

Strategos, Inc.
3916 Wyandotte
Kansas City MO 64111 USA
816-931-1414

The Basics of 5S & Visual Control

Productivity at the Micro Level



By
Quarterman Lee, P.E.
Strategos, Inc.

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Introduction

5S is a procedure that organizes individual workstations or departments. The objective of 5S is to increase efficiency at the micro-level by keeping the workplace neat, orderly and accessible. The results are visually dramatic and also increase pride and morale.

Visual Control uses visual (and other sensory devices) to guide everyday decisions such as "When should I cross this street?" Conceptually, Visual Control is not the same as 5S but the two ideas are closely linked and often used together.



5S On The Plant Floor

There are many variations of 5S, mostly of minor importance-- for example, different translations of the original Japanese. The extent of the organization effort also varies. Some versions are little more than a cleanup while others involve time and motion studies or layout. Safety is often included as a step to eliminate unsafe conditions and enhance awareness.



5S In The Office

What Does 5S Accomplish?

5S improves efficiency at the micro-level. It can eliminate searching for tools, for example. It may eliminate wasted steps or long reaches that are ergonomically hazardous. Since workers themselves analyze and rearrange their own workplace, it forces each worker to think about their activities. It develops the "Kaizen Mind."

The Elements of 5S

1	<u>Sort</u>	Sort through and sort out junk, seldom-used items and necessary items.
2	<u>Shine</u>	Clean and paint and clean regularly.
3	<u>Set</u>	Set locations; use boundaries & addresses to assure recoil.
4	<u>Standardize</u>	Define and standardize work processes, 5S activities and tasks.
5	<u>Sustain</u>	Make 5S a way of life, institutionalized in the organization.

The table above summarizes the five elements. Most elements are straightforward and self explanatory. The five words are a convenient mnemonic device. They derive from equivalent Japanese words which also started with an "S". Each, however, involves much more than the word alone implies. Click on each word for more detail.

整理 **seiri** (create tidiness)
 整頓 **seiton** (right place)
 清掃 **seison** (cleanliness)
 清潔 **seiketsu** (organization)
 躰 **shitsuke** (discipline)

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When To Implement 5S

This is a point for debate. Many firms start their Lean Journey with 5S. Setting implementation priorities involves many factors. It may be best to start with an element having faster and more verifiable savings.

The other side argues that, initially, 5S can be relatively easy to implement and has direct benefits. Moreover, it establishes a standard of discipline that begins the cultural change necessary for other elements of Lean Manufacturing.

Ultimately, there are many paths to Lean and it is probably more important to just start then it is to find the "correct" path.

5S Elements--Sort, Shine, Set, Standardize & Sustain



Sort—Clean Out The Junk

Sorting through objects in the workplace is the first step. Everything that moves should have a tag-- tools, parts, furniture and personal objects. While the procedure is simple, the decisions are sometimes agonizing.

Who Decides? This can be a delicate issue. Generally, let the person who uses or owns the item decide. When several people within the work group use the item, negotiation may be required.

The Tags

<p>Red Tag 1. Not Needed. 2. Dispose of it Now.</p> <p><small>© 2006 Strategos, Inc.</small></p>	<ul style="list-style-type: none"> • Allocate a central "Red Tag Area" where items go that cannot be simply thrown in the trash. • Include disposal instructions if necessary. • Appoint a review board for questionable items. (You may not need it but someone else may.)
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 <p>Yellow Tag 1. We MAY need this 2. Keep it until: (Disposal Date)</p> <p><small>© 2006 Strategos, Inc.</small></p>	<ul style="list-style-type: none"> • Allocate a "Yellow Tag" location near the workplace. • Review on a specific date. • Store occasionally necessary items in out of the way locations.
 <p>Green Tag 1. We DO Need It 2. Keep It.</p> <p><small>© 2006 Strategos, Inc.</small></p>	<ul style="list-style-type: none"> • Leave "Green Tag" items in the workplace. • Set their final location later.

Shine—Clean, Polish & Paint



With only essential items remaining, it is time to clean and paint. In some 5S programs, cleaning and painting are considered separately. Either way, it is likely to be done over time.



The first cleaning leaves some dirt and oil. The next cleaning looks better and third cleaning will prepare for painting. All floors, equipment, and almost every surface should get paint.

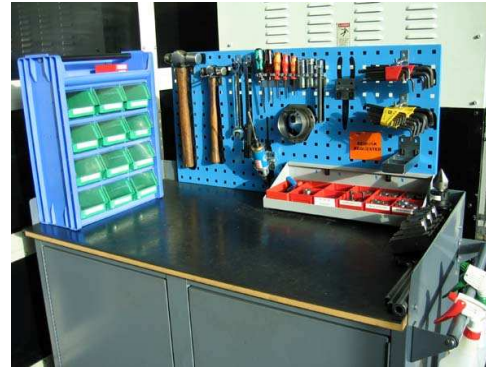


Guidelines for Shine

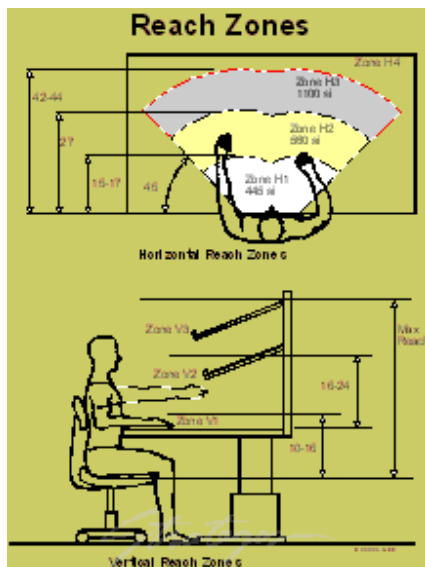
- Each work team should establish their own measure of "clean".
- Establish a regular schedule for routine cleaning and deep cleaning.
- The entire team participates. This is not something for a special janitorial crew.
- Ensure that every crew has adequate cleaning supplies and equipment.

SET in Place—Determining Locations

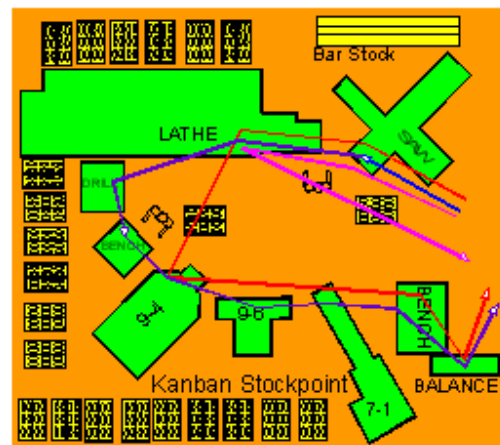
After Sort and Shine, "Set" determines and identifies the location of each item. The methods for determining such locations may be elementary and intuitive or formal and elaborate. Often the elementary methods work quite well, especially in the early phases. Workers simply look at each item, visualize its use, estimate the frequency of use and then select a location. After a few days, they can review and revise their locations.



Locations should be identified at both a micro and sub-micro level. String diagrams can assist at the micro-level. Principles of Ergonomics can assist at the sub-micro level. Horizontal and vertical reach zones help to determine the best sub-micro location. The heaviest and most frequently used items should be in the nearest reach zones.



Reach Zones To Determine Location



"String Diagram" for Material Flow

Once people develop awareness, their body sense will alert them to excessive reaching, walking or awkward positions. They learn to "SET" items instinctively.

Standardize—Standardize

At minimum, standardize the 5S activities shown below. In some programs, standardization is used as an opportunity to standardize normal work activities and develop work instructions. Standards may include:

- 5S Activities
- Aisle Marking
- Cleanliness Standards
- Color Schemes
- Cleaning Schedules
- Signage

5S Job Cycle Chart		Name:			Dept:		
		Date:					
No	5S Job	Sort	Set	Shine	Standardise	Sustain	
							CONTINUOUSLY
							DAILY(AM)
							DAILY(PM)
							WEEKLY
1	Red-Tag (company wide)						
2	Red-tag (cells / lines)						
3	Inventory check						
4	Tool check						
5	Wipe area						
6	Vacuum area						
7	Machine Clean Inspection (Ops)						
8	Degrease work area						

The Benefits & Payoff of 5S

5S should be more than just housekeeping. When properly implemented, 5S is part of total Lean Manufacturing Strategy. Many of the benefits and effects are systemic in nature, i.e. they cannot be evaluated in isolation from the other elements of Lean.

Nevertheless, we have attempted to identify typical improvements in the table below. Since there seems to be few documented, rigorous studies of 5S benefits, the improvements in this table come from the experience of our clients and readers. they are necessarily anecdotal. Some narratives about experiences with 5S are at our Commentary page.

Benefit	Commentary	Potential Improvement
Safety	Many 5S programs use Safety as one of the S's. An organization's concern for safety can be a significant contributor to morale and pride. It can be measured with Lost Time Injury rates or other measures of safety performance.	Up to 70% Reduction
Space	Cleaning out the junk will sometimes open significant space by itself. If an analysis and localized re-layout of departments is part of the 5S effort, there may be significant savings. However, such space savings must be consolidated into larger blocks of space to be useful.	5%-60% Reduction
Productivity	Measurement of productivity can occur in many ways and at many levels such as overall factory productivity, work team productivity or micro-motion productivity. Overall factory productivity is the most important from a competitive viewpoint but many other factors can influence this other than 5S.	15%-50%+ Increase
Pride & Morale	Pride and morale are notoriously difficult to measure but critically important. While there are survey tools for such measurement, they are time-consuming. The practical effects are seen primarily in absenteeism, turnover and productivity.	Significantly Improved
Absenteeism	Absenteeism results from many causes but pride and morale are two of the more important. Improvements in absenteeism, if other factors remain constant, can be assumed as resulting from increased pride and morale.	20%-50% Reduction
Wasted Motion	If 5S teams prepare before-and-after spaghetti diagrams, they can measure reductions in walking distance. There are, however, other motion savings at the micro level (reaching, bending, etc.) that are more difficult to measure directly.	20%-50%+ Reduction
Kaizen Mind	The rigor, discipline and analysis inherent in 5S can contribute to the development of the "Kaizen Mind." This is a culturally induced attitude of constantly looking for and implementing improvement, particularly at the level of an individual worker or a work team. For more on this see "The DNA of Toyota" and Quick & Easy Kaizen . One way to measure this is with the number of suggestions per employee.	Number of Suggestions 1500%+ Increase

5S – Sustain

The Fifth Step--Sustain The Program

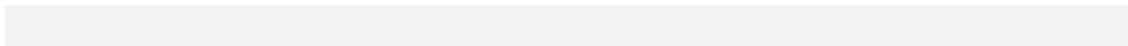
Sustainment is usually the most difficult part of 5S. The attitudes and activities must be institutionalized and repeated until they become part of the culture and the fabric of everyday work.

The table below summarizes eight common tools that help with sustainment. A combination of several or all of these tools is usually necessary.

Eight Tools To Sustain 5S


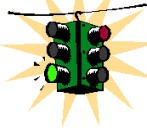
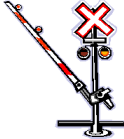
1	Code of Conduct	A document that spells out the standards of behavior expected of all employees with respect to 5S.
2	5S Corner	A small area where people on the work teams can obtain supplies, information and assistance for their efforts. Usually operated by the 5S Coordinator.
3	5S Checklist	A list of specific items to check regularly within each area. This list is agreed upon by each work team.
4	5S Patrol	A small, rotating team of associates from each area who inspect each area and advise the work teams/
5	Steering Committee	Volunteers from each area meet to determine the overall direction of the effort.
6	Visual Coordinator	The coordinator provides support, advice, training and coordinates activities.
7	Management Champion	An executive with high standing and credibility who has the responsibility for supporting the program.
8	Management Watch	A regularly scheduled event where the Management Champion tours areas under 5S improvement. The purpose is to reinforce behavior through encouragement and ensure that resources are available.

This cannot be outsourced or solved with software. Management, top management, must reinforce it constantly with time, attention and repetition. Former military people, especially battalion or company level line officers are usually quite good at this. They are also good candidates for Management Champion and for the Management Watch.



Visual Control—Making Micro Decisions

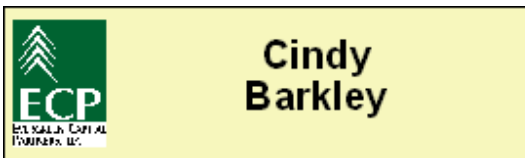
Visual Control provides information to guide everyday actions. Traffic signals and signs are the most common examples. It is a powerful tool for enabling good decision-making at the micro level. The table below summarizes different types of visual control and gives examples.

Indicator	Signal	Control
		

Device	Power Level	Description	Examples
Indicator	Low	An indicator only provides information about the immediate environment or situation. Indicators are passive and people may not notice them or respond to them.	-Street Signs -Level Indicators -Auto Fuel Gauge -Aisle Markings
Signal	Medium	Signals grab our attention with visual (or audible) alarms. People may still choose to ignore signals but they usually perceive them.	-Traffic Lights -Auto Fuel Warning Light -Aircraft Stall Warning
Control	High	Controls limit behavior through strong visual messages or physical restrictions as an action takes place.	-Traffic Gates

Addresses & Nameplates

Addresses and nameplates are helpful in any organization but especially so in large firms. This simple nameplate gives basic information: Cindy Works Here.



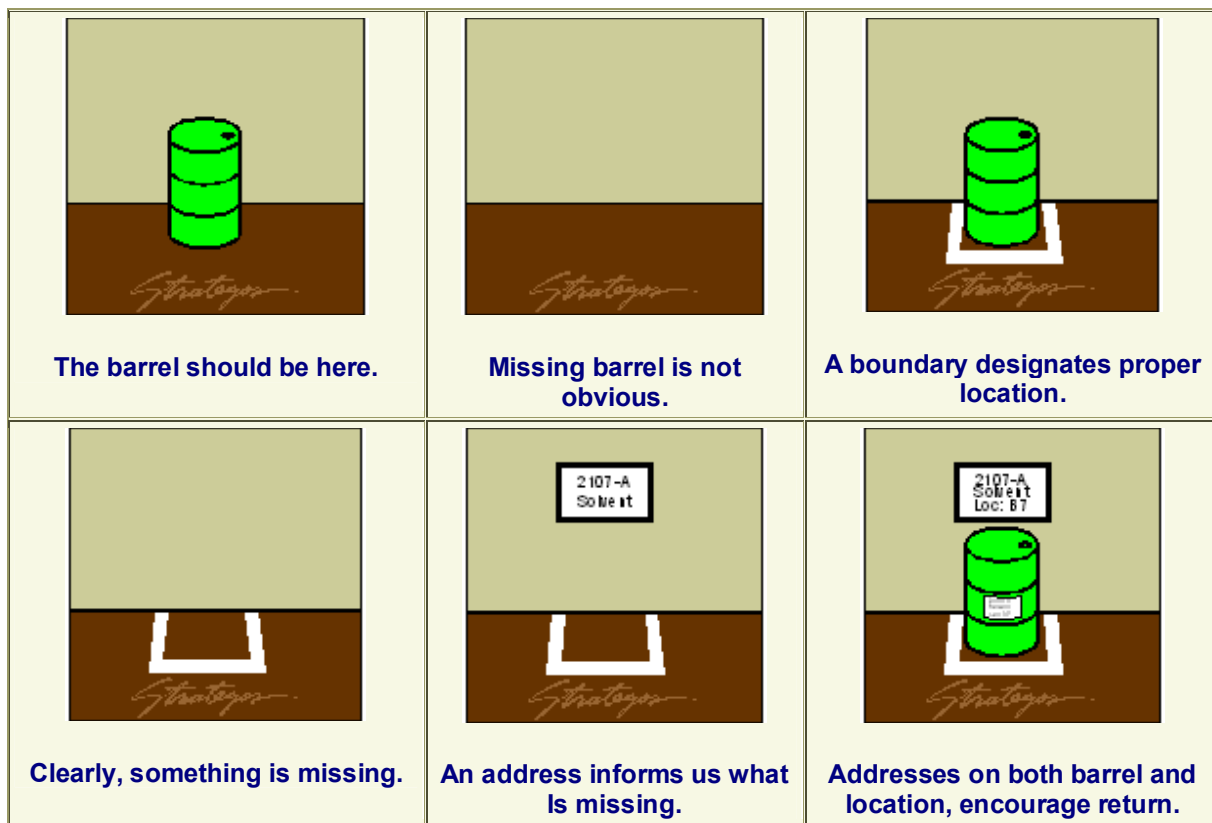
A complete nameplate has a phone number if Cindy is away; a photo so a new visitor may recognize her; responsibilities so they know if they have the right person; an alternate contact if Cindy is unavailable.



Boundaries

Boundaries identify the designated and location and space for each item. They encourage recoil, that is the proper return of an item, as shown below. They also tend to prevent people from placing other items in a designated space.

When combined with addresses and nameplates, boundaries are a powerful tool for ensuring that every item returns to its proper place, every time.



Implementing 5S

Stage I

Stage I of 5S emphasizes cleanliness, housekeeping and convenience. Improvements in efficiency, motion economy and process are basic and, mostly, limited to individual workstations. Or, in 5S terms, Sorting, Shining and basic Setting. Training is short, team planning limited and action is quick. Standardization activity is also basic and limited to maintaining the initial levels of cleanliness. Stage I also includes a steering committee to begin Sustainment. Our workshop, "5S Fast & Simple" implements Phase I in two days. This does not have to be difficult or complex. The bias should be on action and participation. To see a typical schedule, [click here](#).



Stage II

Stage II builds on the skills and experience of Stage I. It assumes that Sort and Shine have been maintained and that most of the Set activities for individual workstations are correct. Stage II training emphasizes layout of the area, Ergonomics and advanced Motion Economy. It also extends Standardization activities beyond 5S maintenance and into production tasks, safety or other activities where work standardization is useful. It may include Team Development training.



Useful Tools

Banners & Posters

These can change culture and attitudes but only when accompanied by management action and support. People need the knowledge of 5S tools and the resources to use them. Without such backup, employees view banners and posters as just another example of management hypocrisy. For an excellent discussion of this issue, [Click here](#).

Kaizen Events (Blitz)

Kaizen Events are short, highly focused projects for improving some aspect of a work area. They generally include training followed by or concurrent with analysis and implementation.

Quick & Easy Kaizen

Originated by Toyota and popularized by Norman Bodek, Quick & Easy Kaizen (or Mini-Kaizen) can supplement 5S activities.

Planning The Implementation

5S Teams

- The purpose of these teams is to implement 5S improvements in their own areas.
- The team should have about 5-12 members.
- The core group of a 5S team consists of people who work together in a contiguous area or department.
- People from support areas such as engineering, maintenance or supervision can supplement teams for the initial kaizen event. This is a useful way to train those people who will not participate in daily 5S activities but need to understand the program.

Steering Committee

- The purpose of the committee is to coordinate activities, set policies, and sustain the 5S program.
- The committee should have about 5-15 members.
- Membership is representative of all organizational levels and most areas of the operation.
- Members should participate in initial training and serve temporarily on 5S teams to observe activities.

5S Coordinator

The 5S Coordinator assists 5S Teams, may facilitate kaizen events, conducts training and executes the directions and policies of the Steering Committee.

Management Champion

The Management Champion is a senior manager who provides resources and support the for 5S program.

Stage I Kaizen Events



In a Stage I kaizen event, participants are organized into 5S teams (see above). Managers, supervisors and support staff supplement core teams for learning purposes. Up to eight teams and 60 people can participate in a session and the event normally runs for two days.

Training occurs during the first half day. This training introduces 5S and basic 5S tools. After the formal training, the teams spend an hour or so planning and organizing their project. Each team presents its plan to the other groups.

Teams then move to the plant floor and execute the first of the 5S'-- Sort, Shine and Set. Several general sessions are held to report progress and the facilitator and managers visit each team as the work progresses. Near the end of the second day, the teams complete their work and report to management and the other teams in a plenary session.

While the 5S teams are executing their projects, the steering committee holds several meetings to determine their course of action. They decide on sustainment methods, initial policies and standards for 5S teams.

The 5S Coordinator works with all teams to ensure they have adequate tools and supplies. The training facilitator assists teams with decision making and organization. The Management Champion offers encouragement and support.

Stage II Kaizen Events

Stage II Kaizen Events should occur several weeks or months after the stage I event. Stage II events may require 2-5 days and the emphasis is on advanced tools. The initial training, analysis and team project planning consumes most of the first day. Such an event may include the rearrangement of equipment or the construction of special tools.

After the training and planning, the event is executed in a manner similar to the Stage I event but the time required may be longer. Stage II events are more focused and only a few teams hold events simultaneously.

Benefits of 5S

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Productivity

Measurement of productivity can occur in many ways and at many levels such as overall factory productivity, work team productivity or micro-motion productivity. Overall factory productivity is the most important from a competitive viewpoint but many other factors can influence this other than 5S.

Pride & Morale

Pride and morale are notoriously difficult to measure but critically important. While there are survey tools for such measurement, they are time-consuming. The practical effects are seen primarily in absenteeism, turnover and productivity.

Absenteeism

Absenteeism results from many causes but pride and morale are two of the more important. Improvements in absenteeism, if other factors remain constant, can be assumed as resulting from increased pride and morale.

5S Benefit Summary

Benefit	Potential Improvement
Safety	Up to 70% Reduction
Space	5%-60% Reduction
Productivity	15%-50%+ Increase
Pride & Morale	Significantly Improved
Absenteeism	20%-50% Reduction
Wasted Motion	20%-50%+ Reduction
Kaizen Mind	Number of Suggestions 1500%+ Increase

Wasted Motion

If 5S teams prepare before-and-after spaghetti diagrams, they can measure reductions in walking distance. There are, however, other motion savings at the micro level (reaching, bending, etc.) that are more difficult to measure directly.

The Kaizen Mind

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Reader Commentary

Discussion Background

In our Lean Briefing #45, I stated that the benefits of 5S were significant but difficult to measure for a variety of reasons. Several thoughtful readers took issue with this and some provided results and narratives from their 5S implementations.

The discussion has been stimulating and, it seems to me, that there is no longer serious disagreement between any of the participants. I am suggesting some joint conclusions and you may read the original comments below. These comments are also reflected in our page on 5S Benefits. --Quartermaster Lee

Conclusions About 5S Benefits

- 5S is an integral part of a larger manufacturing strategy and the total effects cannot be measured in isolation.
- It IS difficult to measure SOME of these effects directly but they are often reflected, at least partially, in other metrics.
- Directly measurable effects are significant and these alone are sufficient to justify the investment and effort.

Anthony V. Element (Australia)

Electric Motors

Sorry to be critical, but your argument that 5S benefits are difficult to quantify is fundamentally flawed.

First, you are making the mistake of addressing 5S in isolation. When Taichi Ohno developed the suite of concepts that make up LE for Toyota, he was adamant that they all worked together, harmoniously. You simply cannot discuss any aspect of LE in isolation.

In terms of relevant figures, here's one example that relates directly to the link between 5S and throughput. Some years ago I was General Manager of an electric motor manufacturer in Australia. We had begun introducing LE with company wide training on:

- **LE introduction**
- **The business case-- saving the factory from emigrating to China;**

The factory workers response for the most part was, "We know the Chinese will have our jobs someday but this is the first time we've felt like we could fight back. We'll give it a go."

We then implemented 5S thoroughly, i.e. each S got a good going over right across the company, (that means offices and factory.) The staff decided to pile it all up in the car

park so we could viscerally sense that we were doing something significant. Much hilarity about the size of the mountain that ensued.

Anyway, the C Frame production people suddenly discovered the distance they were traveling because now that the clutter was gone the space they traversed between work centres, tool boards, parts racks, etc, was made obvious by the emptiness. Before we'd gotten around to actually having a kaizen, they moved all the machines, tools, and parts together. Doing nothing else resulted in:

- **Utilised space reduction of 62%;**
- **Daily distance walked reduction from 1+ kilometers to <100metres,**
- **Output improved by >20% with the same headcount.**
- All this and we hadn't yet done a kaizen event.

We had a pizza lunch to celebrate and that was when the real benefit came out. One of the C Frame team said, as best as I can remember: "If we can make this much improvement from nothing more than a big Spring clean, what's going to happen when we've done all this LE (expletive deleted)."

That was several years ago and the factory's still there. Although the products aren't as cheap as imports, production can turn on a dime in response to customer requirement changes, and that the Chinese can't do without a local warehouse which eats their price advantage.

Hope that helps. Cheers,

Michel E. Hess (U.S.)
Financial Call Center

"In our call center operation, 5S eliminates distractions, promotes consistency and reduces wasted motion. It greatly enhanced our office rearrangement and helped our conversion to paperless processing."

Brian Levitan (Australia)

I disagree that the benefits of 5S are hard to quantify. Here are some examples:

Roll Forming

- Accidents LTI and MTI 50-70% reduction
- Space Saved 20%-40%
- Morale/ Absenteeism- drop of 25% - 50%
- Productivity/Quality- improvements of 15- 50%
- The results were obtained after years of conventional methods and committees and HR surveys which did not produce results.
- Reverse Logistics Stores
- Improvement in productivity of 15%.

Welding Wire Plant

After a 5S Blitz on a steel slitting line (3 day event because of the culture change) there was a huge improvement in quality. This impacted favorably on the downstream downtime of the wire lines, thus a huge improvement in OEE resulting from an improvement in quality from an upstream process. Yet, the focus was on culture change and not quality itself.

Americo Chiruque (Mozambique)

Basic Metals

After reading this article, I felt that it could raise a very interesting debate, especially amongst those who are (or have been) part of a 5S implementation team.

When we started the 5S implementation at Mozal in 2003, this was one of the questions put and although the importance of the initiative was clear to us, it was not easy to give a sort of a mathematical answer to it.

Now, about three years down the line, we can feel that 5S is a pre-requisite for creation of a high performance culture in the organisation as it helps to establish the basics. I tend to believe that no one can achieve big accomplishments without being able to do small things.

Last month I received a safety report that was making a correlation between HSE audit findings and 5S audit findings and the conclusion was the following:

- The main category of safety and environment problems is 5S related problems;
- All the departments that have poor performance on 5S are also poor performers on safety and environment ;
- The best 5S areas are also best areas in terms of safety and environment.

It is possible to extend this analysis to other correlations such as quality of 5S versus productivity, etc. This is because the key for good safety performance is discipline and appropriate behaviour.