

The Factory Powerhouse

**White
Paper**

Factory Acceleration

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Biography:

Peter Bowen began his career as Head of an undergraduate teaching department in the Behavioural Sciences in the University of Northumbria, Newcastle upon Tyne. He has also been a Director of the Centre for Employment Policy Studies, Henley Business School. This career also involved research in workforce performance and behaviour for the Social Science Research Council and in white collar workforce performance for the Anglo German Foundation.

He holds first and higher degrees of the Universities of Leicester and Durham in the UK. He is also a Fellow of the Institute of Personnel and Development, London. He left academic life to found MPL and develop ideas and methods of business, workforce and workplace performance, which are now the focus of his work.

In this role Peter has shaped and influenced the thinking and activities of over 200 UK, European, African and US businesses in their interpretation and implementation of lean management and accelerated savings programmes. Fundamental to his approach is the high value of actively involving first line management and operational work teams in the development of business solutions which integrate the motivational aspirations of workforces with the performance requirements of their employers.



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A Factory Powerhouse is the term we use to identify highly competitive factories capable of measuring and sustaining long-term continuous improvement. They use powerful integrated data management and process management methods to keep ahead. They invest in constant skills development. They prefer to measure their success in real-time financial measurement. They plan to keep ahead.

How do manufacturers build competitive advantage? How can they build momentum to stay sensitive to their markets and respond quickly to threats and to opportunities? How do they stay ahead of the game? How do they respond to uncertainty? And how do they create the manufacturing capability, the performance powerhouse, to do all of this?

Often businesses develop from entrepreneurial initiative; by differentiation from an existing product or service, by innovation, by niche recognition. Our interest is in the resilient manufacturing business which manages the transition well from inception to robust performance in volatile markets. How do these businesses build reliable defences against competitors? How do they continue to sustain competitive advantage in their markets?

Powerhouse Factories build the right solutions. They develop entrepreneurial know-know to drive continuous improvement long-term. They initiate fast short-cycle management operations across their functions and then develop common purpose operations management across their businesses. Their focus becomes increasingly cross functional and their aim to add value to their outputs at every stage.

These are the manufacturers who single out their factories as vital agents of business profitability. This is where the tools and techniques of operations management are learned and sharpened most keenly. And this is where added value can be generated more rapidly than the competition.

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Factory Powerhouses use high performance management systems; accurate data management, accurate throughput and the continuous improvement of their capability year on year on year. These are the defining characteristics of the factory powerhouse.

Powerhouse Principle 1: Every Minute Counts

One of the most important features of the Powerhouse Factory is its ability to minimise wasted time. To perform only those tasks which add value to customers. The message 'Every Minute Counts' applies here; a constant call to action to deliver on time and in full, reliably and repeatedly. To achieve this, performance is repeatedly measured and actions taken to maintain optimum results.

So the first step in powerhouse management is to generate very accurate data concerning the reliability of factory performance to plan, and at the shortest intervals possible to enable immediate corrections to be made.

This is easier to say than to do. It raises the problem of how we ensure the collection of accurate data on time. Smaller manufacturers may operate limited automatic data collection, or none at all. And where automatic data collection exists, these more complex systems may be used ineffectively.

This prompts the question of how we develop Powerhouse mind sets in management and their teams to recognise the vital importance of regular factory performance data. Inevitably this is a difficult learning process. Yet to establish an accurate manual data collection data system or to install a simple automatic data management system is really the first major step factories must take to build the power house culture. The cost of indifference to this is huge (in terms of both threats and opportunities) and there is no way around it. The ability to build long-term continuous improvement capability, the Powerhouse culture, begins here.

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So this is Powerhouse principle number 1, and it is a very simple message. Collect data which can measure the pace and accuracy of your results to plan. Build plans, run schedules, track them, measure them and improve them. This is the use of the Plan/Do/Check/Improve circuit. Use it repeatably. Operate it tightly to plan. Reduce variances. Find new ways of improving it. Repeatably. 24/7.

Take a look at how a couple of lines in the same factory perform. They are based on the three linked measures of Overall Equipment Efficiency (OEE) which indicate how well the line is running to plan and target.

Line 1: Availability x Performance x Quality = 75% OEE. This means that this line is running effectively for 45 minutes in the hour.

Line 2: Availability x Performance x Quality = 50% OEE. This means that this line is running effectively for 30 minutes in the hour.

The difference between the two lines shows that Line 2 is performing less efficiently and effectively than Line 1 and this could be for any number of reasons. In both cases however the lines could probably do better and achieve higher OEE values by the application of similar solutions. These are the solutions which the tools and techniques of operations management provide. They are a learned solution, and the powerhouse factory will deliver repeatably as a discipline.

However, there is a more significant learning point still. Line 2 is operating productively on average for only 30 minutes per hour of its operation and line 1 for 45 minutes. For each line in the factory this critical result is indicating the hourly loss of time and resource to the business and to its profitability.

So we start from this simple calculation, but one which is the clearest indicator of manufacturing underperformance we can find. Every minute lost is an opportunity lost and it is an opportunity which the underperforming factory offers to its competitors.

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“Whatever the causes, an indifference to wasted production time and its causes is a clear signal of underperformance. To resolve it requires close attention to the collection of data and its interpretation.”

The problem is that results like these are not unusual. At their most extreme you will find them in factories with poor data collection and limited short interval control methods of management. They can survive in tolerant markets. In aggressive markets they will struggle to compete. There is no suggestion that underperformance is ignored but it may be recognised.

There is no suggestion that underperformance is being ignored, but it may be unrecognised. There are several reasons for this. Perhaps the most important are the informal accommodations between managers and their functions which deflect results and outcomes. These are the ‘indulgency’ patterns which maintain factories as much by unwritten agreement as by explicit rules. These are behavioural effects: they exist wherever people lack clear rules of engagement, or operate in factory environments with unclear focus or purpose.

Whatever the causes, an indifference to wasted production time and its causes is a clear signal of underperformance. To resolve it requires close attention to the collection of data and its interpretation. Wherever we see persistent attention given to the reduction in waste, especially the elimination of wasted minutes, the more likely will be the improvement of performance.

This is the factory powerhouse standard: count every minute – make every minute count!



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Powerhouse Principle 2: Streamlined Factory Flows

The disjointed factory whose separate functions are poorly aligned is a further indicator of poor performance. Here, each management function (production, engineering, IT, finance, procurement, HR and the rest) has its distinctive contribution, but overall the business lacks the level of common purpose sufficient to maintain clear customer focus.

Boundaries between these functions can divert and hinder smooth supply chain flow. This duplication of effort adds cost and not value. This problem can intensify as manufacturing businesses enlarge.

Here is an example of poor boundary management. A Production Manager manages the units produced on his production line against clear performance targets and standards. The Quality Department inspects the line and has the authority to halt production to ensure a sub-standard fault is corrected. The production manager overrides this decision by allocating units to rework to keep the line in progress. Reworked units are then collected in a separate area on completion, and additional costs are incurred. This is an informal, unplanned trade-off which exists in the absence of explicit solutions and cross functional cost benefit evaluations

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Organisational design issues are usually the problem here. Vertically driven line and staff organisations often impede the speed and smoothness of horizontally driven flows. The use of cross-functional Service Level Agreements is available as a technique to reduce boundary frictions of this kind.

Flow-driven manufacturing by multi-disciplinary teams is a longer-term solution to streamlining, emphasising the Just In Time, Right First Time priorities involved. The core Powerhouse discipline here is operations management and its application to factory supply chain management is instructive.

In food manufacturing, for example, a 2016 supply chain and logistics survey of challenges facing its respondents listed the top three as on time in full deliveries, cost reduction per case delivered and relationships with retail customers (Food Manufacturing Group: Supply Chain and Logistics Survey 2016). These challenges are hardly new! Their persistence suggests a need for better cross-functional performance reporting, and an ability of factory senior management teams to improve factory profitability.

MRP systems already exist to measure the accuracy of end to end supply chain performance. The issue is that they can be time consuming and expensive to implement and therefore prohibitive to some manufacturing companies. There is a clear need to provide individual factories with Management Information Systems supported by the use of operations management techniques enabling performance to improve, stabilise and improve again over long periods.

The Common Purpose management team's first priority is to maintain the smooth flows of Powerhouse factory performance. This is the unique know-how/can-do formula which separates the competitive factory from the rest

This is the second Powerhouse principle: reduce the number and cost of separate management touch and pinch points to in the chain. Accelerate smooth, uninterrupted flow time speeds. Encourage cross-boundary collaboration.



Powerhouse Principle 3: The Learning Loop

Competitive advantage is enhanced wherever management and key operating teams are contributing actively to throughputs by agile cost reduction.



But competitive advantage is given away at no cost to the competition wherever a factory best practice skillset is not developed, and where the skillset of continuous improvement manufacturing is not continuously practiced.

This is the skillset which drives factory managements into the Powerhouse league, regardless of business size. Fortunately, it can be acquired relatively inexpensively and ideally it should be introduced as early as possible in the development of any factory business.

What is a Learning Loop?

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 This is the Powerhouse standard: build multiple learning loops which propel long-term, measurable continuous improvement: multiply learning touch-points for continuous skills improvement. Use learning loops to maintain competitive advantage. 

Experience shows that the use of these techniques enable factories to improve their core key performance targets over longer and longer periods of time. These include output, productivity, performance and quality KPIs. When factories can demonstrate several years of continuous improvement in Overall Equipment Efficiency (OEE) through the use of learning loops, we know that this is a behavioural reinforcement technique of some power.

Powerhouse factories are familiar with these techniques.

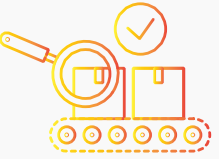
The use of three-tier management learning processes at shift, middle and senior management levels provides a powerful platform for continuous improvement and added value applications. It is the framework for a common purpose operations outlook which is not confined only to managers but extends to all.

Here we move from the world of MIS/MES to the behavioural culture of know-how and can -do. The cutting-edge behaviours of Powerhouse factories are developed here. The will to improve, and to keep improving.

Winning cultures are shaped by individual achievement, and personal achievement is driven by learning. They are driven also by successful teamworking, and by cultures of common purpose. These cultures are skills-driven, problem-centred and results - focused in competitive factories.

So the reduction of unnecessary touchpoints and pinch points in pursuit of optimum flow in factory supply chains is the outcome of sound operations management. This is a learned discipline, and its learning loops activate continuous process improvement.

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Powerhouse Principle 4: The Factory Balance Sheet

How far can factories operate to measure their own direct profitability? How do they measure the value of their own continuous improvement? To what extent should they be encouraged to invest their added value in further factory development?

Creating meaningful targets of manufacturing performance, preferably financial targets, gives the clearest factory performance statement of all. A factory profit and loss statement equivalent is needed, and one which reflects activities which can be directly influenced by manufacturing units themselves. Too often financial targets are measured by wider business accounting requirements. They lack the real-time urgency of production margin management, which a local MIS/MES system delivers.

Here is a typical KPI range which such systems deliver:

On time in Full – The % of times customers receive the entirety of their order, to the correct specifications, and delivered at the expected time.

Capacity Utilisation - Indicates how much of the total manufacturing output capacity is being utilised at a given point in time

Production Attainment – A measure of what % of time a target level of production is attained within a specified schedule of time.

Overall Equipment Effectiveness (OEE) – Used to indicate the overall effectiveness of an entire production line or site.

Quality - % of products that are manufactured correctly without scrap or rework.

Cost per unit -Total Labour and Materials cost divided by the units produced.

Profit per unit – Total revenue minus the total cost, divided by the number of units produced,

Stock Turnover -Dividing the cost of sold goods by the average inventory used.

A first-stage reporting dashboard containing basic performance reporting against a business plan might be:

PP This is the Powerhouse method; Measure factory performance using KPIs which focus on real-time financial added value or loss. Create organisational structures that optimise flow. Build senior management and factory teams with the know-how and can-do to add value continuously. Every minute counts! PP

1 Produced variance from plan (£)	Calculate £'s produced -£'s planned
2 Production service level (%)	Number of Works Orders completed to correct units/ Planned units
3 Schedule attainment (%)	Absolute no of units produced /no of units planned
4 Labour Variance (£)	Actual Labour Cost £s -Standard Labour £s
5 Materials Variance (£)	Actual Materials Cost £s – Standard Materials £s
6 Performance Variance OEE (£)	Actual Minutes Cost £s - Standard Minutes £s
7 Cost per pack (£)	Absolute no of units produced / Total production costs £s
8 SKU margin (£)	Absolute no of SKU Works Orders / no of planned margins attained %

The use of factory performance dashboards is a worthwhile first step to overall manufacturing unit reporting. These dashboards provide teams with hourly or real-time data on throughput, and also reason codes to explain variances to plan. This is the pathway to the visual factory and with it to the introduction of a vital workplace learning loop: front-line variance management. Data can be collected automatically or manually, but its availability is key to the operation of proficient factories.

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SUMMARY

Creating the factory Powerhouse..

- is a learning journey and requires concerted factory management leadership.
- is a business journey which builds a powerful sense of factory competence to manage itself.
- above all, is a competitive journey where the will to keep ahead of the rest is developed and sustained.
