

Lean Design: *The \$10K Solution.* A TrueNorth Whitepaper

Abstract

Lean process and methods have slowly gaining a foothold in the building industry, producing dramatic reductions in cost and schedule, but many obstacles remain. Among the barriers is the “fluid factory” nature of homebuilding whereby building sites, labor and tooling move often on daily basis, inhibiting the standardization and stability which facilitates the highest levels of process improvement. The results of 40 Lean process implementations in homebuilding demonstrate that a critical yet rarely understood component required for high-level process improvement lies in the up-front design process, and bridging the gap between architectural plans and functional working drawings. This element is essential to the reduced complexity that enables control of processes of any type. This white paper presents real-world examples from a large variety of builders to make the case that for Lean process in homebuilding to produce the astounding results achieved by other industries, Lean Design is essential.

In Philly, the homes are big and the foundation Paul peers down at is even bigger, formed-up for at least 9-foot basement ceilings. It takes just a minute to spot several classic wastes: four corners that can come out without any material impact on the home, a number of piers that are built way beyond code, and two supports for porch stoops that could have been wing-walls but instead run full-depth to the footer. “Hey Paul, what are you staring at?” asks Jill, the young site superintendent who is showing him around. Paul replies with a note of irony, “Oh, I’d guess about fifteen hundred bucks.”

Scenario

Chuck Collins, Division President of Delta Homes in Springfield is troubled. He just learned that a long-time local competitor, Hilltop Homes, is making significantly better margins than Delta on similar total sales. His VP’s have no answers although one did find out that Delta’s finished lot costs are nearly identical to Hilltop’s, so scratch that theory. Pouring over budgets reveals nothing obvious, but Chuck has spent his 20-year career looking at only Delta Homes’ budgets, so he has little to compare. This morning when Chuck woke up, he recalled the words of that Lean consultant at the last BIA dinner, chiding homebuilding executives because he never sees a pair of dirty shoes on any of them. His point was if you never get out there, you lose touch with the heart of your operation. He called it “Gemba” – a Japanese word meaning, “go and see.” So today, Chuck throws on his site clothes and walking shoes, and heads out to the field.

Out on the west side in the high-growth Springfield Heights area, Chuck stops near two competitive projects across the road from one another, one Delta, one Hilltop. The homes are similar, mid-priced, 2-story with 2-car garage attached. As much as the corporate marketing folk work to conjure up the “Delta Difference,” from the look of the models and a review of features, options, and selections, there isn’t much to be found. Each company has a reputation for using capable trades, dependable suppliers, quality components and strong site supervision. Along with the right product, the right location, and good financing, this has always been the Delta formula for success, yet something is missing. Chuck resolves to find out what it is.

Chuck’s quest is a difficult one. None of his list of usual suspects point to the answer, but his hours walking the competing sites yields important clues. He marvels at the clear sense of organization at the Hilltop project compared to Delta’s and the cleanliness of the sites themselves. There is less clutter at

Hilltop, fewer loads of material scattered about, and a general sense of calm. At Delta, “hair on fire” is not a joke, but more like a daily condition report on the superintendents and project managers. Everything is always urgent. Over at Hilltop, people are busy but composed and purposeful; no loud voices and hardly a cell phone out of its holster. The high-side roll-off dumpsters at Delta are perpetually full, while over at Hilltop, the small plywood and chicken-wire pens on each driveway are comparatively empty. Chuck makes a note to himself to ask his Construction VP to dig into that one a little deeper. A car rolls by and the driver does a double-take and stops abruptly. It’s Bill, a manager from the cabinet company who was in Chuck’s foursome at the golf outing just last week.

“What are you doing over here in enemy territory?” Bill asks. Chuck explains that he is just trying to get a feel for what his competitors are building, and then asks what brings Bill out today. Bill replies, “One of our field guys is sick, so I had to come out to your project and measure for cabinets.” Chuck goes on, “So now you’re over here on the same mission?” Bill, with a nervous laugh, explains, “Well not exactly. Since I’m out here I just thought I’d pay a friendly call on the project manager ... we don’t have to measure for cabinets at Hilltop.” Chuck is confused by this and probes further, “You mean they don’t let you measure? That’s just dumb!” Bill gives Chuck a long look and contemplates his response. “No, I said we didn’t have to. Hilltop builds so consistently we can order right from the plans. We save the trip, which saves us a lot of money and a day in the schedule.” Chuck is taken aback. He’s never heard that before, the idea of not needing to measure for cabinets. He’s skeptical, but if it wasn’t true why would Bill say that? Chuck makes another mental note to his VP of Construction. As Bill drives off, Chuck walks on down the street, contemplating the cabinets, and wondering what else he’ll find. What is it, he ponders, about Hilltop Homes that enables their framers to build so much more consistently than Delta? And why don’t they have high-side dumpsters? And why do things seem so much calmer over here? Then he shouts out loud to no one, “And why is this place so damn clean!?!”

The Challenge

Chuck’s story is unusual, not because the business situations are contrived, those occur every day. What’s unusual is a senior manager getting out and walking the projects, both his and the

“Site specific plans? We used to do that, but the boss decided it costs too much and killed it,” explains Christine, the in-house architect. “Besides, I used to have a full-time CAD operator and two part-timers, and now I am down to just one operator, two or three days a week. No way can we get them out now. And here’s the answer to your next question. No, we have not confronted the boss with the costs of all the mistakes made in the field as a result. Purchasing and construction won’t touch that hot potato these days. Perhaps you’d like to try, but I suggest you have your latest check in hand before you do!”

competitor’s, examining things closely enough to pick up on the clues. Chuck made quite a list that day of the obvious things, yet he sensed he was seeing only the visual symptoms of something deeper. He had to determine what was behind the symptoms; what was it about Hilltop’s way of working that enabled these results? His hunch that there was something significant behind the obvious and impressive differences between Delta’s projects and Hilltop’s was correct. What Chuck observed was the remarkable impact of Lean process and methods applied to homebuilding, henceforth in this white paper simply referred to as “Lean,” which we define as:

The relentless pursuit, identification & removal of waste in all forms, both product and process.



Lean Process has revolutionized most industries around the world and after a few decades delay, is finally edging its way into homebuilding. What took so long? The obstacle has always been that “construction is different” – and indeed it is. In no other enterprise do both the “factory” and the workers move each day, and 95% of those who do the work do not work directly for the builder. These additional variables inherent in the business confound traditional Lean practitioners brought up in a stable production environment. Yet today there are more than sufficient case histories to clearly demonstrate that Lean process and methods work in homebuilding with outstanding results. As strong as the results have been however, Lean implementers frequently confront both the frustration and the opportunity regarding how much is left on the table; how much *more* gain is available to builders. Ironically, the excitement that comes from the initial outcomes of comparatively simple “small I lean,” kaizen-type implementations, sometimes stymies efforts to move to a higher level. There is a world of “Big L Lean” that requires far more learning, commitment and discipline, producing even greater results. With this white paper, we raise the issue of one of the most critical requirements for the graduation into more advanced Lean Process. This is the arena of Lean Design, which includes architectural plans, working drawings and product specifications.

New Eyes

Beginning with the crash of 2006, builders have become increasingly desperate to reduce costs and have pushed themselves to the limit, yet we see them walk right past some of their greatest savings opportunities. There is a goldmine sitting right under their noses, yet builders fail to tap it because they don’t know how to identify, measure and track the waste. Most who do see it simply assume these costs are just part of doing business, or are just too difficult to deal with. Yet the biggest hurdle seems simple at first glance, that is, recognizing waste for what it is. The challenge is well-described by French author Marcel Proust:

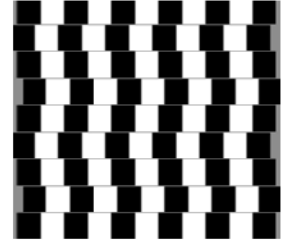
“The voyage of discovery is not in seeking new landscapes, but in having new eyes”

Acquiring “new eyes” is hard. The more successful you’ve been, the more difficult it can be. We see innumerable cases where two homebuilding professionals view the same foundation, the same truss design, the same elevation or the same set of prints – yet one sees nothing wrong while the other is ready to explode with examples of obvious waste. Before you jump to the easy explanation – *experience* – consider that we have often witnessed young superintendents with just a few years on the job who see the waste that 20-year-veteran Construction VP’s walk right by. How can this be?

Passing a framed-out home in Vegas, I slow to a stop and stare. Frank, VP Purchasing, follows my eyes over to a huge wall opening. It is set up for two triple-wall doors off a great room, each opening more than 10 feet. Across the top of the opening is a massive, custom-made beam using 13 layers of 2x4 -22’ in length. Supporting it are 3 framed posts, requiring 30 jack studs and king studs in total, cut from 12-footers. What is this beam requiring a small army of framers and a crane to erect holding up? Only a truss, supporting a very shallow gable. In other words, nothing. Frank looks disgusted. I ask, “How much do you suppose you have in this beauty?” He figures with labor, material and crane time, around \$1200. Take out all the waste and you need \$200 in it at the most. “How many of these did you build last year?” I ask? Frank sighs, “About 50 units. That’s \$50K ripped up.” In this case, it was a “borrowed plan,” a two-story from another city quickly converted to a single-story to fill marketing’s urgent demand for a big ranch. A few things were missed in the process. Downsizing the wall that carried no weight was one of them.



From childhood, we have seen hundreds of these examples in pictures and diagrams such as those to the right. Seeing the solution to these visual puzzles is tricky, even when you *know* there is something else going on. You have to suspend what you know – what your “old eyes” tell you



– and discover something new. Now consider a puzzle with 100,000 parts, assembled by 40-50 suppliers and trades and 500-1,000 different workers, and remember that you have to please inspectors, customers, investors and the boss. No wonder that in homebuilding, we cannot always see what’s sitting right before our eyes. These paradigms took years to build and overcoming them is no easy task. They have served builders well until perhaps recently, but little is sacred in times like

I am driving through a project in Texas with Troy, a project manager. Three guys are standing on the curb, holding a plan over their heads up to the bright sun, pointing and gesturing, confusion on their faces. I ask Troy what’s going on. After a brief pause, he explains they are building a left-hand house from a right-hand plan – a mirror image. When I ask why the builder would possibly ask anyone to do that, Troy gives the stock reply, “Well, it costs a lot to reverse those plans and we had to let our CAD guy go.” I ask, “How much?” but I already know the answer. It costs between \$100 and \$200 if you have your own guy, depending on your system capability and how complicated your plans are. An outside architect charges more. We agree on \$150 as a conservative average. I then ask, “How many mistakes might result from 40 or 50 supplier & trades, all building a mirror image, with no reversed plans?” We settle on a very conservative, best-case guess of 10 mistakes of varying degrees. My final question, “How many mistakes avoided does it takes to break even on the cost to reverse that plan?” Troy gives me a pained look, “About a half of one I’d think.” Then he adds, “Do you think you could help me explain this to my boss?”

these. So let’s assume you have become adept at spotting waste in product and process and now you are ready to rid yourself of it. Two elements are essential before you start “fixing” – identifying *root cause* and *stabilizing* the process. The vast majority of improvement efforts skip both of these requirements, however, which explains much of their failure. On the positive side, Lean Design provides a vehicle for pursuing both.

Root Cause

A direct and revealing technique in Lean problem-solving is called the “Five Why’s”. Simply put, keep asking “Why,” at least five times, and it leads you to root cause, or at least much closer than you were. Consider the example with Troy in Texas in the box on the left. Keep asking ‘Why?’

The responses might go like this:

- Q: Why are they holding that plan up to the sun?
- A: They are building a left-hand house from a right-hand plan.
- Q: Why?
- A: Because we only print right-hand plans
- Q: Why?
- A: Because we think it costs less to do it that way
- Q: Why?
- A: Because we don’t track & cost the mistakes that are made when we use right-hand plans to build left-hand houses
- Q: Why?
- A: Because that would make us look bad

Now we are getting to the root cause, but clearly, a few more why’s are needed for this example. We do know that the company is not set up to produce reversed plans that ensure the structure is spec’d right, bid right and built right because they think it costs too much. They have never faced the cost of *not* doing it the right way.



Most organizations burn out chasing symptoms of problems but never get to root cause. Studying the results of 40 builders and more than 900 suppliers and trades in Lean implementation reveals that a large percentage of waste in product and process alike has its origin in the design process. This is not a casual observation taken lightly. It is a paradigm-changing revelation for many builders. Ask, why is a framing crew out on a Saturday, ripping out a garage wall to install a missing service door? Trace it back to design issues. Why does purchasing routinely order 3-5 cubes more brick than needed? The problem is in the plans. Why do the HVAC crews spend an extra day on each home reworking ducts and chases? The working drawings don't have sufficient detail. Why are there so many VPOs (variance purchase orders)? There are insufficient plan details to get the POs right the first time.

The Disconnect

There is no end to horror stories of waste of time, materials and profit such as those in the accompanying boxes, all emanating from the same source. In the box to the right is a story illustrating just one more, this time it's about brick. This represents both a vast, expensive problem and a great opportunity, amplified by its position at the very front end of the homebuilding process. Simply put, there is a massive disconnect between architecture and field construction, and the costs are immense. This disconnect is reflected most clearly by the inadequacy of the working drawings used to build our homes. They range from abysmal to just passable, with a few rare exceptions. How has this problem gone largely ignored? It's a classic example of the old conundrum, "does a fish ever know it's in water, until it's out? Most builders have simply never seen a 100% fleshed-out, fully detailed, site-specific working drawing. Architects produce great architectural renderings and plans, and builders pay a big price for them, but when it comes to working drawings, we go cheap. Builders give it little thought, but if they do it sounds like, "The trades will figure it out. That's their job."

Here's the rub. This "fluid factory" we described earlier defies traditional efforts to stabilize and standardize it in the manner of a fixed plant as in manufacturing autos or electronics. That has been our excuse, and the fifteen "If we build it, they will come" glory years before the housing economy crash provided abundant cash flow and profit to keep the problem on the back burner. Then the volume stopped, the margins disappeared, and we discovered the baby was ugly, so now we get to work. But one of Dr. W. Edwards Deming's most important lessons in process improvement was that before you improve any process, you must stabilize it.

Ryan, a young estimator who has peppered me with emails since our LeanBlitz orientation session 3 weeks ago, brakes to a sudden stop. He points to 3 full cubes of brick, still in the bands, with a big pile of brick next to it. The front of the home is complete and even if the back isn't done, that's way too much brick. The walkaround reveals that the brick work on the house is indeed complete, but it gets worse. Between the big pile in front, the brick smashed into the mud around the house and what we see in the dumpster, we estimate between one and two additional cubes of brick. Just then, the site super walks out of the house next door. "What's up guys?" Ryan explains his discovery. "Ah hell," says the super, "tell me something I don't already know!" He goes on to explain that for months now, every 2830 model has had 3 or 4 cubes extra, and how having so much extra brick has made the trade lazy on utilization. The superintendent told his boss, called purchasing, filled out the forms, but the stuff just keeps coming. Something about not enough detail on the plans, and even though they changed the design to waist-level on the back and sides last year, the PO still specs it as full brick all the way around. "I finally gave up and just call the supplier for a pickup after each job. I don't even want to think about what it costs us."



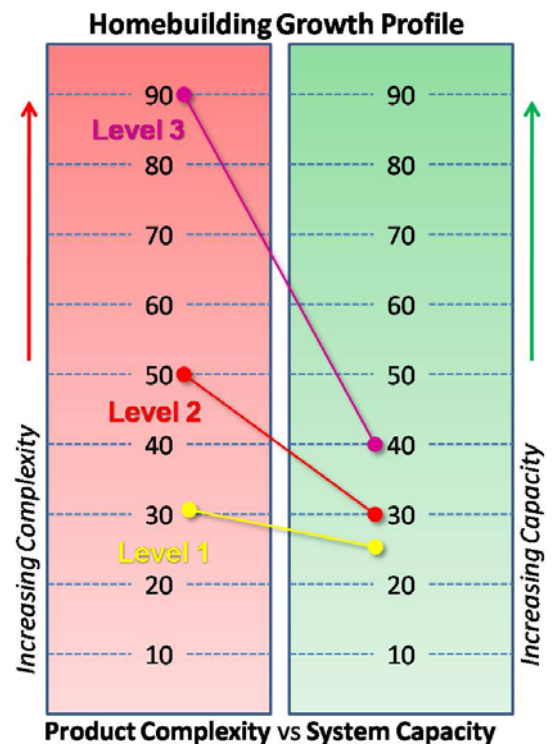
Stabilization & Complexity

The homebuilding process cries out for stabilization, standardization and predictability. Without it, improvement efforts are difficult to impossible. One obvious way to bring stabilization is for builders to hire their own, full-time, dedicated work crews. In the current homebuilding economy however, that is out of the question for 98% of builders and will likely remain so. We compensate by developing long-term mutually-beneficial relationships with the very best trades; at least that's the smart way to do it. "Outsourcing" is one of today's hottest business topics, yet this strategy is old news for builders. The very best builder/supplier/trade partnerships do bring tremendous stability to the homebuilding process. Stability is likewise enhanced through vertical integration of material supply but again, that is not a viable option for other than a few "giants." Just as with our trade contractors, we are thus compelled to find the very best outside suppliers who will provide dependable and consistent supply on a long-term basis. This combination creates much greater process control.

The enemy of stability is complexity. Complexity is insidious because it grows exponentially, not arithmetically. In the absence of strict controls, a doubling of projects, plans or options does not double the workload on the system; it more accurately increases it by a factor of four or more. Historically, builders always allow their offerings, (product complexity,) to increase faster than their system's capacity to manage them. Elements of system capacity include design, plans, estimating, purchasing, work orders, (PO's, VPO's, etc) accounting and personnel, among others. The result is that both systems and people fall further and further behind, details are overlooked, mistakes increase, rework grows, controls suffer, quality drops, customer satisfaction wanes and profitability fades. On the right is a simple graphic depiction of this phenomenon. At Level 1, we have set Builder X at a level of 30 on a 0-100 level of product complexity, where "0" is virtually no complexity at all and 100 is the point of meltdown. On the right "System Capacity" scale, we rate this builder at 25, indicating the amount of capacity required to meet each level of product complexity. Here, the builder's product complexity is moderately surpassing the system capacity. At this level, a group of smart people working very hard can hold it together and keep up, at least for awhile.

At Level 2, we show a complexity of 50 being supported by a capacity of 30. The builder worked hard to increase system capacity but it is being outpaced by expansion of projects, plans and options. They are wondering what is going wrong, while working 60 hours a week, stressing their people as well as their suppliers and trade contractors. They resolve to increase the capacity of system components and do, but they are not able to keep up with expanding complexity.

Now we progress to level 3 with a complexity rating of 90 being supported by a capacity level of 40. Stress levels are palpable, turnover increases, managers, employees, suppliers & trades all suffer burnout. The intent is always to increase system capacity but it is almost always cheaper, easier and faster to reduce complexity. Curiously, this is usually the last option considered.



Before the building economy crash, most builders were somewhere between Levels 2 and 3, and many will now admit to being at 3 and beyond. A great many builders have reduced product complexity during the downturn, but cuts in staff mean the great majority still exceeds capacity. The real crux will be confronted during the expected recovery. Complexity will increase as builders add projects and new plans. Meanwhile builders will be understandably reluctant to increase capacity, especially regarding personnel. With so many experienced people gone from the industry, the problem is magnified. This has the makings of a monumental meltdown, because the margins in the recovery, while increased, will not reach the heights seen before the crash. Even in better times, builders will not hide their inefficiencies. This makes the case for bringing complexity and capacity in line now, before the next growth phase, highly compelling.

The day-long supplier/trade partnering workshop was going reasonably well as lunchtime approached. There was no shortage of frustrations, but the 55 participants were clearly loyal to the builder with a passion to help improve both product and process. As we finished up table discussions and reports on things the builder does that add cost to suppliers & trades, Ned, owner of a large plumbing outfit, raised his hand. "How about during the lunch break, everyone go out to your truck, bring in your copy of the 2305 plan and spread it out back here on the floor. I have a hunch about something." Everyone agreed and off to lunch we went. When we returned, Ned and his crew leader were finishing up making notes while pouring over a sea of plans spread across the floor. Each had come from a separate supplier or trade contractor attending the workshop. Ned handed me a tally sheet.

- 26 suppliers & trades
- 5 different editions of the 2305 plan

The VP of Construction's curiosity overwhelmed him. "What's Ned got for us?" he almost shouted. I replied, "If you are willing to do something about it, this looks like a check worth over 6 figures."

The solution is twofold: rein in complexity, while increasing system capacity. But how? First, simplify product, options and selections. The key here is for the builder to truly understand what the target buyer needs and wants, and what they will pay for. Offer them that and nothing more, unless you are positive there is return benefit in sales or good will. Most builders who challenge themselves on this issue will find they can eliminate 50% or more of their plans, options & selections, and never lose a sale. For many, that is just a start. This can be a painful process, but the impact cannot be overstated. In no way do we advocate "dumbing down the houses" or otherwise making them difficult to sell. We do champion the relentless pursuit, identification and removal of waste however, and there is monumental waste in needless complexity.

Next, we return to the need for fully detailed, site-specific working drawings. As previously described, the state of working drawings in homebuilding is generally abysmal. Yet there are builders who get it. Recently, we encountered what could most aptly be called "Plan Nirvana" at a large builder who keeps a very low profile. What we found were perfectly rendered, explicitly clear, thoroughly logical, completely detailed working drawings. Every detail of each corner, gable, knee-wall, electrical outlet, vanity location and every other aspect of the house was there. Each option was treated with identical precision. Layouts of trusses and joists were spelled out; for anything that might generate questions, there was a

note of explanation. Any competent supplier or builder estimator could perform material take-offs from these drawings with total accuracy. Any competent trade could determine their exact labor requirements for bidding, and then build from these prints precisely, time after time. Any competent field manager could conduct thorough inspections and do a better job, because the manager would know exactly what was expected, and in fact, far fewer inspections are needed.



The current builder paradigm says that this level of detail costs too much. This builder we observed, even in a poor economy, is thriving and profitable. They also build the single best built product we have witnessed in 20 years working with more than 200 builders in the U.S. and Canada. Their customer satisfaction is top-of-game and their warranty and rework are at minimums. It was readily apparent that their exquisite working drawings were a key element in their success. They enabled components to be specified, bid, purchased, delivered and built right the first time, every time. So much of the time that other builders spend dealing with daily problems that crop up from inadequate plans and specifications is rightly classified waste, and that was eliminated here. Yet most builders have accepted the notion that all the waste – all the brain damage – is just part of the homebuilding business. It is *absolutely inarguable* that through Lean process, built on Lean design, this waste can be substantially eliminated. The results are higher profits, better homes and an optimum working environment.

Discipline & Strategy

Lean is not a panacea. With marginal understanding and poor implementation, it can and does fail, yet the requirements for a successful strategy are no longer a secret. The adoption of Lean process and methods require that system capacity maintain pace with complexity. In all but a minute number of cases this calls for the strategic simplification of plans, options and selections, while still building a great home and providing customers what they need. To back up whichever business model you choose, both complexity and capacity are profoundly impacted by the up-front design-to-construction process. Architects must design with product utilization in mind. Rooms are built in even increments whenever possible. Dimensions such as a 4' 1" hallway or a 12' 2" bedroom are virtually never seen. In the example on the right, inadequate attention to room and wall sizes dramatically impacted the utilization of drywall. For this builder, the ratio of square feet of wallboard to square feet of floor space averaged 4.16 for their larger, move-up product. For their entry-level product, it was 4.96. If the entry-level could have met the efficiency of the move-up product, cost would be reduced by \$1500 per house. It is true that smaller homes use proportionately more drywall, yet in this case, the contractor felt that if he had been involved up front, he could have eliminated half of the waste. That's \$750 per unit in house cost.

This example illustrates the critical need for a rock-solid process with the required tools to move from product concept to architectural plan to working drawings. Such a process decreases complexity by reducing product waste, errors and rework while it expands capacity by increasing the capability of the builder to manage growth. Both now and even more so during the recovery, this capability will become a key determinant of homebuilder profitability.

At one time, builders considered this level of capability prohibitively expensive, but both an understanding of true cost and a continuing evolution in the technologies

We were beginning the 9th one-hour Lean session with suppliers & trades that day and the builder's team was beat. Mike, owner of a small but growing drywall company, sat down with his field supervisor and passed out his materials. "Let's start here," he said, but he already had the rapt attention of both the product design manager and the estimator who were reading a table in Mike's materials and talking back and forth. "This is just amazing," the estimator declared. "Mike has a table here that shows our drywall utilization on the new first-time buyer product requires 25% more board per square foot than that of our move up product!" The product design manager sighs, "We made the houses smaller and drove up our costs. Not exactly what we had in mind." This is also decidedly not what their target customers had in mind.



to produce plans and drawings will see the end of this obstacle. Because builders will be reluctant to expand staff in the recovery, it seems likely that they will turn to outsourcing to fill the gap and this is no great surprise. Just as builders effectively outsource 95% of the field work, more of the white collar functions will go the same route. More and more, the conversion of architectural plans to detailed working drawings will be done by outside firms; already companies are springing up to meet this need. Negotiating the miasma of local codes and regulations is likely to keep this work stateside.

The glue that holds Lean process together is discipline – the daily commitment to following the best known process, then continually making it better. Studying the successful Lean implementations

We stop by the construction trailer to escape the blistering Atlanta heat and get a feel for how the field operation is run. Dan the project manager welcomes us asking, "What can I show you?" I suggest we begin with a start package for one of this builder's most popular plans, then show my age by adding to my request a set of "blueprints." Dan smiles and informs me, "Well, even the old-timers no longer call them blueprints." Old timer? Everyone in the trailer laughs. "Oh, that's not what I meant," Dan explains. "With all redlines, they now call them "redprints!" Hearing that, I already know we are about to step into a veritable waste goldmine.



versus the failures demonstrates this with complete clarity. Rigorous discipline at all levels, in all functions, is essential. As we have discussed, homebuilding is by nature a difficult process to bring under control, thus demanding discipline throughout. While we are compelled to create strong control mechanisms wherever possible in the process from land development all the way through warranty service, for most builders the exact opposite has occurred. The complex nature of the fluid factory has served as justification for ignoring the need for these control mechanisms. For Lean implementation, a new mindset is required.

Consider the common example of the red-lined plan as seen on the left. Red-lines are a prescription for induced errors into the process from bidding through construction, resulting in rework, lost time, greater cost and customer dissatisfaction. The answer, of course, is having all trades work from current, site-specific, fully-detailed working drawings. Any honest and thorough analysis of the cost of producing site-specific plans demonstrates that it is far lower than the cost of mistakes, yet building from redline plans remains the dominant industry practice. Changing this practice, holding the line and requiring that each plan is fully site-specific is an example of the discipline required to put Lean into practice.

Summary:

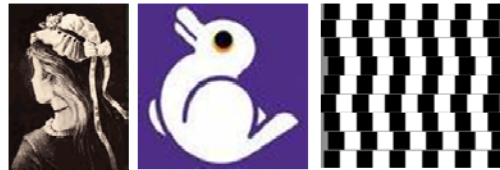
At the beginning of this white paper, we followed Chuck Collins, President of Delta Homes' Springfield Division, in his quest to determine why his competitor, Hilltop Homes, was more profitable. Chuck was looking for something missing in the Delta formula that would account for the difference. There was indeed something absent at Delta but ironically, it was seeing what was missing at the Hilltop project that provided the best clues. What Chuck *didn't* find at Hilltop was the mess usually associated with production building and the "brain damage" that goes with it. As we learned



from the examples in the sidebars throughout this paper, a production system overwhelmed by complexity is by definition inefficient and costly. Recasting a builder using Lean operating process and methods, however, requires “new eyes” and the results of builders who have found those new eyes are remarkable. Over the years of helping builders implement Lean, our own new eyes led us to understand that without Lean Design at the front end, the stability required for genuine process and product improvement was forever marginalized. Reducing complexity is mandatory, and it does not mean building houses that are cheap, unattractive or lacking in choices that customers want. It does mean enabling a builder’s system capacity to keep pace and that makes all the difference. How much difference? Go back one more time through the vignettes presented in the sidebars, thinking about how many times you might find these same costs with how many of your suppliers and trades. We believe you will discover what other builders have found, that through Lean Design alone you will easily find \$10,000 in waste per unit. Getting from where you are now to a becoming a genuinely Lean organization is an arduous journey, but that should be enough to convince you to begin the trip.

Notes: Key to Optical Illusions on page 4:

- Find both the beautiful woman and the old witch
- Find Duck and Rabbit
- The horizontal lines are perfectly straight!



About Scott Sedam:

Scott Sedam, former Pulte executive, Malcolm Baldrige National Quality Award examiner and National Housing Quality Award judge, is President of TrueNorth Development and writes the provocative column “Higher Ground” for BUILDER Magazine. A leader in homebuilding’s quality revolution since the late 80’s, Scott’s focus is on Lean process improvement that increases profit while enhancing quality customer satisfaction. You may reach Scott via email, scott@truen.com or by calling 248.248.6011.

About TrueNorth:

TrueNorth Development was founded in 1997 by Scott Sedam to serve the growing developmental needs of the residential construction industry. With professionals located across North America, TrueNorth has worked with over more than 200 builders, suppliers and trade contractors to improve quality and profitability.

TrueNorth has the industry’s most extensive catalogue of over 30 coursework titles designed specifically for the building industry with associates based in Arizona, Colorado, Florida, Virginia, New York and Michigan. All TrueNorth consultants and facilitators are professional presenters and have extensive building industry experience. TrueNorth clients have received more recognition from national quality and service award organizations than any other firm in the industry.

The LeanBuilding Blitz™, the latest builder/supplier/trade joint activity, is an intensive five-day process that brings builders together with their suppliers and trade, applying Lean Process & Methods to identify and remove waste in all forms of product and process. . Once waste in all its forms is recognized, the collective knowledge of the builder, suppliers and trades can destroy that waste to everyone’s advantage, reducing costs *without reducing margins*.

For more information about how TrueNorth can help your organization achieve its goals, whether builder, manufacturer, supplier, or trade contactor, contact us at 248.348.6011, write to info@truen.com, or visit us on the web at www.truen.com.



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