

## Brownfield Transformation: 25 Years On, Fulfilling the Promise of Lean Manufacturing

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# Brownfield Transformation: 25 Years On, Fulfilling the Promise of Lean Manufacturing

Under intensifying pressure to relocate manufacturing to areas of cheaper labor, the challenge facing many traditional manufacturing locations in the United States and Western Europe will be to transform or close.

by **Kaj Grichnik, Christian Basedow, John Hedgcock, and John Potter**

In the 1980s, the West prepared for a manufacturing revolution. Japanese innovations of smoothly integrated production processes and advances in automation led U.S. and European companies to believe that a new dawn beckoned. In factories, it was predicted that manual labor would be widely replaced by machines to create “lights-out” facilities; and “lean production” systems would yield double-digit productivity improvements, allowing Western manufacturers to fend off low-cost competition from places like Japan and Taiwan.

In the United States, these predictions were accompanied by a flurry of activity. Many large companies started in-house programs to develop optimum production approaches. By the 1990s, university programs like the Leaders for Manufacturing (LFM) program at the Massachusetts Institute of Technology and the Master of Management and Manufacturing (MMM) at Northwestern University were established to train the best and brightest in emulating Japanese manufacturing principles. Business publications featured more articles about manufacturing than ever before. The factories of the future, they confidently proclaimed, would hum with best practices.

The predictions came true — but only in a very few plants, and typically those built on greenfield sites. Almost all the top-performing plants in the West today

were established after 1985; lean manufacturing capabilities were embedded in them from the start. For example, Nissan and Toyota opened numerous greenfield plants in the U.S. and England in the last couple of decades and set new records for productivity. Yet in the industrial heartlands of North America and Western Europe, manufacturing plants commissioned before that year — the so-called brownfield sites — have proved largely resistant to change.

Now, the pressure on Western manufacturing is intensifying once more. Companies are increasingly tempted to move manufacturing operations to new plants in low-cost countries — or buy from suppliers that have already done so — in order to take advantage of greenfield operational capabilities and cheaper labor. Moreover, a more open regulatory environment in China has put that nation’s vast consumer base within reach for Western manufacturers, who cannot afford to ignore the potential markets there or in other newly emerging regions like India and Eastern Europe.

The effects are already being felt in the West. In 2005, 10 times as many manufacturing jobs disappeared to the East each month as did in 1985. These job losses have shaken trade unions in North America and Western Europe. Once fiercely opposed to anything but full employment, unions are slowly facing up to the

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need for more flexible working practices to forestall more pain among their membership.

Clearly, the imperative to transform established manufacturing plants in North America and Western Europe has never been more pressing. Our research suggests that a 15 to 30 percent cost improvement is achievable and, at least in the short term, would be enough for most languishing plants to fend off Asian competitors. However, this optimistic assessment is more than offset by the stubbornly large gap in operational performance between excellent and average factories in the West.

So, if the potential efficiency gains exist and management has the will — and the need — to make it happen, what will it take to transform the brownfield plants?

There has been no shortage of initiatives intended to revive established manufacturing locations in North America and Western Europe. But the failure rates for plant turnaround in these areas are striking. Few manufacturing professionals today have any difficulty describing their vision of how excellent factories should operate. They are highly knowledgeable about the leading manufacturing techniques. Knowing the theory is one thing, of course; making it work in practice is quite another. Despite the fact that practically all of the relevant elements have been public knowledge for nearly 20 years, few brownfield plants have successfully made the transition to lean manufacturing.

The primary problem for brownfield plants is that executing a manufacturing vision is a lot easier said than done. Toyota Production System emulators often give the ingredients but no recipe — the sails but not the rudder. As one experienced manufacturing executive told us: “Lean manufacturing may not be rocket science, but implementing it is like advanced rocket science.”

In particular, four fundamental sets of questions often remain unanswered in attempts to transform plants:

**Mission.** In which operations can enhanced production systems truly make a competitive difference — and hence, where should a manufacturing excellence effort be focused? To succeed, a brownfield transformation must have a fighting chance in the first place. The hard fact is that some manufacturing environments will just not be able to fend off competition by instituting manufacturing excellence. Failure may be due to the culture of the plant, the profile of its employees, or gridlocked industrial relations.

But most often, failure occurs because some manufacturing technologies in the West, no matter how innovative or how service- and response-focused they are, cannot compete against factories in low-cost countries — and that would be true even if productivity were improved by double-digit numbers. This is frequently the case in manufacturing operations involving a significant labor component.

In those cases in high-cost regions, very little can be done to counter the labor rates available in the East. Some Western manufacturers believe that the extra expense of shipping from the East to markets in Western Europe and North America will protect their manufacturing assets; others feel the higher quality of their Western goods favors them over any manufacturer based in the East. However, neither of these factors is likely to provide a sustainable competitive weapon. Eastern European manufacturers are increasingly competitive, even in such quality-oriented, regulation-driven environments as aerospace components manufacturing.

Before engaging in a brownfield transformation program, it makes sense to select those technologies that

are most likely to deliver competitive advantage for at least the next five years. This analysis has led some of our Western European clients, for example, to split their plants into two categories: those that are labor-intensive and use standard technologies, and are therefore best divested to the East, and those in which manufacturing excellence is required and can be implemented. Some U.S. clients have even separated their production technologies into three groups: parts manufacturing that is, for example, best located in China; component sub-assembly that is best located in Mexico; and final assembly that, for the time being, remains in the U.S.

**Methods.** What is the plant's underlying performance problem? Will the new production system truly resolve the issues? What tools will give the most bang for the buck? Once the mission has been clarified, a targeted methodology can be employed. This methodology recognizes that it is not cost-effective — or feasible — to transform all aspects of a brownfield operation simultaneously. The belief that a production system will bring the desired benefits only if all elements run in concert from the start is a misconception. In fact, the term system is something of a misnomer. In brownfield plants, it is important to choose only those tools that most directly affect the plant's critical weaknesses. In this way, the plant community is spared unnecessary implementation pain — and management gets the largest and quickest return on project investment.

Creating focus in this way makes sense from an economic perspective — it reduces the initial investment required. It also significantly enhances the chances of success. The single biggest complaint shop-floor workers have about large manufacturing improvement programs is that management tries to tackle too many imperatives at once. Executives might try to enhance asset utilization while simultaneously reducing the payroll and improving product quality, for instance. This approach demotivates people and is often unnecessary.

Rather, the focus should be on the prime imperative. This creates clarity and consistency for those who have to carry out the bulk of the implementation. The other imperatives can be considered later, once the initial gains have been achieved.

Once the prime imperative has been identified, the key elements from the production system's toolbox for capturing value can be identified. The most basic view of production systems assumes that improved performance comes from implementing more intelligent processes and working practices. With this in mind,

many plant transformations start with embedding concepts like *kanban*, multiskilling, and *pokayoke*.

But in brownfield factories, inefficient practices and processes constitute only one of three reasons for poor performance — and represent only 40 percent of the potential gains in productivity. Our research indicates that pure overstaffing — more personnel than work — on average constitutes 35 percent of the potential, and redundant or low-value-added tasks constitute another 25 percent. No change in working methods is required to tap these two sources of inefficiency.

In Western Europe and North America, the average plant has at least as much to gain from eliminating excesses as it has from embedding more intelligent work practices and processes. However, traditional production systems offer little guidance on how to identify these excesses — and even less on how to remove them in the Western context of labor laws and unions. This is not surprising, as these production systems are typically designed for consensus-oriented, greenfield environments. Many attempts to install production systems fail because companies ignore these simple facts. Indeed, implementing smarter practices and processes in overstaffed plant organizations is a steep uphill battle, primarily because overstaffing is a significant cause of undermotivated plant communities. We call this the “fat ballerina” principle: A manufacturing operation should really get in shape before starting to dance.

**Momentum.** What is the best way to spread the new knowledge across plants and hierarchies, countries, and cultures? And how can employee motivation and senior management sponsorship be secured along the way?

Sustained momentum is required to overcome cultural inertia. Most brownfield shop-floor communities are only loosely attached to the interests of the company. The typical operator or technician is tired of repetitive and top-down improvement efforts and suspicious of the intentions of senior management. Even plant managers, more often than not, show a stronger loyalty to their profession and their region than to the company that employs them.

The average tenure of a brownfield employee is 20 years. In that time, he or she witnesses many step-change improvement programs come and go without discernible effect. How can these jaded employees be motivated, with such a negative atmosphere hanging over the workplace?

In our experience, there are three basic ways of

engaging plant communities to support substantially new ways of working:

- Instilling fear (“We’ll move the plant to Ukraine”): This tactic is inevitably less effective each time it is applied; it typically works just once or twice, and then only if credible.
- Leveraging greed (“If asset utilization increases by X percent, the team will receive a bonus of Y”): The problem with this approach is that the reason the new system is introduced in the first place is the need to create savings. And the effect of bonuses is temporary. Yet there is no doubt in our minds that almost all manufacturing excellence programs fail to share enough gains with shop-floor communities.
- Generating pride (“We’ll show the executive suite that we’re the best”): This is the most sustainable tactic, but the hardest to pull off. A successful example is tire company Michelin’s motivation of the workforce at one of its plants.

Brownfield transformations require not just commitment from senior management, but also ongoing financial and emotional support. The potential benefits are substantial, but not instantaneous. For instance, full implementation of a production system in a network of about 25 plants will take more than four years — and could cost as much as €15 million (US\$20 million) in project and capital investment.

If everything goes well, for example, a program designed to increase capacity by reducing bottlenecks might produce a yearly volume increase of 10 percent after a period of time. And if a cost reduction program based on head count is effective, it might take up to two years to see any financial benefit after dealing with union restrictions and severance payments. These durations test the limits of patience of most senior corporate managers.

**Measurement.** What is the best way to ensure that benefits are measured, monitored, and managed?

A common problem faced by manufacturing companies is that once they have successfully formulated a production system and gained the required support, they have lost critical momentum. A primary reason for this phenomenon is that management is unable to gauge improvements and manage change. And typically, managers fail to communicate the benefits of the system to the thousands of practitioners across divisions and plants.

Many companies’ production systems become

completely gridlocked at some point in the first two years because of basic dilemmas. For example:

- Do we roll out the system to the whole network simultaneously, or over time in a sequence of pilot schemes?
- Do we use trainers or directly reeducate the shop-floor personnel directly?
- Do we farm out implementation to the local branches, or centralize the scheme and manage the programs from one base?

Our research suggests the most successful approach is to:

- Use waves of deployment — don’t try to do everything at once. A successful pilot in one plant improves the chances that other plants will adopt it. It also helps senior management to ensure an ambitious yet realistic program.
- Reeducate shop-floor workers directly. Japanese-style “road show” approaches, in which a task force is dispatched to factories by corporate headquarters to train workers during a series of short sessions, look good and create a brief sense of excitement. But once the task force has left, the plant workers shrug their shoulders and don’t know what to do. Then they often drift back to the old ways of doing things. A constant training presence in the plant is needed, and this atmosphere of continuous training should be maintained by more than one or two dedicated people.
- Centralize — don’t disperse responsibility. Most attempts to install production systems follow the “set goals centrally, then leave the program to the plants” principle. This is easy to sell to the plant communities, but doesn’t allow for the constant juggling of disparate elements: quality, output, cost, and safety. Step-change objectives easily get lost among these daily variables. Pace is another issue. Many plant communities have become conditioned to incremental change. Ask a production manager what reasonable targets are, and the answer is unlikely to be more ambitious than “beating inflation: 2 to 4 percent per annum.” A central team is required to instill pace by setting higher targets and by pushing through initially unpalatable tasks that will serve the company better in the long run.

However plausible they may seem, in practice these recommended solutions are rarely found in combination. The simple fact is that they require more patience and more investment than is generally known. Lack of patience often prohibits management from properly implementing these solutions, except in companies that have clearly decided that manufacturing is essential to preserve or build competitive advantages. Confectionery and beverages giant Cadbury Schweppes, for example, decided that manufacturing success or failure should be viewed over a five-year rather than six-month term. Cadbury also ensured the right level of central support, and rolled out a well-thought-out and smartly sequenced set of methodologies. One of its first methodologies was to standardize the nomenclature of who did what in plant functions, which greatly facilitated cross-plant comparisons and best practice exchanges.

Faced with low-cost competition, many manufacturing operations in Europe and the U.S. are under pressure to produce more with less. That pressure will only increase. For these operations, the time has come to pursue the lean manufacturing potential that has been dormant for well over a decade.

The current offshoring debate represents both a threat and an opportunity. Most unions, works councils, and governments in the West are undoubtedly becoming more desirous of a transformational approach in which dying brownfield plants are overhauled into highly productive factories. And senior management is more amenable than in past years to listening to creative and sometimes even futuristic concepts such as the “digital factory” and “instant manufacturing,” which hold out the hope of massive productivity gains. For all sides, the alternative is the wholesale destruction of a large part of a manufacturing base that once was the bedrock of Western nations.

Yet, despite the growing political will to do so, converting brownfield plants in Western Europe and the U.S. will not be easy. It requires a fundamentally different approach. We are optimistic, however, that if the issues are addressed head on, the promise of a new dawn for manufacturing in the West can, finally, become a reality. +

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## Resources

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Kaj Grichnik, Conrad Winkler, and Peter von Hochberg, “Manufacturing Myopia,” *s+b*, Spring 2006: How manufacturers can avoid drifting into decline and irrelevance. [www.strategy-business.com/article/06105](http://www.strategy-business.com/article/06105)

Hans-Jörg Kutschera, Peter Obdeijn, Michael Ilgner, and Peter von Hochberg, “Relocate? Transform? Which Option Is Right?” *s+b Resilience Report*, 10/17/06: A guide to decisions that could maximize manufacturing efficiency. [www.strategy-business.com/resilience/rr00037](http://www.strategy-business.com/resilience/rr00037)

Jeffrey Rothfeder and Georgina Grenon, editors, *Manufacturing Realities: Breaking the Boundaries of Conventional Practice* (strategy+business Books, 2006): The book from which this article was adapted offers a set of solutions for the crisis facing manufacturing today. [www.strategy-business.com/manureader](http://www.strategy-business.com/manureader)

James P. Womack and Daniel T. Jones, *Lean Thinking: Banish Waste and Create Wealth in Your Corporation* (Free Press, 2003): Contains excellent brownfield transformation case studies. [www.amazon.com/o/ASIN/0743249275/](http://www.amazon.com/o/ASIN/0743249275/)

James P. Womack, Daniel T. Jones, and Daniel Roos, *The Machine That Changed the World: The Story of Lean Production* (Harper Perennial, 1991): Likely the most influential book on lean production ever published. [www.amazon.com/o/ASIN/0060974176/](http://www.amazon.com/o/ASIN/0060974176/)

Lean Enterprise Institute Web site: A wide-ranging repository of information about lean manufacturing. [www.lean.org/](http://www.lean.org/)

Manufacturing Realities Web site: A site devoted to coverage about alternative approaches to conventional manufacturing practice. [www.manufacturing-realities.com/](http://www.manufacturing-realities.com/)

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