vrana: Building Information Modeling (BIM) has become pervasive in architectural practice. The BIM model is a double-edged sword. Architects are now required to do more work for the same fees, creating a digital document that can be handed off to building owners, contractors, and subcontractors.

Increasingly we are using an open source parametric software that allows us to model anything, be it a building or a product design. The digital model is communicating with architects, contractors, fabricators, engineers, permitting agencies, and clients simultaneously.

Cameron Alexander: We have a depart-
ment that we recently opened up within our company where, for instance, we take the model from the architect and then we make structural modifications—clearance zones for perimeter air diffusers—as well as pass that along to the subcontractors for their modeling purposes so they know to stay out of those zones. The upfront costs savings are huge just in time and fabrication. The Exxon Mobils and the Chevrons, the Hines and the Trammel Crows, and the GSA (US General Services Administration) are requiring BIM.

Meppelink: All of what you just mentioned are good things—the potential for that intelligent software to make buildings more efficient from inception all the way to completion—but the design profession is in essence throwing up its hands and saying we don’t detail anymore. That’s a loss. The greatest potential for the software is for all professions across the board to work better together and for architects to intervene in key moments aesthetically, spatially, and in wrong. Everything should come manufactured to a job site and fit perfectly. Part of the way they are able to leverage themselves into that ultimate fabrication and construction process is they become part owners. They take a stake in a building.

Cite: It is hard for an ordinary person to get excited about BIM and digital fabrication if the only goal is cost savings. Is this about more than doing office buildings for less money? What else is at stake?

Meppelink: Go to any job site. Look at the waste. At a residential job site, the waste factor is ten to twenty percent. Look at a commercial job site with a waste factor of five to ten percent. Then go to Keith’s shop. There’s no waste. There’s tiny little trash buckets there that get thrown out. He’s got a dumpster as big as a Westheimer coffee shop like Brasil here. Every scrap of metal that comes off of a lathe, every piece that is dropped off of his laser, every cut off that comes off a stamping machine goes right into a recycling bin.

We are in an industry that thinks waste is okay. We’re piling up building debris in our landfills, both when we make them and when we tear them down 20 years later.

If you combine residential and commercial construction, that’s approaching half of our gross domestic product in this country. You couple that with the realization that just as that is half of our GDP it is also half of our energy consumption. Half of all the energy consumed in this country is consumed by buildings. Forty percent of our energy is just consumed in the operation of buildings. If you consider embedded energy, we are up to 50 percent of all energy consumed in this country. You thought it was factories and vehicles. It’s not. It’s buildings. When you have a construction industry that big and that is as inefficient as it is, with the technology we now have, the sky is the limit. We are very well positioned in Houston to take that on.

Vrana: At some point, beauty and efficiency converge over repetitive variation. The way in which it doesn’t cost anymore to do things with subtle variation than it did with picking a standard part and adapting that. A machine can cut something and it is agnostic as whether it is a curve or straight line or punched or stamped or cut through.

Jennings: And let’s face it, you are keeping people employed. You are giving them new things to do, new markets, new products to make, creating a whole new field or demand for things.

We have a wealth of opportunity for people whether they are college graduates or not. It is more restrictive elsewhere, not the same type of entrepreneurial attitude. I know a lot of people who are good at what they do so they go get a loan, get some equipment, some office space or a building. They go into business. Several years later they are busy, covered up with work. It is inspiring to know you can do that.

Cite: Richard Florida writes about which cities are poised to lead the country. Houston ranks relatively low as an environment that attracts the young hip “Creative Class.” Are you saying that there is a different kind of creative class that does well in Houston?

Jennings: That’s true.

Meppelink: When you think about the growth of our economy and what’s gotten us into the mess we are in, it is too much leveraging of the Creative Class and not enough terms of sustainable technology. If you let the subcontractors do everything, they do the way they have always done it. You don’t have progressive innovation in the built environment.

What needs to happen is an early and up-front conversation between the subcontractor, the architect, design team, and structural engineer. We can begin to realize that maybe the most efficient way to build a building isn’t to have everything of regular size and regular proportions. We may get very efficient use of steel if we have variation across a building.

Alexander: That’s right.

Meppelink: We got a procurement system that is as odd with this way of working. The drawings come out. You guys bid it to your subs.

Alexander: That’s right.

Meppelink: The lowest bidder gets the job. You can’t have that communication early on because the architect doesn’t know the subcontractor from Adam.

Shop Architects is a shining example of what we propose. Gregg Pasquarelli gave a great lecture a few years ago, an RDA lecture at the MFAH. The way he described their job site is that if you see a tape measure or hear a saw, that means something is doing. Our GDP in this country is ten percent durable goods output. You look at Germany, their GDP is 50 percent durable goods. Look who is leading Europe out of the recession—Germany. Because they make things. They are also great inventors and a culturally advanced country, but they absolutely have got one foot on the ground when it comes to making things. This country I would argue has lost its way in that we are over-leveraged.

We are all about making deals and we outsource the making of things ultimately to our detriment.

I came here for grad school at Rice and I fully intended to move to New York. I never could have started my company in New York. The fact is I started a company here in Houston while I was a grad student. I didn’t have any money. We just started getting work, it snowballed, and here we are.

I like our chances down here to really make an impact. We’ve got the largest manufacturing workforce in North America. We have an environment that is not overly hampered by union restrictions. We have ample space. We have an economy that is rooted in energy, shipping, aerospace, and medicine. You have all these small businesses, 100 people or less, that serve these major industries in Houston. Like Keith said, there’s an attitude here in Texas. They’re open, they’re interested, they want to try something new.