

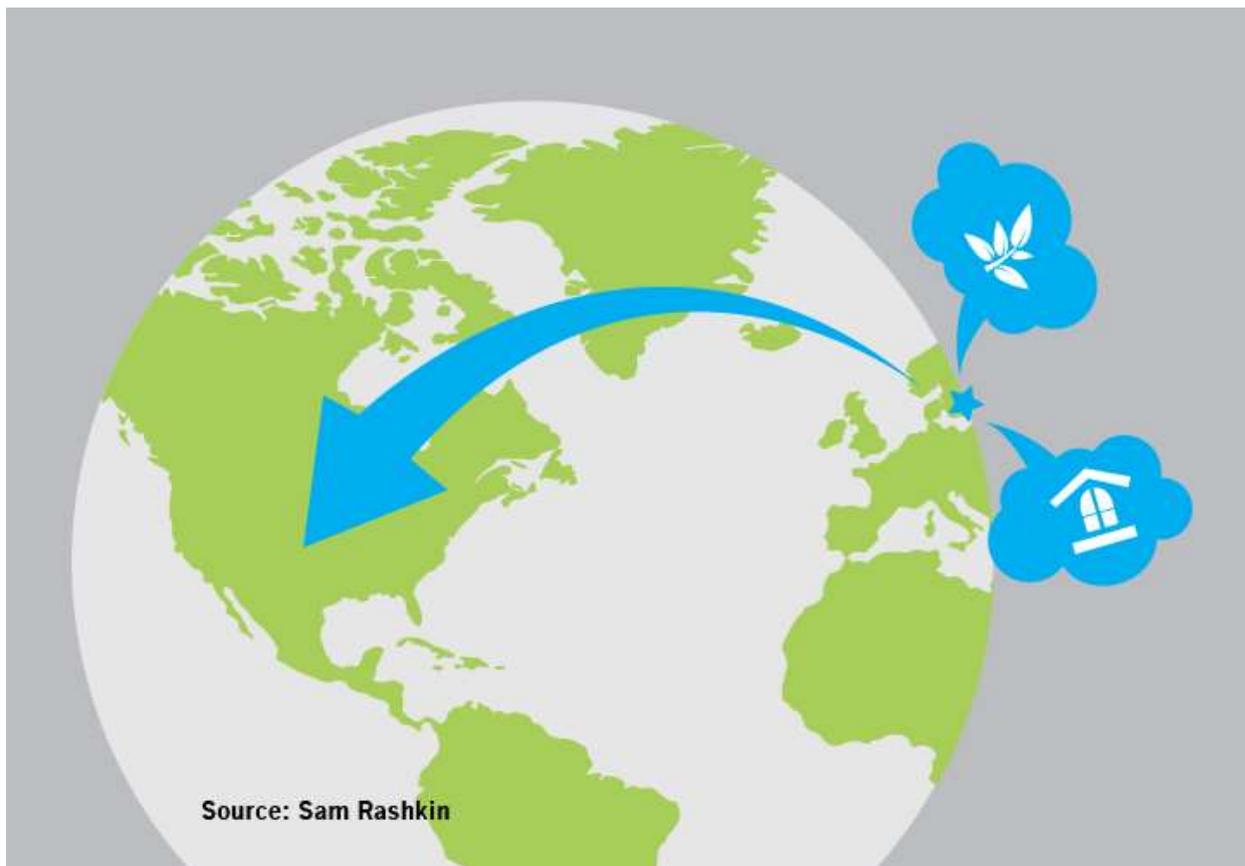
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## The Innovators

**It's time for builders to change platforms:**

### **Part 3 – off-site component fabrication**

Sam Rashkin – Founder, **Retooling the U.S. Housing Industry**



For those new to this series, I'm examining the business case for a variety of advanced technologies sitting on the shelf that have the opportunity to break a virtual 150+-year gap in significant home framing innovation (see [Time to Change Platforms](#)). This article looks at a second alternative to conventional framing, off-site component fabrication. In Europe, Scandanavia, and Asia, off-site home fabrication is much more common than in the U.S., particularly in Sweden and Denmark where it can account for 90 percent of more of new home construction. And

that's because their homebuyers wouldn't accept the inferior quality, materials, and technologies associated with field construction.

In this country, it's just the opposite. Factory-made homes including manufactured homes and modular homes are commonly considered inferior quality housing. Panelized construction is increasingly being used, particularly by large production builders, but just as a simple change out for basic field framing. As a result of so little innovation, it's not surprising that there is almost 300 percent lower labor productivity for housing compared to all other industries in the U.S. (see Figure 1 below).

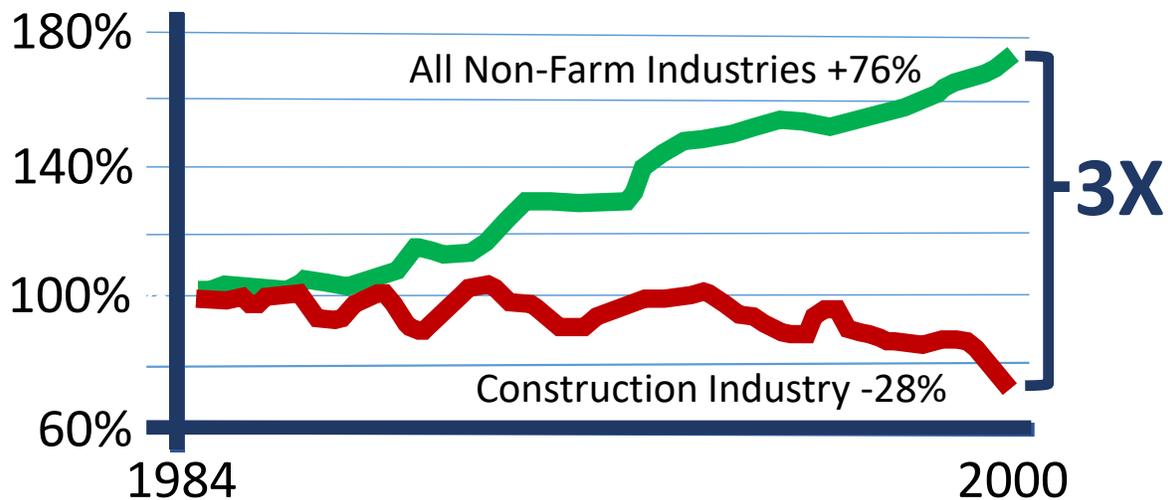


Figure 1: Labor Productivity Index (source: U.S. Bureau of Labor Statistics, U.S. Dept. of Commerce)

The factory built home technology I'd like to discuss in this column produces fully finished enclosure panels including framing, interior finish, exterior control layers, and cladding. In addition, modular cores produced for kitchens, bathrooms, laundry rooms, and mechanical rooms would eliminate the most complicated and risky part of field construction and allow for higher grade finishes with superior fit and trim. Consider these advantages for this type of factory-built homes:

- **Superior Construction:**
  - ❖ Much faster construction time
  - ❖ Less tools for assembly
  - ❖ Substantially reduced enclosure subcontractor work (e.g., framing, insulation, air sealing, window and door installation, siding, interior dry finishes, and significant amount of HVAC work with mechanical core)
  - ❖ Substantially reduced finish trades for the most complicated rooms in the home (wet rooms)
  - ❖ Superior moisture-managed assemblies (with basic attention to proven details)
  - ❖ Substantially less waste
  - ❖ Superior quality fit, finish, and trim
- **Superior Performance:**
  - ❖ Superior strength
  - ❖ Superior wind resistance
  - ❖ Superior quiet
  - ❖ Superior dimensional accuracy that makes everything else easier to install

- ❖ Superior energy performance with minimal thermal bridging, inherently quality controlled insulation (e.g., gaps, voids, compression, shrinkage control, settling control), and inherently airtight assembly
- **Superior Unvented Attics** (where insulated panels are used for roofs):
  - ❖ Hard cost savings for soffit and ridge vents
  - ❖ Fire-rated assembly difficult to achieve with other unvented attic insulation options
  - ❖ Elimination of all thermal bypass details requirements:
    - Wind baffles
    - Air sealing where drywall meets top plate at all walls adjoining attic
    - Insulated and sealed attic hatches and knee-wall doors
    - Sealed air barrier at raised and dropped ceilings
    - Sealed air barrier at attic knee walls
    - Sealed penetrations (e.g., lighting fixtures, piping)
    - Flashed and sealed shafts (e.g., ducts, flue, piping)
    - Air sealing at all HVAC register boots
    - ICAT recessed light fixtures
  - ❖ Free storage or additional living space in conditioned attic
  - ❖ Adaptability to much lower cost shallow frost-protected footings rather than basements in cold climates since basement no longer needed for storage and HVAC system
  - ❖ Savings from forgoing split HVAC in two-story homes since second floor no longer adjoins egregious hot temperatures in summer

Oh this month's column is so easy. I just had to repeat and tweak the impressive list of advantages from last month's column on structural insulated panels. Which begs the question, when will the housing industry seriously consider these advanced technology enclosures including all cost debits and credits? Maybe the most important advantage to this technology is the substantial relief from what is so often cited as the biggest challenge for home builders: finding reliable, skilled, and affordable trade partners.

As a special example of advanced factory built home technology, I will highlight an incredibly innovative company, Unity Homes founded by Tedd Benson currently out of Walpole, New Hampshire, but with plans to expand across the country. Tedd and his associates have invested a significant amount of time and resources to engineer a superior home that just happens to be made in a plant. This includes extensive trips visiting housing plants in those foreign countries mentioned earlier, researching critical best practices, and identifying important lessons-learned applicable to the U.S. market. He has invested in a special team of experts on factory production and Building Information Modeling (BIM) including hiring staff from overseas. In the end, Unity Homes has developed a production operation that exploits all BIM has to offer and fully integrated it with automated production (see Figures 2 thru 6 below).

As Tedd likes to say, Unity Home builds every home twice; virtually on the computer including every stick, nail, screw, piece of hardware, wire, and pipe, and then the second time in the field. This helps eliminate an extensive array of quality problems common to normal field construction. The production process also fully integrates how the product will be shipped managing sequencing and loading onto trailers that enable the optimum shipping and field assembly. Tedd invests the substantial cost savings building in a plant into much higher quality construction, finishes, and details. In particular, Unity homes are ultra high-performance homes including levels of energy efficiency, health protection, and durability that lead the industry. And Unity Homes is just getting started. You

only have to listen to Tedd speak about his new company to understand the opportunity for his passion and vision to take housing to the next level.

As I continue to say in these articles, I am not associated with or financially linked to any product, technology, or manufacturer. I'm simply a long-time industry observer asking hard questions why so many compelling new technology solutions are so slow to be embraced when they offer so many solutions and benefits to the housing industry. Clearly Unity needs to achieve scale to realize optimum cost of production benefits. But from where I sit, this is another important opportunity for a long overdue framing platform change.



Figure 2: Unity Homes Production Facility.



Figure 3: Unity Homes wall panel production



Figure 4: Unity Homes panels sequenced and loaded for shipping



Figure 5: Unity Homes field assembly



Figure 6: Unity Homes finished product

*This article is part of a series on housing innovation based on the author's book, **'Retooling the U.S. Housing Industry: How It Got Here, Why It's Broken, and How to Fix It.'** This book examines opportunities to transform the homebuyer experience relative to five key components: 1) Sustainable Development, 2) Good Design, 3) High-Performance, 4) Quality Construction, and 5) Effective Sales. Each article features one innovation or business principle covered in workshops with builder executives. Find out how to participate in one of these workshops at [www.SamRashkin.com](http://www.SamRashkin.com).*

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