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Let's Fix US Manufacturing Competitiveness

Have we read enough, talked enough, circled, and delayed the issue enough to finally do something about the decline in US manufacturing? Are we afraid enough yet, after each quarterly government trade report, to undertake what is obvious as far as engineering goes? We have the technical know-how in US manufacturing to take away the offshoring advantage of cheap labor. We can design high labor costs out of most products and have elegant assemblies ripple profitably down US manufacturing lines—for export and domestic consumption.

How? First we have to reassign the product costs traditionally and mistakenly placed on manufacturing departments, and put them where they really belong: with the designers. Let's face the facts: Total costs are designed into products at the very start and stay there, give or take the 10–15% reductions that manufacturing engineers generate with lean programs or newer workcells. It's time to help designers understand service and warranty, production throughput, labor, material, rework, and general overhead costs—and to structure that understanding into their work.

This nation has already beaten up its "valued" supply chain. There are no more easy costs to take out in that effort. Other popular ideas provide mainly incremental advantages isolated to silos. The truth is that the big, magical dollars are "upfront." Let's move past the 25-year-old campaign aimed at fixing the over-the-wall syndrome, and set a contemporary strategy. It's a business strategy of truly integrated design and manufacturing, with upper management providing

goals and useful, tactical accounting. This next step is everyone's responsibility, even if it manifests largely in design departments guided by management.

Here's the core problem: most manufacturers have a VP of product development and a VP of manufacturing. Organizations have drawn these lines and, with them, the lines of cost accountability. The design community is responsible for product function; the manufacturing community is responsible for how a function translates into product cost. But the costs are already baked-in for the manufacturing folks with this organizational model.

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The design community has the power and responsibility to include end-cost as an element of functionality in the same way that they control part geometry, or which gear meshes with another when a lever clicks them into place. Cost is determined in design and cascades throughout the organization. It's almost a mechanical, causal science, really, so let's pull the lever and change the direction we are headed as a manufacturing nation.

I suspect that the managers who send their teams out to flog domestic suppliers are the same ones who eventually go overseas looking to cut costs that are already locked into the design. As cost managers, they don't understand the added shipping and logistics, lost quality, and risk-management expenses that offset cheap labor. But they have no other strategy for survival. The designer, in turn, didn't understand the financial impact

for manufacturing of a tight radius or fillet, or that warranty cost is design robustness, expressed as successful product function measured over time. And manufacturing, correspondingly, couldn't influence designers before the next design cycle or quantify for them how features influence throughput and cost.

We committed to a program five years ago that has lean manufacturing and DFMA at its core. It's a solution that is universal across all mechanical products and at any volume. At the highest level, we picked profit per square foot of factory floor space as the most absolute metric for both engineering and management to follow. Next were part count and labor time. Then we went to work simplifying and measuring, and we watched the correlations build.

Redesigning just half our product line, we have seen a 600% increase in profit per square foot. Our entire product line is made in New Hampshire, and about 60% of our output is shipped to other countries. Now, after five years, we have most of the world market and costs to our customers are essentially flat, making entry into the market difficult for competitors. We have win-win supplier relationships, and all our associates have profit sharing and stock ownership. Are we an exception to some law of nature that says the US can't make innovative, efficient products? I don't think so. You shouldn't either.

In a nutshell: Design out the parts and labor, as this has an effect on everything worth caring about; get manufacturing and management to track critical downstream costs for designers; and work with your best suppliers to identify features that create cost.