

4 | **KAIKAKU: MOVING BEYOND KAIZEN ONE ORGANIZATION'S STORY OF RADICAL PROCESS CHANGE USING 3P**

A WHITE PAPER BY PRODUCTIVITY



KAIKAKU: MOVING BEYOND KAIZEN ONE ORGANIZATION'S STORY OF RADICAL PROCESS CHANGE USING 3P

Productivity, Inc. and Andy Meyerhofer, Plant Manager, and Lambros Skoutelas, World Class Manufacturing Coordinator, CertainTeed Corporation.

Andy Meyerhofer, plant manager at CertainTeed, was not sold on the 3P process when it was first proposed as the right approach to tackle a major project. In fact, he tried to sidestep it.

The process sounded too difficult and resource-intensive. He discovered, however, that although 3P does require a big investment, it is a powerful tool, and the process of making the decision to use it was just part of the journey.

3P (Production Preparation Process) is a method originated by Chihiro Nakao in which employee teams conceptualize, develop, validate, and deploy radical improvement in product and process design.

In contrast with kaizen, incremental improvement, there is nothing gradual about 3P; it's a systematized way to achieve kaikaku—sporadic, step-level change.

At CertainTeed, the 3P approach has been used to radically redesign processes and achieve groundbreaking improvements.

THE BACKGROUND

Founded in 1904, CertainTeed is a subsidiary of Saint-Gobain and is the largest manufacturer of building products in North America. Meyerhofer's 40-year-old plant in Jackson, Michigan, makes vinyl siding and related components.

Starting with the premise that continuous improvement (CI) is what drives cultural transformation—not change focused solely on bottom-line gains—the Lean journey at the plant began in 2002 with a six sigma program designed to tackle the most complex problems that had the highest customer impact.

Within a few years, « workout » projects (focused on fast solutions) and week-long kaizen events (aimed at more complex problems) were introduced, followed by autonomous maintenance and total productive maintenance (TPM). More than 100 successful projects had been completed by 2008, but the cultural change was lagging. For the next several years, the CI focus shifted to sustainment—that is, to changing everyone's behavior through daily improvements rather than through a stream of new projects and events..

With an accumulation of toolsets or 'programs' in play, management had to show that it could integrate all the tools into an overall Lean philosophy and understand that the key was finding the right tool to apply at the right time to the right problem.

By the time Meyerhofer was considering a 3P project, the plant had laid some strong foundations in the overall adoption of Lean practices.

They had a well-established 5S system in place; fairly regular autonomous maintenance activities were ongoing; and six or seven events per year were being conducted, rotating through the lines.

Improvement ideas were grabbing hold, and shopfloor employees were seeing the value they'd get from sustaining Lean efforts (and believing that Lean wasn't just the flavor of the day, nor a scheme devised to create more work for them). Importantly, Lean partnerships were functioning well at all levels of the organization. Gemba walks were ongoing, a strong Lean leader was in place, and the entire leadership team demonstrated support for innovative change.

THE PROBLEM

The work force at the plant is very senior, with the low end of seniority at 10 years. They're experts at what they do, but their jobs are also very physical.

A 12-foot section of vinyl siding comes off the line multiple times a minute, all day long. Each section must be carefully placed in a heavy corrugated cardboard box, which the packager formed by manually bending it.

Grabbing a large piece of cardboard and manipulating it into shape very minute or so is a very difficult task. Workers also needed to come off the packaging line periodically to perform regimented quality checks. The entire packaging process extended from the point product comes off the line to the point where fully loaded boxes are palletized. Naturally, ergonomics was a strong concern.

THE SOLUTION—TAKE I

The high-level solution the plant targeted was this: to elevate the packagers from their role of putting material into boxes, which customers don't consider value-added activity, to a new role as «packaging operators» focused on adding value. It was a lofty goal. Meyerhofer describes what happened next:

« Here's where we jumped off and went horribly wrong. Our lean resource advised that this was a perfect project for 3P. But we already had great lean tools at our disposal—six sigma, workout, kaizen, TPM, gemba walks, and 5S.

I looked up 3P to find out a little more about it. Even though our resource was telling me that this was the right thing to do, I decided we'd tackle the problem during a kaizen event instead.

I didn't appreciate the difference between an approach used for kaizen, incremental change for the better, and the 3P approach aimed at kaikaku, an exponential leap forward.

There's a real mindset as to when to use which tool.

Why wouldn't kaizen work for this application?

It took us going through this experience to figure that out.

During the kaizen event, workers complained of posture issues and weariness, so the team zeroed in on ergonomics. The solutions they devised included raising the worker's stance at the line with a platform and raising the work surface itself a few inches with a metal box they constructed.

The team reported out successfully at the end of their kaizen week and celebrated.

Meyerhofer says:

« We didn't even know at that point that forming the cardboard box was the most difficult part of this job, so we focused on ergonomics. We got off track here. We'd been set up to work on creating the role of 'packaging operators' and ended up focusing on posture.

The tool we were using wasn't the right tool, and we got waylaid by people's agendas. It was always part of our intent to improve ergonomics; we just got mired in it. »

We got off track here. The tool we were using wasn't the right tool, and we got waylaid by people's agendas.

When Meyerhofer returned to work the following Monday, the device used to raise the work surface had been set aside on the floor. At first, he figured it was a communications problem between shifts, replaced the device, and reinforced the new way of working with supervisors.

But he continued to find the box moved off the line. When the worker who'd come up with the idea finally rotated back through that area a couple of weeks later, she said:

« It doesn't really work; it doesn't serve our needs, doesn't help us. It was a dumb idea. »

Confounded, Meyerhofer told the team to scrap the metal box.

The experience convinced Meyerhofer that they'd used the wrong process to tackle their problem. Coming back around to address the issue again, four or five months later, he found that the setback had made him ready to listen, to learn more deeply about the phases of a 3P project, and ultimately to make the leap to using it.

THE 3P PROCESS—A FAST TAKE

Seven basic phases comprise the 3P process:

- Project Sponsorship
- Planning Process
- Project Milestone Plan Development
- Team Leader and Team Training
- Discovery
- Narrowing
- Implementation

Through the first four phases, nothing happens on the floor except communication in the plant. All the heavy management lifting starts before the team actually begins working on the problem.

In the first couple of phases, the goal is to negotiate internal politics and ensure that the high-level management team can commit to using 3P for problems of a certain scope.

PHASE I - PROJECT SPONSORSHIP

First and foremost, the site manager needs to be fully committed to 3P and understand its benefits and proper application. He or she needs to become the 3P champion—to believe in the process and be able to articulate the benefits up and down the organizational hierarchy.

In-depth knowledge of and experience with the tool is desirable but not necessary, as long as an expert that does have that experience is available to facilitate.

Another imperative is that upper management be ready to support radical change, since a 3P project will likely result in that level of change—possibly requiring the realignment of resources and work standards as well as capital investment.

After investing all the resources to solve a chronic issue and improve the overall health of an organization, failure to execute a radical solution could mean a major setback for an organization's lean journey. 3P should not be undertaken lightly.

Credibility is key. If we had not established enough trust with the plant through what we were doing with lean, this could have gone horribly awry.

The organization must also be ready and able to work with 3P. It's not a ground-level tool, so organizations that use it should have some maturity with lean practices. Ideally, everyone will have been through training in at least the fundamentals of lean, and higher-level managers will have a broad comprehension of various tools and fully embrace the lean approach.

Evidence of maturity with lean includes the presence of a stable 5S program as well as demonstrated experience with six sigma, kaizen, TPM, overall equipment effectiveness (OEE), quick changeover or single-minute exchange of die (SMED), and value stream mapping.



Meyerhofer described his experience with this early phase:

« In phase 1, you've got to commit resources. Imagine taking 10 people out of your plant full time; my plant has hundreds of people, not thousands. Any extra resources we may have had in the past are long gone, and the rest of the plant was left to carry the burden.

Your project may be bigger or smaller, but understand that pain will come with it; it requires taking some risk and making a leap of faith. If you had a solution, you wouldn't need the 3P process.

Our plant isn't perfect by any means. We've had to reinvigorate aspects of our lean initiative constantly along the way, but we always maintained the trust of people both inside and outside the plant.

The way we did that was by delivering a business case for lean, in addition to all the other fundamentals such as honesty, trust, integrity, and communication. We'd improved by an order of magnitude on first-pass yield, approaching theoretical perfection.

What we essentially did during Phase 1 was to sell ourselves on the idea that 3P was the tool of choice.

Since the plant manager (or whoever is making the decision to proceed) is making a leap of faith, it's important to have an internal or external lean resource with whom you have a good partnership and trust, and one that has personal experience with 3P.

The 3P process can be painful at times. Your expert resource does not need to be there every day, but should be available for a week on the front end with frequent checks to ensure the process is moving. It's also important to maintain some separation between that resource and the team; you need to ensure that you're getting objective and honest feedback. »

PHASE 2—THE PLANNING PROCESS

The problem to be addressed by 3P must be a difficult one that has not been solved despite attempts through kaizen or other improvement methods.

It must also be clearly defined and scoped and must catalyze a compelling business case that should be articulated in reasonable detail, including:

- What is the problem?
- How is the problem scoped and bounded?
- What is the desired result, and is it a BOLD goal requiring radical change?
- How will the organization benefit?
- Does it meet with strategic business objectives?
- What has been tried to solve the problem to date?
- How quickly does the change need to happen?
- What resources need to be allocated (financial, human, technical, line time) and how will the organization make them available?
- Who are the stakeholders and what will be the impacts on and benefits for them?

The impact the potential solution may have on all areas of the plant must be considered.

For example, will the various stakeholders, including the management team, embrace the end result?

People readily accept changes that improve their work life and reduce stress levels. They shun and will not easily accept change that may result in more work or the elimination of their livelihood. A plan for communication with all stakeholders needs to be developed and orchestrated before embarking on a 3P project. All employees at the site need to be prepped and trained at a high level about the tool and how they will benefit from the result.

Improperly carried out, a very positive improvement in conditions and metrics could be perceived as a negative and derail the project, which would then require substantial resources to turn around at a later date.

Worse yet, it could result in terminating the effort altogether.

Meyerhofer describes his experience this way:

« There must be a return on the significant resource investment. There's got to be a business case. For us, if an initiative is not going to pay back within 18 months, we're not doing it.

Bold goals means kaikaku—monumental change; for our first attempt, that meant getting away from incremental improvement such as changing people's postures and moving to something that we couldn't even conceive, for instance: 'You have to redo completely the way vinyl siding gets packaged in six months, without using any of the existing equipment, and you get \$10K to do it'.

It's totally innovative on a very tight time scale. In some of our 3P projects, we've been working on a problem that has never been solved in our industry despite attempts. By the time we were into our third 3P project, I had become somewhat immune to the fear of the unknown.»

PHASES 3 AND 4—DEVELOPING PROJECT MILESTONES AND THE TEAM

Careful consideration needs to be given to the team and the resources selected to support it. The first selection, critical to the project, is the lean expert that will guide the team through the 3P process.

This person should have in-depth experience with 3P, a good, consistent relationship with the organization, and an understanding of the culture and nuances of the facility. Trust is essential.

Next, management must define the high-level parameters of how the team will work; these depend on the culture of the facility, availability of resources, and the complexity of the issue at hand.

- Will team members need to be 100-percent dedicated for a period of up to six months?
If so, what is the impact on the facility and those left to bear the load?
- Will team members split their time between the project and their regular work?
If so, what can be done to lessen their normal workload as necessary?
- What will be the impact on the project and the time line if resources divide their time?
- What will the cost of those resources be?

Next, the team leader is chosen. This should be an individual who is highly motivated and self-directed. Ideally they would be someone who has exhibited natural leadership skills, is ready for a new assignment, and can bring their experience to the team. Some formal 3P training for the leader prior to starting the project is beneficial but not absolutely necessary.

The team participant list should be sketched out, though not formally announced nor assembled at this point. The size and constituency of the team depends on the nature of the problem, the speed with which it must be solved, and the cost. Seven or eight members would be considered a large team.

The team should be cross-functional and include people with both innovative ability and experience in the area being addressed.

Once the team leader has been selected and the team parameters established, the scope of the project and its boundaries must be refined.

This should be done at a high level, with input from the 3P facilitator and the support of upper management. The team leader is then brought into the conversation to discuss the scope, team members, and resources available, and any appropriate adjustments are made.

The team leader, working with the 3P facilitator, drafts and presents the project timeline to the management team for approval. The team is assembled, plans to extract them from their current roles are finalized, and the team undergoes initial training (which can normally be accomplished within several days).

The team will need access to any resources allocated and the ability to make changes within the scope of the project.

They will also need a dedicated space – often called a «moonshine shop»—to work and experiment. The shop area represents a safe place where the team can bond and work on things quickly and cost effectively.

Don't neglect safety precautions; people will be fashioning prototypes using materials with which they may not have much experience, for instance cutting plastic, wood, or metal. (Duct tape and cardboard are commonly used to get started.) Every effort must be made to prevent the creation of this dedicated area from sending a message that the team has become separated from the plant or that team members are favorites or better employees.

The moonshine shop should be announced to the facility in advance of construction or space allocation.

Moreover, all workers should be able to see what is going on, should be invited on a walk-through tour (or better yet, that tour should be mandatory), and should be regularly kept abreast of the team's progress (at least monthly).

The management team must also be kept informed through short, weekly report-outs in the obeya (literally, «big room») format—ideally in the moonshine shop itself.

The team leader should be someone that is hungry, coming off a recent success, and wants to do more; someone who wants to grow in their career.

Unlike the facilitator, they don't have to be all that educated in lean practices, just driven to succeed. As for team selection, we went for diversity, with stakeholders in mind to make sure they had a great say in the process.

A good share of the team should be people that will be using the result and would know what's good and bad—not necessarily engineers or lean experts. And then of course, you need some people that can just get stuff done.

Our **moonshine shop** was low budget; we used cardboard, tape, two-by-fours, and some PVC pipe. One caveat: We built an area inside the plant, walled and sided with our product and with doors; it contained a table saw, work table, chairs, supplies, benches, etc.

We told everyone about the 3P project and invited them to come through—but an invitation to a party and a required event are two different things.

I didn't make everyone parade through, and the shop became known as 'Area 51', the place where 'they're going to design us out of our jobs'. We had to break down that barrier down.

Regarding the time line, use a project management tool to track your goals and deadlines at a glance. It keeps the process moving.

It's also important for the leader, as the seller of the process, to have the current status at his or her fingertips so that any questions about resource expenditure can be answered vigorously and quickly. In a heartbeat. Even at the planning stage, you have to have contingencies in mind regarding financial and personnel resources that might be required at different stages of the process.

« To kick off the team's activities, we held a week-long 3P training session designed to educate them on the fundamentals and enable them to recognize the internal tools they already have at their disposal.

3P is just a process—a guided journey—for using those internal tools. The process entails learning by trying and doing. Updates are kept on the wall in the moonshine shop's obeya room for anyone in the plant to see. »

PHASES 5 THROUGH 7—DISCOVERY, NARROWING, AND IMPLEMENTATION

With the extensive necessary foundation established, the team gets started on the problem itself, working through the 3P methodology. They must completely decompose the process as scoped, defining the «what» (not the «how») of each step using a verb—«flip,» «fold,» «place,» etc.

After the current process has been outlined in explicit detail, the team begins its hunt for creative ways to accomplish those steps. Drawing heavily on the field of biomechanics—that is, looking for examples of how things are accomplished in the natural world, where methods have been competitively tested and proven over eons, each member must come up with seven unique, alternative ways for accomplishing each step.

It's an exhaustive method that forces a full exploration of the process design space. The alternative methods for each step are individually ranked, then checked for conflicts in interactions between steps.

Several promising concepts are mocked up at full scale and tested for viability, with input from the operators who will actually use the process.

That feedback is taken into a second round of reviews, and functional prototypes are constructed for another round of trials. Any remaining issues are resolved, the best solution or solutions are synthesized, and production trials are conducted. Finally a solution that demonstrates performance to «bold goals» expectations is presented to management for implementation.

« This is the gnarly piece, where the rubber meets the road and many of the difficult things happen. Expect people to argue at this stage.

It can be an emotionally charged, risky, and passionate process.

Bartering goes on to resolve any conflicts that come up between the steps. Then you go out and actually try these new ways using rapid, low-cost/no-cost prototypes. We started bringing people from the plant through to provide feedback, and the learning continued.»

After experimenting with several different prototypes the team arrived at a design that worked really well and met the criteria. They presented the final solution to management.

During the process, however, they'd also come up with another concept that fell outside their scope and constraints: The cost was too high. They offered to present that solution to the management team as well.

The benefits of the out-of-scope solution far exceeded our expectations, opening the door to other options. That was an «aha» moment for us, a real game changer. The end result: we opened the door to the team to pursue their alternative concept and stepped away from the working solution that met the original criteria and cost.

That entailed a little more risk, but gave us the opportunity for an exponential improvement, a groundbreaker in our industry. It's not typical, but it can happen. The packagers have been redeployed to more value-adding and proactive activities, including lean tasks we'd been having trouble getting to.»

SUMMARY

3P is not the approach to use for every problem, and not to be entered into lightly. The culture must be ready and able to support the effort.

But it is a powerful methodology that can help you achieve giant leaps forward in your industry—in fact it often yields results that qualify as trade secrets.

For CertainTeed, their first attempt was resource intensive but yielded excellent results.

«This diverse team of talented people—none of them engineers—simply amazed me with their solutions and problem-solving ability. Their commitment as a team and to the organization was beyond expectations. The results also far exceed my expectations.

The team solved problems that we felt were unsolvable or had failed at solving multiple times. This was done in a relatively short period of time: six months.»

Since completing their first 3P project, Meyerhofer's plant has conducted two others in a three-month timeframe and found additional groundbreaking industry solutions to other problems. They've also adjusted their use of resources, finding ways to have the team band together at the inception of the project and at key points, and disband at off times while others helped collect data, and so on.

3P is not a cure-all. A location will fail if it uses this tool exclusively.

It is a powerful tool that can solve difficult problems when properly identified. It should be seen as one of many tools to be used in the proper situation with a knowledgeable facilitator.



AEROSPACE AND ELECTRONICS / AT&T INC. / THE BOEING COMPANY / INTEL CORPORATION / JEPPESEN / LITTELFUSE, INC. / MEGGITT POLYMERS AND COMPOSITES / PRATT & WHITNEY / UNITED TECHNOLOGY CORPORATION / WEIR GROUP / **AUTOMOTIVE** / AUTOLIV INC. / CUMMINS CORPORATION / FORD MOTOR COMPANY / HONDA OF AMERICA / KAMTEC, INC. / LEAR CORPORATION / MIBA BEARINGS LLC / TENNECO, INC. / **BANKING/FINANCE, INSURANCE AND SERVICES** / ARVAL / BNP PARIBAS / COUNTRY FINANCIAL INSURANCE COMPANY / GOODYEAR/DUNLOP SERVICES / GRANGE INSURANCE / GROUPAMA / GROUPE CAISSE D'EPARGNE / KEYBANK / NATIONWIDE FINANCIAL SERVICES, INC. / SPB / **CAPITAL GOODS** / AEROQUIP CORP. / A.O. SMITH CORP. / BUSCH MANUFACTURING / CRANE CURRENCY / DEERE & COMPANY / EMERSON ELECTRIC CO. / JOHNSON CONTROLS / METTLER TOLEDO LLC / POCLAIN HYDRAULICS / SAUDER WOODWORKING COMPANY / SNAP-ON INC. / STANLEY BLACK & DECKER INC. / UNION TANK CAR COMPANY / **CHEMICALS** / AIR PRODUCTS AND CHEMICALS, INC. / ARKEMA / CECA / CYPLUS IDESA / KMG CHEMICALS, INC. / SOLVAY / **CONSUMER GOODS** / ACUSHNET COMPANY / ADIDAS GROUP / BERRY GLOBAL GROUP INC. / D&W FINE PAK / DURACELL INC. / GANNETT NJ MEDIA GROUP / HENKEL CORPORATION / KIMBERLY-CLARK CORPORATION / LEK INC. / MANA PRODUCTS / PING GOLF / PIRELLI COMPANY / PLASTIPAK HOLDINGS INC. / PROCTER & GAMBLE / QUAD/GRAPHICS, INC. / RECKITT BENCKISER GROUP / SHERWIN WILLIAMS / TEXOPS / UNILEVER / W.L. GORE / **ENGINEERING AND CONSTRUCTION** / AMERICAN WOODMARK CORP. / ATLAS ROOFING / BRAZEWAY, INC. / CERTAINTED CORPORATION / JACOBS ENGINEERING GROUP INC. / JELD-WEN, INC WINDOWS & DOORS / MI WINDOWS AND DOORS / OLDCASTLE BUILDINGENVELOPE / OWENS CORNING / **FOOD AND BEVERAGES** / ADVANCED PIERRE FOODS / ANHEUSER-BUSCH / CALIFORNIA NATURAL PRODUCTS / THE COCA COLA COMPANY / E. & J. GALLO WINERY / FLORDIA CRYSTALS CORPORATION / GENERAL MILLS, INC. / GLANBIA NUTRITIONALS / GROUPE AOSTE S.A. / THE HERSHEY COMPANY / INGREDION INC. / MARS PETCARE / MEAD JOHNSON COMPANY / MILLERCOORS / SCHWAN'S COMPANY / T. MARZETTI COMPANY / URSCHER LABORATORIES COMPANY / WONDERFUL CITRUS / **HEALTHCARE SERVICES, EQUIPMENT AND PHARMACEUTICALS** / BOSTON SCIENTIFIC CORP. / BROOKDALE SENIOR LIVING / CEVA SANTE ANIMALE / ETHYPHARM / GENENTECH, INC. / HOPITAUX UNIVERSITAIRES DE GENEVE / IPSEN GROUP / LEICA BIOSYSTEMS COMPANY / MAYO CLINIC / MEDTRONIC / MERCK SANTE / MERIAL / OHIO COLLEGES OF MEDICINE / OSU WEXNER MEDICAL CENTER / PFIZER – FAREVA / VIRBAC / WOOSTER COMMUNITY HOSPITAL / **METALS AND MINING** / ALCOA CORPORATION / ALLEGHENY TECHNOLOGIES / BARRICK GOLD CORPORATION / GBC METALS, LLC / HIRSCHVOGEL INC. / IMERYS / KAISER ALUMINUM CORP. / SEARLES CORPORATION / **MUNICIPALITIES AND GOVERNMENT** / CITY OF ALEXANDRIA, VA / FEDERAL AVIATION ADMINISTRATION / NATIONAL SECURITY AGENCY / OHIO DEPARTMENT OF DEVELOPMENTAL DISABILITIES / ORANGE COUNTY SANITATION DISTRICT / UNITED STATES DEPARTMENT OF LABOR / UNITED STATES MINT / **OIL AND GAS** / BP AMOCO / EXXONMOBIL CORP. / MARATHON OIL CORP. / SUNCOR ENERGY / SUNOCO...

NORTH AMERICA & ASIA PRODUCTIVITY INC.

375 Bridgeport Avenue, 3rd Floor
Shelton, CT 06484
Phone: (203) 225-0451 / (800) 966-5423

Register online: www.productivityinc.com
Email: lean@productivityinc.com

EUROPE PRODUCTIVITY INNOVATION

Paris – Lyon – London

LATIN AMERICA PRODUCTIVITY LATINO AMERICA

Mexico