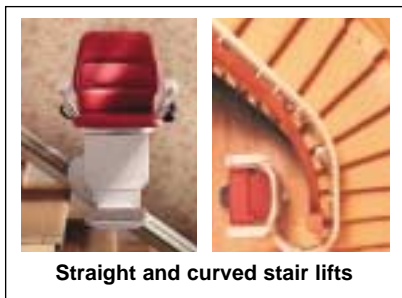


Step Change Improvement at Stannah

Tim Eagles, Stannah Stairlifts Limited

ABOUT THE COMPANY

Stannah Stairlifts Limited is a family-owned business, employing 600 people. It is based in Andover, Hampshire, where it has manufacturing and distribution operations and further manufacturing is located in Blaydon, Tyne and Wear.



Straight and curved stair lifts

The company produces two types of stairlift – one for straight staircases and one for curved. The situation is slightly complicated by the range of options each product must feature (colour, variants of seatbelt, control systems to name a few) – there are over 440,000 valid variants of each product! Manufacturing is deliberately a mix of lean and agile operations because of this. Each stairlift order must be custom configured, but major sub-assemblies (chair, carriage, installation kits) are identical and built-to-stock.

Stannah has invested heavily in production facilities, with metal fabrication (laser cutting, bending, welding), powder coating, final assembly and distribution operations all in-house.

INTRODUCTION

If you say the word 'stairlift' to someone in the UK, they are very likely to say 'Stannah' in response; such is the brand association with the product.

Stannah Stairlifts Ltd. are the largest stairlift manufacturer in the world and their products are distributed in over 40 countries, a fact recognised with Queen's Awards for Export in 1987, 1994 and 1999 and since the 1970s, its products have helped solve stair-climbing problems for more than 250,000 people.

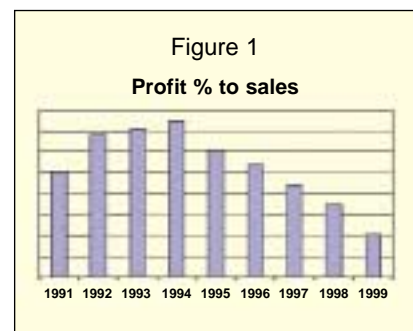
With leadership of a growing market (fuelled by favourable demographics), Stannah appears to be ideally positioned for a healthy future. However, this has not always been the case. Back in 1999, profits were low and declining, quality was poor and delivery inconsistent.

This article describes the turnaround that has taken place in the past five years, a journey driven by 'blood, sweat and tears' rather than a 'eureka' moment. It is an improvement that was recognised with the 'Best Engineering Plant' and 'Manufacturing Plant of the Year' Awards at the 2003 Manufacturing Awards, sponsored by Cranfield School of Engineering, the DTi and Management Today magazine. More importantly for Stannah, it has been a journey back to stability and profitability, and one which has allowed Stannah to retain manufacturing within the UK.

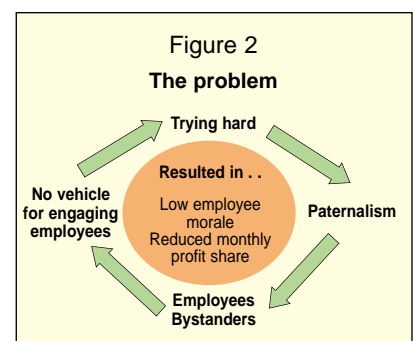
BACKGROUND

In order to understand Stannah's position in 1999, a little history is required. Between 1990 and 1995, Stannah grew rapidly on the back of TV advertising in the UK and growing exports. The market leadership and sliding pound produced price increase and good profits. The challenge was actually making enough product to support sales. Because of this, and not

surprisingly, insufficient attention was paid to the fundamentals of cost, quality, delivery and people development.



Between 1995 and 1999, competitors became more aggressive and the weakening currency situation effectively produced price reductions in export markets. Sales volumes also stalled and profits declined, a fact illustrated in Figure 1. Given the apparently linear decline in profitability, the company needed to change, and change rapidly. However, within the company's paternalistic culture, senior management found it difficult to explain the situation, there was no vehicle for engaging employees who were effectively bystanders and morale inevitably suffered. This downward spiral, shown in Figure 2, had to be broken.



1999 – BACK TO BASICS

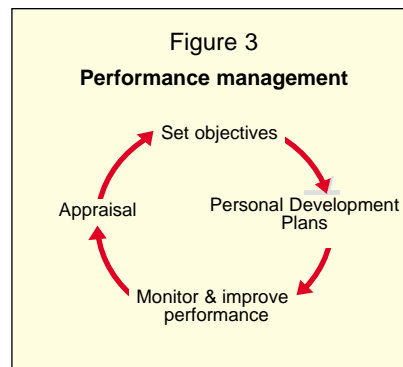
Profitability had to be improved, but so did quality, cost and delivery performance and the Stannah senior team committed to three initiatives to underpin the improvement drive:

- **Performance management:** individual objectives that linked to the overall business objectives, consistent communication of six key company performance measures and improved communication including team briefs and lots of ‘management by walking about’.
- **Continuous improvement programme:** everyone was trained in problem solving tools and techniques and full-time resource was dedicated to making it work.
- **Operational effectiveness:** customer feedback (both internal and external) was captured and utilised to drive improvements within the Stannah operation.

In order to further focus on the size of the prize, the senior team made a ‘Crosby-esque’ estimate of the cost of non-quality; this showed waste to be three times greater than company profits at that time! This certainly aided the decision to commit time, resource and money to the improvement initiatives.

PERFORMANCE MANAGEMENT

People needed to understand how they fitted into the bigger company picture – why and how their contribution mattered. Virtually the first step taken was to share the poor position that the company was in – previously the prevailing paternalistic culture meant that managers sought to ‘protect’ their staff by putting a positive spin on any bad news. Products were arriving on-time, but not in-full; they were delivered with several problems that were fixed by the installer. Stannah’s reputation for reliability and quality was suffering amongst its’ distributors and profitability was slipping - the trend shown in the profitability graph (Figure 1) made such a large impression that it is now simply known as ‘the graph’.



Stannah introduced a performance management cycle that linked business goals to individual objectives through an annual appraisal system, shown in Figure 3. It starts in September of the preceding year with discussions of goals for the coming year. In January, the Managing Director briefs the annual company business objectives to all staff. This is done in small groups of approximately 30 people to stimulate a more question and answer session. Department level briefings then follow, before individual objectives are discussed and agreed. Company achievement against objectives is communicated through departmental team briefs and much MBWA (management by walking around). Six key metrics were introduced to monitor and communicate overall performance:

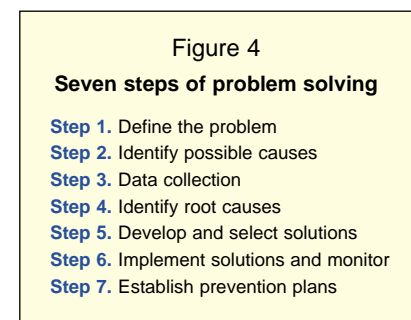
1. Sales against target.
2. Cost reductions against target – labour, materials and overheads.
3. Performance plan payments (the monthly profit share scheme).
4. On-time in-full delivery to customers against target.
5. Out of box against target – a measure of product ‘right-ness’ at installation (did all the bits arrive as ordered? Did the product work first time?).
6. Product reliability against target – measured over the first three months of working life.

CONTINUOUS IMPROVEMENT PROGRAMME (CI)

Stannah had had at least two previous attempts at CI, but on each occasion, the initiative fell by the wayside as other business issues (typically production pressures created by sales growth) became flavour of

the month and enthusiasm waned. This time significant dedicated resource was given to the programme - three employees, who had previous experience of CI techniques, were dedicated full-time to the programme. External consultants were also used to help kick-start the programme. It was almost an act of faith that it would work this time - although senior managers understood the size of the prize, the dedicated resource represented a substantial cost with an ill-defined payback.

The CI programme was based on a relatively simple 7-step problem-solving process, shown in Figure 4. The process provided a platform for local change and required people to clearly define the problem and identify root cause before any potential solutions were brainstormed. It sounds relatively easy, but the skill is in clearly defining the problem and avoiding the urge to jump straight to ‘solution mode’, irrespective of whether someone (usually a manager) believes they have the perfect solution.



CI teams were piloted in each area within the business in order to gain initial successes and build momentum. At first, teams were given the remit to work on anything that they felt important, which led to some teams working on ‘hygiene factors’ (the colour of window blinds, vending facilities etc) which frustrated certain managers. However, once the teams had cut their teeth on these initial problems and gained enthusiasm and experience of the process, they were guided to focus on more business critical issues.

Over a period of six months, all employees were trained in problem-solving, and over twenty CI teams established across the company.

Some even co-opted suppliers and customers into teams to help address certain issues.

CI has been successful (this time) because of Stannah's commitment to make it happen – it has not been just another initiative, but an appropriately resourced long-term commitment that has been woven into the 'way that we do things around here'. CI was linked into HR activities by including it on individual's objectives, appraisals and recruitment processes, 84% of people have been involved in at least one CI team. Over £2 million savings were achieved in the first three years of the programme and a wide variety of improvements made that have made people's working lives easier and helped to change attitudes. As a result, people feel more secure, they are more capable of initiating and absorbing change and they feel they can make a difference. It is also important to understand that their growing business absorbed the improved efficiencies without significant redundancies – how you motivate people to make improvements for the greater good of the company, but that may put those individuals out of work, is an entirely different proposition.

OPERATIONAL EFFECTIVENESS IMPROVEMENTS

The business KPIs suggested there was much improvement required and the CI programme began to address many of these issues 'bottom-up'. In addition, cross-functional projects were initiated to make other substantial and sustained improvements. The remainder of this article will focus on these manufacturing and operational improvements by walking through the supply chain.

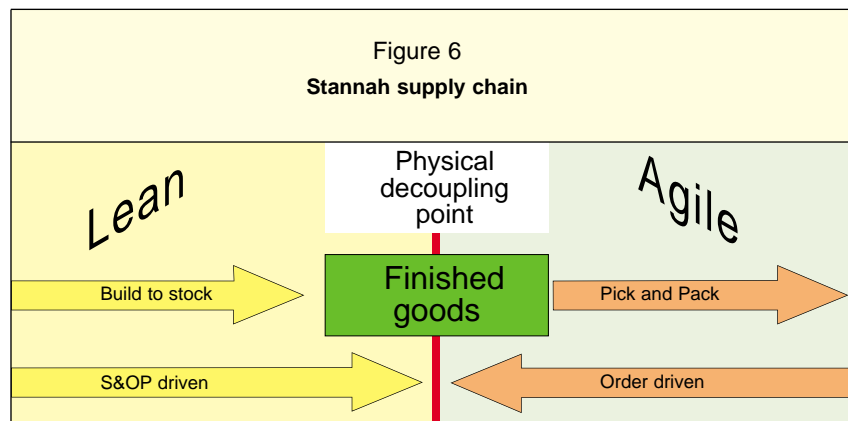
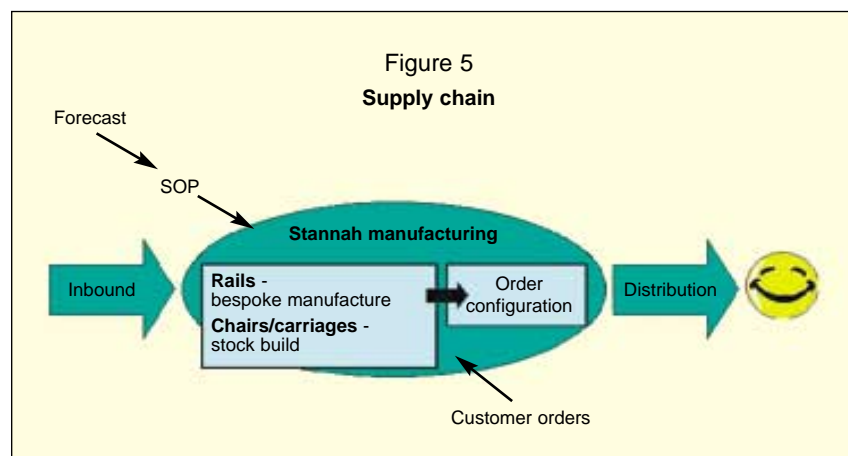
Figure 5 shows a schematic view of the supply chain. It is managed through a monthly Sales and Operations Planning (SOP) cycle. Rails are bespoke manufactured which dictates the customer lead time – which are currently 3 days for a straight lift, and 15 days for a curved lift. Chairs and carriages

are built-to-stock in order to maintain sufficient strategic stock to allow for the inevitable peaks and troughs of demand within the order configuration process. This strategic stock effectively physically decouples the lean processes from the agile processes within the supply chain, as shown in Figure 6. Customer ship-date drives the order configuration process within which individual orders are picked and packed. Distribution manages the outbound shipment to customers worldwide, be that a single order being picked up by a local installer, or the packing and despatch of a 40 ft. container to Japan or USA.

10 days ahead. This has reduced finished goods inventory to a strategic stock equivalent to between 4-6 days of sales. A new, larger warehouse would have been required had this not have been possible.

INBOUND SUPPLY

Prior to 1999, Stannah purchasing was relatively transactional, confrontational and reactive in style; there was little strategy that focused on developing the supply base to provide competitive advantage and they had simply outgrown several long standing suppliers, exposing capacity and capability problems.



The SOP process has evolved to mirror the other improvements across the business. In 1999, Stannah struggled to adhere to a traditional three-month fixed production window, which it did unless, as happened relatively frequently, order intake exceeded forecast. The current process takes advantage of the capacity flexibility now designed into the Stannah operation. Production rates are now set weekly looking only

Component ordering processes were not robust, and frequent line stops occurred – 400 hours per year was not uncommon. Things had to change!

The first step was the introduction of a more collaborative relationship management style – 'Buyers' became 'Supplier Account Managers' and were encouraged and supported to achieve membership of the Chartered Institute of Purchasing and Supply.

An annual supplier conference was introduced to present and discuss Stannah's performance and future plans. A purchasing brochure was produced to market Stannah to (and condition) current and prospective suppliers. Supplier performance measurement was also improved with the introduction of a vendor scorecard. This provides a composite, quantitative view of supplier delivery, quality, commercial and product development performance and even allows the relative performance of single source suppliers to be compared and publicised – not surprisingly, no supplier wants to be bottom of the league!

Poorly performing vendors have been replaced with more capable suppliers. Given Stannah's growth, such suppliers are typically larger, many with automotive experience (but looking to decrease their exposure to this sector) and several based overseas.

Ordering processes were also dramatically improved. True Kanban systems were introduced and have continued to be improved and refined. Annual blanket purchase orders are now placed with the top 35 suppliers (representing 90% of total spend) and many now manage their own re-supply processes; Vendor Managed Inventory (VMI) sees local suppliers deliver directly to point-of-use in the factory, whilst factory webcams allow more remote suppliers to monitor stocks via the internet. One such webcam allows their largest supplier (by spend) to achieve 37 stock turns a year, using one delivery per week from Germany and with no intervention from Stannah. The improvement in delivery systems has reduced downtime to an average of under 2 man hours per week, freed Stannah personnel to add value elsewhere, and improved flexibility to the extent that production has on occasion been increased by 50% at 10 days notice (a situation described in Stannah as 'a nice problem to have!') with no impact on component availability.

The level of R+D collaboration with suppliers has also been stepped up. Suppliers are regularly integrated into cross-functional development

teams, both for new product developments and for improvement of existing designs. Some lower-level sub-assemblies have been outsourced to suppliers, freeing up valuable factory floor space at Stannah.

Component re-designs have realised substantial benefits:

- Cost reductions – one supplier-driven improvement produced 66% cost reduction by modifying a sub-assembly from a welded fabrication to a cast and machined component.
- Reduction in inventory complexity – re-design of the radio control system reduced the number of variants by 75%, and cut lead time by 24 weeks.
- Quality improvements – CI teams have progressively worked down the pareto of issues and eliminated root causes of problems.
- Design for manufacture and assembly – collaboration with manufacturing cell teams has eliminated or improved many issues.

MANUFACTURING

People have been the focus of improvements within Stannah manufacturing and CI has been used as the vehicle for much of this change.

The pre-existing cellular manufacturing structure was augmented with manufacturing engineers being dedicated to each cell team. The traditional workcentre-based structure (punching, welding, assembly etc.) has been replaced with Product Streams, with two Production Managers responsible for the entire (straight stairlift or curved stairlift) process from sheet steel to backflush of the packaged product.

The overall business indicators for quality, cost and delivery (QCD) were devolved down to provide local performance measures for each cell team, so that everyone could 'hear the voice of the customer'. CI training has now evolved to more targeted training on mistake proofing, 5Ss and Total Productive Maintenance to continue to drive this forward.

The 'Front Line Manager' (FLM) role has been critical to the continuing improvements and much training, development and coaching of these managers has been undertaken. Budget responsibility has been

devolved to this level, resulting in impressive cost management as each pound is spent as if it were their own. Over the past five years, cell teams have also been re-organised to reduce the number of reports to each FLM to a maximum ratio of 15:1 – this is felt to be the maximum effective team size for effective performance management.

New production equipment has also had a positive impact. Each sourcing decision is led by the appropriate FLM in conjunction with purchasing and manufacturing engineering. New laser cutting, punching and press-brake equipment has dramatically improved quality and efficiency. The introduction of robotic welding has substantially reduced the amount of manual welding required and improved quality, repeatability and increased capacity. Assembly cell teams have re-designed their production lines to significantly reduce takt times, improve material flow and incorporate mistake-proofing ideas. The most recent change has been the introduction of new powder-coating equipment on the paint line – the combination of automatic spraying equipment and rapid colour-change will improve quality and increase capacity. All these changes have been required to support the next improvement – the move from batch production to one-piece flow, a project that will run for the next 18 months, and aims to realise step-change improvements in flexibility, capacity and cost reduction.

DISTRIBUTION AND CUSTOMER INTERACTION

As stated earlier, there are over 440,000 valid configurations of each stairlift product. This obviously complicates the 'pick and pack' (order configuration) process! Historically, the process was totally dependent on zero-defect picking by staff. Not surprisingly, 'missing parts' and 'incorrect parts' represented the highest cause of OOB defects found at installation. Bar-coding was introduced to eliminate human errors in picking and all parts are labelled with part number and serial

number information (serial numbers are used to ensure that multiple items of the same part are scanned and packed correctly). Now, the MRP system will not produce shipping labels and documentation until the entire contract has been scanned correctly.

Distributors have been integral to improvements in two other areas – those of staircase surveying and customer order lead time reduction:

In order to produce a stairlift rail to fit onto a curved staircase, a survey of the staircase is necessary, to an accuracy of +/- 10mm. Traditionally, this was done using tape measure, spirit level and plumb line – it was slow, prone to error and discouraged some distributors from specifying curved stairlifts for fear of making a mistake. Many potential methods were trialled, but eventually photogrammetry was found to offer a solution. As shown in Figure 7, the sales advisor now takes a number of overlapping digital photos of the staircase and emails these to Stannah, where a computer programme models the staircase from the photos. Over 9,000 stairlifts have been successfully designed and installed using the technology, with no failures due to survey error – a huge improvement for Stannah and for the distributors.

The consequent time reduction in surveying has been matched by lead time reductions elsewhere in the curved rail delivery process. Value stream mapping was used to identify improvements through the entire process, not just manufacturing! As a result, total lead time was reduced by 17.5 days, manufacturing time by 9 days. The easiest reduction resulted

from the distributor altering their transport arrangements. Stannah now routinely manufacture and deliver a curved stairlift into the USA and Japan faster than local market competitors.

RESULTS

The turnaround in Stannah's fortunes has been marked. It has not been an easy or well-defined process, despite how this article may read! It has been a journey of iterative improvement and set-back, characterised by much perspiration, a little inspiration and undoubtedly some luck. There has been no miracle cure, no single fix, although perhaps the engagement and development of people throughout the company comes closest to achieving that accolade.

The results speak for themselves – Stannah is a leaner, better focused organisation. Since 1999, profitability has trebled, sales volumes have increased by 57%, productivity is up 40%, OOB defects have been reduced by over 85%, and delivery performance has been maintained above 99.8% over the entire past twelve months.

Perhaps most encouragingly, Stannah has succeeded in bucking the recent trend in industry, and has retained manufacturing in the UK.

THE FUTURE

It sounds corny, but like many other organisations, Stannah is on an improvement journey that will never end. Many major problems have been resolved, but this has simply exposed the next tranche of issues down the pareto curve.

However, the work over the past few years has created a solid foundation of robust processes and the relationships between management and staff have improved. Managers are doing less management and more support; they have more time to light fires, instead of struggling to put them out. But the challenges remain, competitors are always improving and Stannah will work hard to stay ahead.

Within the next year or so, cross-functional teams will launch new products. The SOP process and operational systems will be modified to manage the increasing product complexity. The entire supply chain must become more agile as lead times are reduced still further and increasing numbers of products will be built-to-order. CI in manufacturing will focus in on 5Ss, mistake proofing and TPM techniques in the drive towards one-piece flow. The lay-out within distribution must be totally re-designed to increase capacity and thus avoid an expensive re-location to larger premises.

Life at Stannah will continue to be challenging, but hopefully also rewarding.

About the author

Tim Eagles is the Logistics Director at Stannah Stairlifts Limited. A qualified engineer Tim has worked in engineering and materials management roles across a diverse range of industries from PCB manufacture through vended drinks to high value metrology equipment. In his current role, Tim manages the purchasing, production planning and distribution activities and has played a major role in the re-invention of the Stannah supply chain. He is also a member of the Chartered Institute of Purchasing Supply and holds an MBA from University of Nottingham.

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