

Business Process Re-Engineering: Housekeeping Case Study

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December 18, 2009

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EXECUTIVE SUMMARY

In the fall of 1999, a project was initiated by Dennis L. Harvey (then Director of Manufacturing Engineering at the GM Electro-Motive Division) to significantly reduce the cost of housekeeping at the La Grange, Illinois site. At the start of the project, the cost per square foot for housekeeping was benchmarked as follows:

General Motors Corporation average:	\$ 4.43
Ford Motor Company average:	\$ 2.55
GM Electro-Motive Division:	\$2.30 – 2.50
North America industry benchmark:	\$1.17

At the conclusion of the project in December 2000, the Electro-Motive Division achieved a cost per square foot of \$1.79 or about a 25% improvement. The cost savings was achieved by eliminating waste in the sequence of tasks used by the housekeeping staff and by reducing variation by standardizing work. These improvements allowed a headcount reduction of 8 (29 down from 37) for an annual savings of \$672,000. These 8 people were reassigned back to production where they were needed.

The difference between the end performance level of \$1.79 and the industry benchmark of \$1.17 was attributable almost exclusively to wage rate differences between the Industry Benchmark and the burdened UAW wage rate used at General Motors Corporation.

The quality of work done by the housekeeping staff was measured throughout the study and was maintained, if not slightly improved in several areas.

The project was executed using steps equivalent to Six-Sigma DMAIC. Because the project was implemented with the full participation of the UAW hourly workforce, no grievances were filed; a first for the Division for this type of cost savings project.

DEFINE OPPORTUNITY

Situation prior to project start

The facilities at GM Electro-Motive Division (EMD) consisted of four large buildings which required housekeeping attention on a daily basis. Total floor space was approximately 1.5 million square feet. The buildings are listed below along with the abbreviations which are often used in this report for charts and graphs:

US Headquarters Building (USHQ): Office building with some laboratory space

Engine Plant (EP): Primarily a manufacturing building with limited office space

Manufacturing Services Building (MSB): Manufacturing and warehousing

Annex Building (Annex): Warehousing with some training facilities

At the start of this project, there were 37 UAW hourly personnel performing housekeeping functions and grounds keeping. They were under two job classifications: Janitors and Laborers. Laborers generally did the grounds keeping, waste removal and stocking of supplies. Janitors did janitorial duties. For the purpose of this report, all the activities of both classifications will be combined under the term “housekeeping”.

Supervision of the hourly workforce was contracted to Aramark, Inc. There were three supervisors during the day and one on the second shift. Roughly three quarters of the hourly housekeeping personnel worked on the second shift.

Historical frustration in making housekeeping improvements

Prior to this project, EMD was unable to make any meaningful improvements in the cost or quality of housekeeping. Since the supervision of the hourly workforce had been contracted to Aramark, the expectation was that Aramark should be accountable for improvements. This expectation was problematic for two reasons.

First, Aramark was reluctant to put forth a major effort (with resources from their headquarters) without charging EMD extra for the cost. Clearly this was unpalatable to EMD management. Any proposal they offered was based on time and materials without a commitment to expected results. EMD management had little confidence that this approach would yield improvements.

The second reason holding Aramark accountable was problematic was that the union leadership did not view the Aramark supervisors as “empowered” to make changes in work expectation of the represented workforce. Any changes Aramark made usually required a significant amount of participation by EMD salaried facilities staff to implement. In other words, EMD personnel were burdened with any improvement efforts as an added cost, essentially defeating the intent of outsourcing the supervision to Aramark.

Prior to this project, the commonly held belief was that the primary driver for housekeeping cost was labor rate. With this in mind, outsourcing of housekeeping had been raised as a potential expectation during UAW contract negotiations. However, this perceived improvement potential was never validated and therefore,

outsourcing of housekeeping never made the cut as a priority issue when UAW contract negotiations actually began.

Industrial Engineering Team established

A team was put together to begin formulating a project plan and expectations for making improvements to housekeeping. The team was championed by Dennis Harvey (Director of Mfg. Engineering). The team leader was Garry S. (Superintendent of Facilities). Industrial Engineering support was from Andy Anderson. Aramark supervisor Robert F. rounded off the team with expertise on best practices elsewhere in the industry. Others in the Manufacturing Engineering Department were drafted into the project as required for specific tasks or studies. EMD also had access to the General Motors World Wide Facilities Group in Detroit on an as needed basis for subject matter expertise and Corporate common processes.

Benchmarking to establish the cost gap

Two sources of benchmarking information were used to establish a benchmark for cost and quality; Aramark, Inc. and General Motors World Wide Facilities Group. To normalize the data, a quick assessment was made of the square footage for all four buildings on the site. Then a composite of cost per square foot was made for the EMD facility taking credit for office space versus industrial and warehousing. The results are as follows:

General Motors Corporation average:	\$ 4.43
Ford Motor Company average:	\$ 2.55
GM Electro-Motive Division:	\$2.30 – 2.50
North America Industry Benchmark:	\$1.17

The reason the Electro-Motive Division had a range was that the headcount in housekeeping fluctuated depending on how many hourly people on the site had work restrictions which took them out of production. This was a situation (fluctuating headcount) which we knew we would have to control in some way if we were going to run housekeeping like a business.

The Industrial Engineering team believed the project should be able to achieve something under \$2.00 per square foot but more work would have to be done to determine a precise target.

Voice of the Customer – Quality issues and lack of standards

Customer complaints about quality and timeliness were a significant issue at the onset of the project. It was common for Aramark supervisors to spend two hours a day following up on complaints on substandard quality levels. In particular, the quality of housekeeping in washrooms was particularly troublesome. This will be discussed again in the section on Measure Performance in this report (page 5-6).

When the Industrial Engineering Team interviewed housekeeping personnel, they found variation in what each worker thought were the customer requirements for the

job. This led to customer dissatisfaction when workers would rotate through an area one day versus the next. Customers would see variation in how the job was being done and infer that one of the workers was doing an inferior job of quality, when in fact the problem was that a quality standard had not been set.

Periodic customer surveys were conducted but they tended to increase variation as the Aramark staff tended to chase the comments section of the surveys. In spite of the fact that scores tended to increase slightly with time, the number of complaints did not decrease.

It was recognized at the onset of the project that a more robust audit would have to be institutionalized to track quality. The audit questions would have to exceed customer expectations and would then serve as a tool for establishing better articulated quality standards for the work performed by the housekeeping personnel.

Variation due to lack of standardized work

Prior to the start of the project, housekeeping personnel were assigned specific work areas (territory) for the day with a scope of work for expectations. For example, a person might be assigned to the mezzanine floor of the US Headquarters Building and expected to empty waste baskets, vacuum and dust cabinet tops and desks. The problem with this approach was that this example assignment was never quantitatively checked for workload. There was wide variation between the amounts of work content in one worker's assignment versus another.

This approach also led to the supervisors spending most of their day checking up on the housekeeping employees to make sure they were doing their work effectively.

In interviewing housekeeping personnel, it also became apparent that each one had a different idea of what their customers wanted. For example, one worker might empty waste baskets once a day while another would do it twice during their shift.

In no case were any of the assignments evaluated against lean principles such as wasted motion. The Industrial Engineering Team believed there was great opportunity for improvement here, especially if task sheets or routings were created for assignments that specified timing and sequence for tasks to be executed.

Expected outcomes for the Housekeeping Improvement Project

Based on this early definition of opportunity, the outcomes expected for this project were as follows:

1. Standardize work through the use of Routings as is done in manufacturing. By applying lean principles, a significant elimination of waste could be achieved as well as a reduction in variation between the same jobs done by different people.
2. Establish sound quality standards to meet customer expectations while also reducing variation. The implementation of a robust audit that matched the Voice of the Customer was essential.

The preliminary estimate of cost savings was bracketed at \$600K to \$800K per year. This justified assigning Industrial Engineering resources on the project.

MEASURE PERFORMANCE

Use of housekeeping standards data

The first detailed study done by the Industrial Engineering Team was to identify the total work content for the site and apply industry standard data to bracket the opportunity.

In order to proceed, housekeeping tasks were divided into two types. Daily tasks were tasks that had to be performed daily or every other day. These were highly amenable to being implemented using Routings. These were referred to as Routed Tasks.

The second type of task was those that could be performed on a less frequent basis but still needed to be scheduled. These included waxing floors or deep cleaning areas where an accumulation of dirt might form. These tasks were referred to as Project Work.

The first study indicated that the number of people necessary to do Routed Tasks would number about 18. With some consideration for line-balancing by site, it was believed there would be about 20 people involved with Routed Tasks.

Project work was a bit more difficult to estimate as there was some discretion involved in the frequency of executing tasks. For example, deep cleaning certain areas could be done monthly or quarterly, depending on how clean you expected to make the area.

At the end of this assessment, the Industrial Engineering Team agreed that the target headcount for both Routed Tasks and Project Work would be 27 people.

Use of a standardized quality audit to measure housekeeping quality

As mentioned earlier, the primary mechanism for customer feedback was to use a customer survey. Though it would seem reasonable to get feedback directly from customers, there was great variation in the results. Often this was explained away as being a snapshot of the customers most recent experience with particular people on the housekeeping staff. Often, the Aramark supervisors, tried to meet the expectations of the most recent surveys which ended up changing the quality standards given to employees almost as often as surveys were given. Clearly, there needed to be a more objective measure of quality for the purpose of this study.

One of the first pilots for a standardized audit was conducted on November 1, 1999 to assess the condition of the washrooms. The table of results is shown in Figure 1. The results indicated not only issues with housekeeping but also problems with the condition of the facilities in general. This turned out to be quite common as the team moved forward with standardized audits.

Electro-Motive Division Washroom Evaluation All Buildings

Item No.	Washroom Facilities	Location	Stool Capacity	Urinal Capacity	A.D.A.	Drains/Sewers	Floors	Walls	Ventilation	Heating	Stools/Closets	Urinals	Bradley Basins	Sinks	Dispensers	Lighting	Mirrors	Score	Out of	% Grade
Engine Plant:																				
1	Men (Main Floor)	B-5	4	4	10	2	2	2	2	5	8	8	N/A	2	8	4	8	61	120	51
2	Women (Main Floor)	B-5	4	N/A	10	2	8	3	2	5	8	N/A	N/A	8	8	5	8	67	110	61
3	Men (Main Floor)	B-19	6	5	10	5	7	10	5	5	8	8	10	8	8	9	10	103	130	79
4	Women (Main Floor)	B-19	3	N/A	10	5	7	10	5	5	8	N/A	N/A	8	8	9	10	85	110	77
5	Men (Main Floor)	K-7	6	3	10	5	2	10	7	8	8	8	10	8	8	8	10	102	130	78
6	Women (Main Floor)	K-7	3	N/A	10	5	2	10	7	8	8	N/A	N/A	8	8	8	10	84	110	76
7	Men (Main Floor)	K-17	6	3	10	5	9	10	7	8	8	8	10	8	8	8	10	109	130	84
8	Women (Main Floor)	K-17	3	N/A	10	5	9	10	7	8	8	N/A	N/A	8	8	8	10	91	110	83
9	Men (2nd Floor)	K-25	10	5	1	5	5	4	5	5	4	8	7	N/A	8	5	2	59	120	49
10	Women (2nd Floor)	K-25	4	N/A	1	5	4	4	5	5	5	N/A	N/A	6	7	7	5	54	110	49
11	Men (Main Floor)	U-7	4	2	10	8	6	10	7	7	7	8	N/A	8	8	9	8	96	120	80
12	Women (Main Floor)	U-7	1	N/A	10	8	6	10	7	7	9	N/A	N/A	8	8	9	9	91	110	83
13	Men (2nd Floor)	U-21	5	2	1	6	6	3	5	5	8	8	N/A	8	8	4	10	72	120	60
14	Women (Main Floor)	U-21	1	2	10	8	6	10	7	7	8	8	N/A	8	8	9	8	97	120	81
15	Men (Service School)	A-5	2	1	10	9	9	10	8	8	8	8	N/A	8	8	9	8	103	120	86
17	Unisex (Medical)	A-5	2	N/A	10	9	9	10	8	8	8	N/A	N/A	8	8	9	8	95	110	86
18	Unisex (Medical)		1		10	N/A	9	8	8	8	8	N/A	N/A	8	8	9	8	84	100	84
19	Unisex (Medical)		1		10	N/A	9	8	8	8	8	N/A	N/A	8	8	9	8	84	100	84
20	Unisex (Medical)		1		10	N/A	6	8	8	8	8	N/A	N/A	8	8	9	8	81	100	81
21	Men (Front Office)		3	2	1	8	9	6	7	8	8	8	N/A	8	8	9	8	88	120	73
22	Women (Front Office)		2	N/A	1	8	9	6	7	8	8	N/A	N/A	8	7	9	8	79	110	72
23	Handicap (Front Office)		1		10	8	9	8	7	8	8	N/A	N/A	8	7	9	8	90	110	82
M.S.B.:																				
24	Men (Main Floor)	A-3	3	4	1	2	7	10	8	8	8	8	N/A	8	8	9	8	85	120	71
25	Women (Main Floor)	A-3	2	N/A	1	2	6	10	6	6	8	N/A	N/A	8	8	8	8	71	110	65
26	Men (Main Floor)	K-7			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A
27	Women (Main Floor)	K-7		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A
28	Men (Main Floor)	K-5			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A
29	Women (Main Floor)	K-5		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A
30	Men (Second Floor)	F-13	5	2	1	7	4	2	6	8	6	2	2	N/A	7	6	4	56	120	46
31	Men (Main Floor)	F-27	4	2	1	4	4	2	6	8	6	2	8	N/A	7	7	2	57	120	48
32	Women (Main Floor)	F-27	2	N/A	1	4	4	2	6	8	6	N/A	N/A	7	7	7	4	56	110	51
M.S.B. Annex:																				
33	Men (Main Floor)	H-4	6	2 trough	1	4	2	2	4	4	4	2	4	N/A	6	7	2	42	120	35
34	Women (Main Floor)	H-7	1	N/A	1	2	2	2	4	4	4	N/A	N/A	4	4	7	2	36	110	33
U.S.H.Q.:																				
35	Men (Main Floor)	D-2	2	1	10	9	10	10	10	10	10	10	N/A	10	10	10	10	119	120	99
36	Women (Main Floor)	D-2	2	N/A	10	9	10	10	10	10	10	10	N/A	10	10	10	10	119	120	99
37	Men (Main Floor)	D-3	2	1	10	9	10	10	10	10	10	10	N/A	10	10	10	10	119	120	99
38	Women (Main Floor)	D-3	2	N/A	10	9	10	10	10	10	10	10	N/A	10	10	10	10	119	120	99
39	Men (Main Floor)	E-12	4	4	1	9	8	8	10	10	10	10	N/A	10	10	10	10	106	120	88
40	Men (2nd Floor)	H-2	5	4	10	7	10	10	7	9	10	10	N/A	7	10	8	10	108	120	90
41	Women (2nd Floor)	H-2	5	N/A	10	7	10	10	7	9	10	10	N/A	7	10	8	10	108	120	90
42	Men (3rd Floor)	B-6	4	4	10	6	10	10	7	9	10	10	N/A	7	10	8	10	107	120	89
43	Women (3rd Floor)	B-8	8	N/A	10	6	10	10	7	9	10	10	N/A	7	10	8	10	107	120	89
44	Men (3rd Floor)	G-10	5	4	10	6	10	10	7	9	10	10	N/A	7	10	10	10	109	120	91
45	Women (3rd Floor)	J-10	5	N/A	10	7	10	10	7	9	10	10	N/A	8	10	10	10	101	110	92
46	Men (Balcony)	G-14	2	2	1	3	4	4	3	6	4	4	N/A	6	10	4	4	53	120	44
47	Women (Balcony)	G-14	1	N/A	1	3	4	4	3	6	4	N/A	N/A	6	10	4	4	49	110	45
M.U. Site																				
	Men (Main Floor)		1		1	3	3	3	1	4	3	N/A	N/A	3	5	4	2	32	110	29
					6.70	5.83	6.80	7.41	6.45	7.30	7.66	7.92	7.63	7.44	8.14	7.82	7.68			

Figure 1. Washroom audit conducted as a pilot for standardized audits.

Aramark, in collaboration with GM World Wide Facilities Group secured an independent auditor to perform a comprehensive audit of the site just prior to the start of the project (November 19, 1999). This company did one subsequent audit on March 31, 2000 before EMD and Aramark staffs were sufficiently trained to conduct their own audits. The results of these audits are shown in the section on Improve Performance. This standardized audit became the basis to redefine quality standards which is discussed in the next section on Analyze Opportunity.

The Industrial Engineering Team felt it was reasonable to set an expectation to improve quality but never set an expected numerical target value for audit results.

ANALYZE OPPORTUNITY

Development of Routings to create standardized work

Routings are detailed task descriptions which define the schedule of tasks a housekeeping employee would execute during a single day. Figure 2 shows an example of one such Routing for the US Headquarters Building.

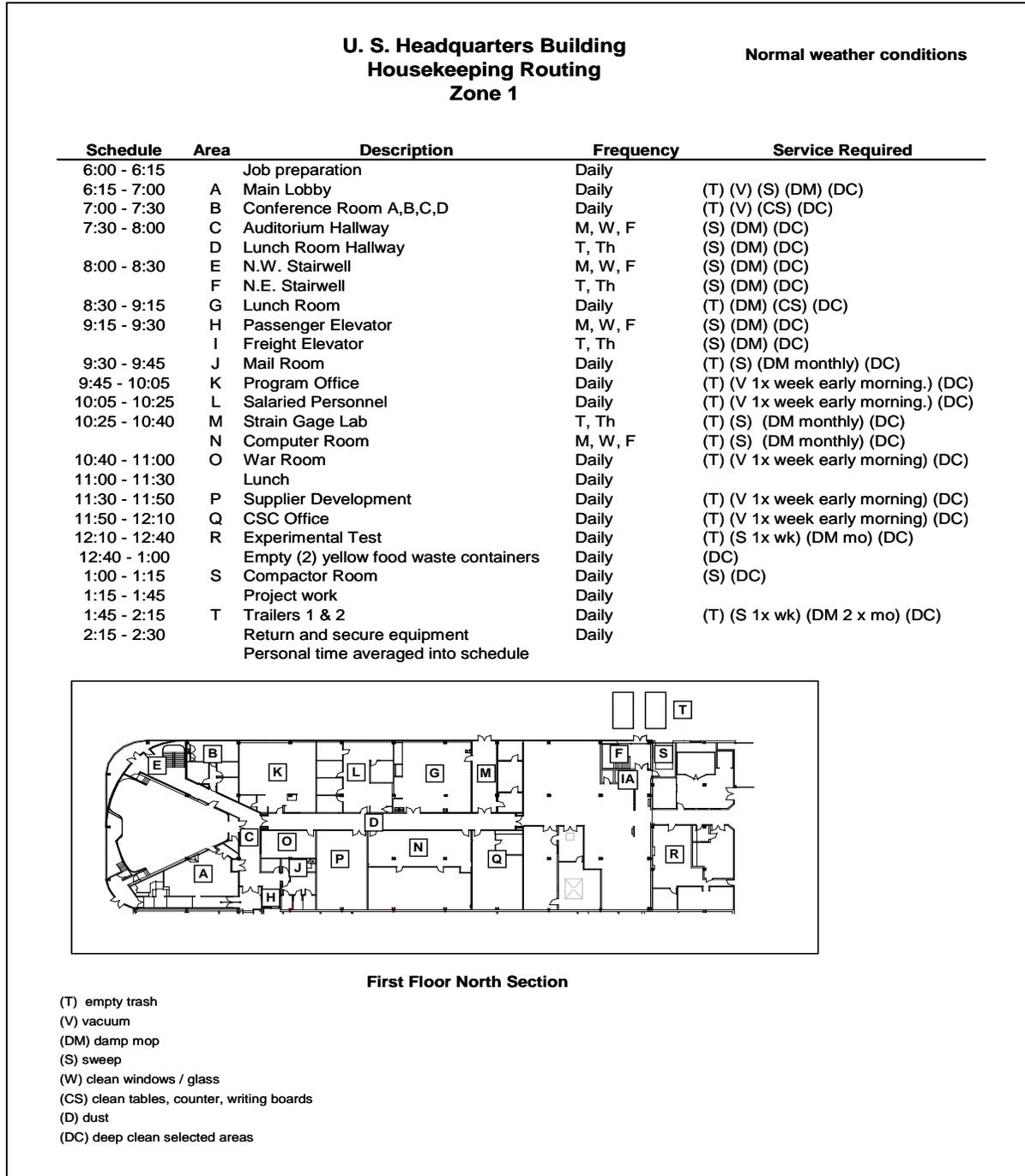


Figure 2. Typical Routing for daily housekeeping tasks for one individual.

The first draft of a Routing was always developed by the Industrial Engineer. This was done by taking industry standard task time data and blending it with a series of tasks that minimized wasted operator motion or walk time. Schedule times were approximate and allowed the operator to fit in a 10 minute break at a time of his or her choosing. The refinement and validation of the times was done with operator feedback during the implementation phase detailed in the next section of this report.

This exercise of getting more specific on task times and line-balancing them to the characteristics of the La Grange site eventually led to the development of 21 Zone Routings as opposed to the initial target of 20.

Development of quality standards to reduce variation and meet VOC

Interviews with hourly personnel showed wide variation in how they did their jobs. This was due in large part to housekeeping personnel responding to the requests of individual customers. Aramark supervisors also displayed variation in what they believed the quality standard should be as they responded to complaints of individual customers or comments in customer surveys.

Once a standardized audit was established which exceeded customer expectations, the questions on the audit became the prototype quality standard. For example, prior to the standardized survey, cleaning dust off the tops of picture frames was not viewed by most as a quality standard. However, once demerits were given when dust was present, it quickly became a standard. This example may have exceeded the expectation of most customers, never the less it became a standard and was relatively easy to fit into the Project Work portion of the job assignment.

Figure 3 shows a graph of audit data broken down by area type. This look at the data helped the Team prioritize what quality standards needed the most attention.

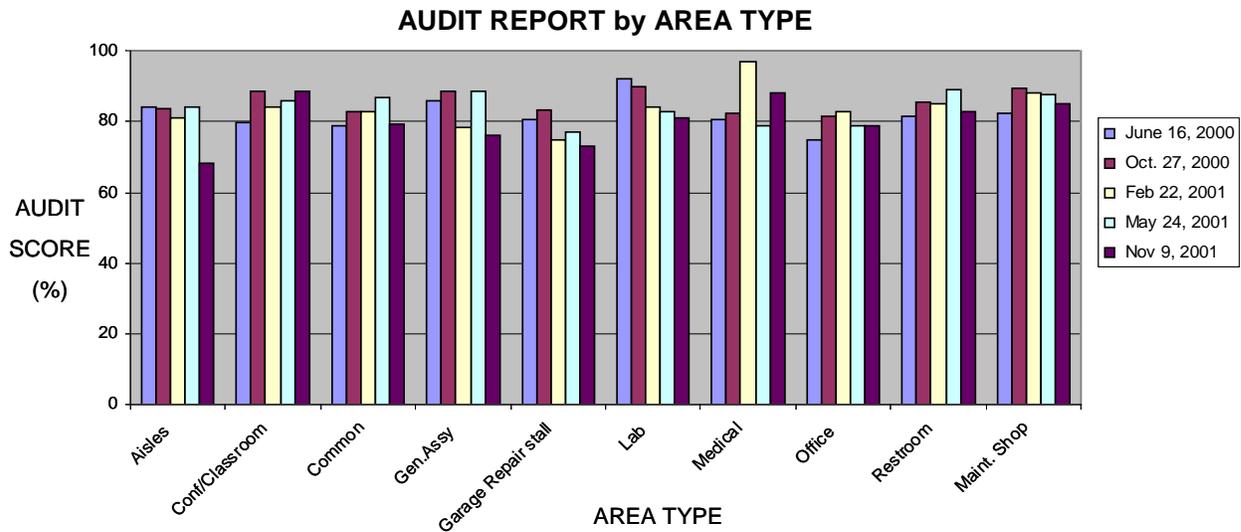


Figure 3. Audit Report by Area Type helped track performance to quality standards.

IMPROVE PERFORMANCE

Preparing for implementation

In preparation for implementation, two enabling conditions were established.

First was securing a commitment from the Plant Manager, that we could stabilize the workforce in housekeeping. Till this point, it was common practice to transfer hourly people into housekeeping if they had been injured in production or had otherwise secured a new work restriction. We agreed that by stabilizing the workforce in housekeeping, we could run this like a business rather than being a holding activity for employees with job restrictions. The Plant Manager found this approach palatable for two reasons. This placed more motivation for production supervisors to keep their employees safe knowing that if they were injured, their headcount would remain on the books of each production department. Additionally, the cost savings from the Housekeeping Improvement Project would go to the Plant Manager's performance to budget.

The second enabling condition prior to starting was to inform the Shop Committee that we were beginning an initiative to improve the performance of housekeeping to get closer to benchmark performance levels. Clearly it was recognized that this would mean a reduction in headcount in housekeeping but we made the commitment to transfer these people back into production as headcount levels dropped. Additionally, the Shop Committee was invited to observe the implementation process and offer suggestions off line as appropriate. They agreed they would not interfere with this approach.

Implementation Team established

Implementation began in the third week in November 1999. In addition to the Industrial Engineering Team, all hourly janitors and laborers became members of the Implementation Team.

Dennis Harvey led the kick-off meeting with the following points covered:

- Business need for making the improvements.
- Commitment that headcount reduction will mean that people are reassigned, not that they lose their job.
- Desire to reduce customer complaints
- Improve housekeeping employee job satisfaction.
- Will establish quality standards to reduce variation and meet customer expectations.
- All daily work in a Zone will be done to Routings that capture the best practice way to do the job (eliminating wasted motion).
- Routings will be proposed by Industrial Engineering but all housekeeping employees will participate in refining and validating the Routings.
- Will go through one Routing per week, then move on to the next.

- Will implement US Headquarters Building first and then move on to others on buildings on the site.
- Will have an issue register where employees can raise any concerns and they will be addressed by the Industrial Engineering Team. If an issue gets bogged down or an hourly person wants to appeal an outcome, they have an open-door invitation to meet with Dennis Harvey, Director of Mfg. Engineering for reconsideration.
- During the quest to make improvements in performance, the cost savings are large enough to justify investing in better equipment. Employees were invited to recommend where equipment improvements could be made.

Monthly meetings were held with this Implementation Team for the duration of the Project with Dennis Harvey in attendance at all meetings.

Issue resolution during implementation

During the 13 months of implementation, all issues brought up by the team were logged and tracked for closure. This tracking information was made visible to employees and openly discussed at meetings. Figure 4 is a graph that was updated every month and discussed at the monthly meetings.

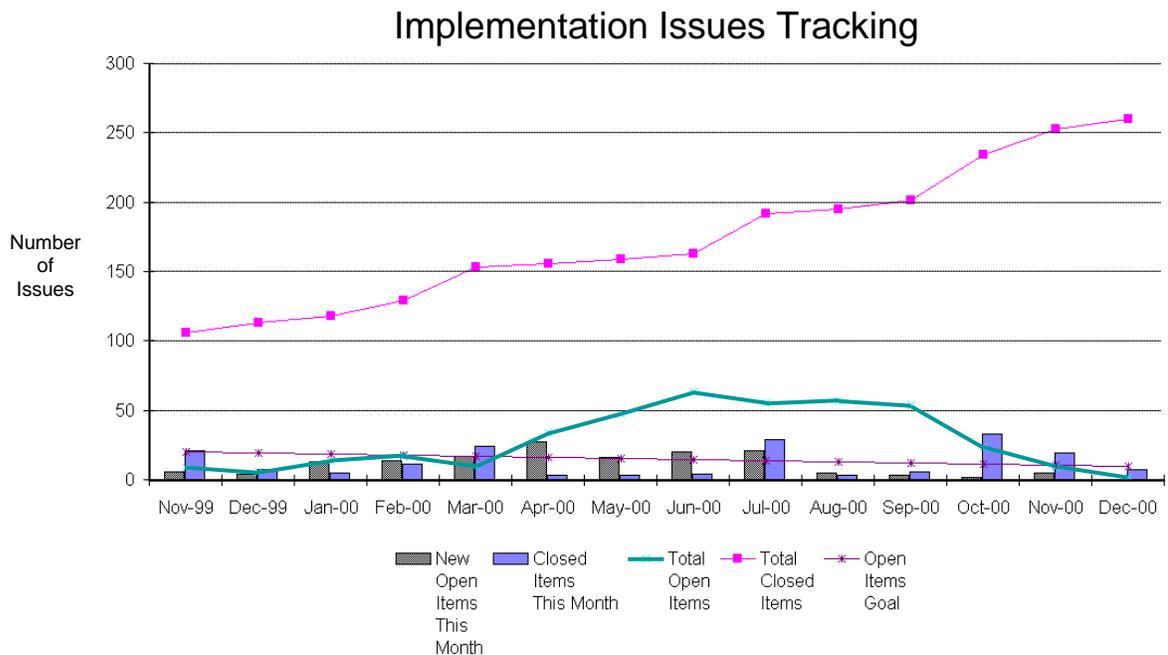


Figure 4. Performance of issue closure during the implementation phase of project.

Though by contract, the hourly employees had the right to use the grievance process, there were no grievances filed during this project.

Refinement and validation of the Routings

When the Implementation Team was formed with all hourly housekeeping personnel involved, management made it clear how the Routing system would work and how the Routings would be validated. The following was shared with all the hourly participants

1. Industrial Engineering created a first draft of the Routings using standard data and other information but recognizes that the work times may change when the reality of executing the tasks is observed.
2. The Implementation Team (the Industrial Engineer in particular) will refine and validate one Routing at a time.
3. The Industrial Engineer will spend one half day with the janitor who will pilot the Routing and explain the rationale for organizing the work as reflected in the Routing.
4. The janitor will attempt to use the Routing with the Industrial Engineer shadowing the janitor and taking feedback for Routing adjustment. This process will usually take 3 days.
5. Adjustments will be made to the Routing during those 3 days to reflect fair times for all tasks.
6. Once the Routing has been validated, the Industrial Engineer will move on to the next Routing.

Estimated time to complete the refinement and validation of each Routing was one week. In actuality, it took at least one week and more like two weeks as it was advantageous to have more than one person pilot the Routing.

As each Routing was complete, it turned out that the total amount of time to cover the scope of work remained relatively unchanged from the original estimates by the Industrial Engineer. That is, some tasks were done quicker while others took longer but the net affect was that the total time remained close to original estimates.

Additionally during the development of the Routings, it was found that most janitors could do some amount of Project Work during every day. This typically amounted to about an hour.

Performance to quality standards

Housekeeping quality was audited every quarter during the project and for one year after the conclusion of the project. Quality improved during the project despite the reduction in headcount. However, after the project was concluded, quality slipped a few percent and remained at that level without the heightened level of attention placed on quality during the project.

Figure 5 shows the audit quality for all buildings during the timeframe of the project. The last bar in the series (which was 2 ½ months after project completion) shows some slip in quality.

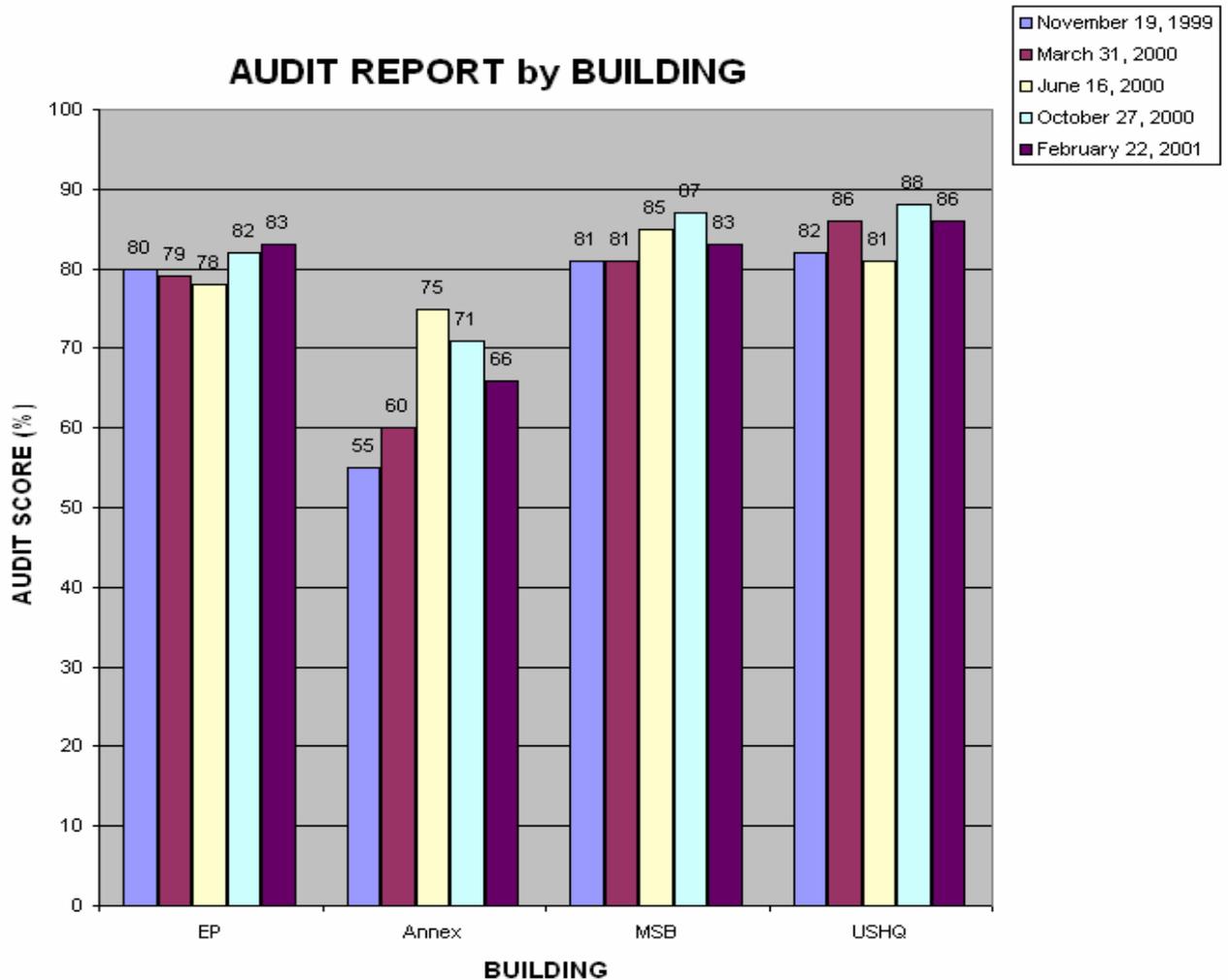


Figure 5. Housekeeping quality audit results during the Project and just after its conclusion.

Other improvements made during the Housekeeping Improvement Project

Besides the headcount reduction of eight (which forms the sole credited savings for this project) there were other improvements to housekeeping performance for which cost savings was not rolled up as part of this project.

1. Up till one year after the project was concluded, there were three supervisors on first shift. Historically, three were needed to make sure all hourly employees understood their assignments at the start of the shift, were available throughout the day to monitor employee progress or answer employee questions, and were available for follow-up on customer complaints. After the project, customer complaints became almost non-existent. Additionally, with the Routings, employees understood their assignments because it was well documented. As a result, only two

supervisors were needed on first shift and this was implemented about a year after completion of the Project. Estimated cost savings above that reported in this report: \$80K / year.

2. All storage areas for housekeeping supplies were subject to Lean 5S Workshops for workplace organization and visual control. The reduction of inventory was documented but that cost savings is not reported as part of this project.
3. Several pieces of equipment were procured in response to housekeeping employee suggestions during the project. In each case, the Industrial Engineer helped develop the business case for the procurement. One example of such a procurement was new quieter vacuum cleaners that could be used in the US Headquarters Building during first shift. The noise reduction allowed this task to be integrated into the first shift Routings without noticeably disturbing customers. As a result, line-balancing of workload was facilitated and thus eliminated the need for second shift vacuuming. Though all business cases had a positive return, they were not reported as direct savings for this project.
4. To control a rodent infestation problem on the site, a food waste policy was implemented coincident with the start of this project. All employees were obligated to place food waste in special yellow containers with lids. In order to enforce this policy, employees who deposited food waste in their personal waste baskets were disciplined. As an indirect benefit of this policy, personal waste baskets no longer needed to be emptied every day. Customers no longer complained that trash was emptied every other day because the root cause of their concern had always been food waste. As a result, the net workload for housekeeping was reduced. Though part of this savings ultimately was rolled into the savings of the headcount of 8, there were additional non-labor savings but this was left undocumented.

CONTROL PERFORMANCE

Routings placed under change control

After all the Routings were implemented, they remained fixed and subject to change management control. From that point on, EMD's Continuous Improvement Program drove any changes initiated by Industrial Engineering or by the Facilities group. Changes proposed by the hourly workforce usually came through the Suggestion Program where employees would get a monetary reward of 20% of the first year savings.

Routings remained in effect through at least April 2005.

Continued of used Quality Standards

Quality had increased during the Project. One year after the conclusion of the project, the audit results showed a slight deterioration of a few percent. This was attributable to a reduced level of attention on housekeeping by management.

It has been reported that since the project's conclusion, there has not been an initiative to enhance the quality performance of the housekeeping activity.

Final cost savings due to the Housekeeping Improvement Project

The original target for the housekeeping staff was 27. As the project was implemented, it turned out that 29 were needed to maintain quality levels and to execute Project Work. That created a headcount reduction of 8 rather than 10.

As the Routings for each building were completed, the reduction in workforce for that building was transferred to production as originally agreed to with the Implementation Team.

For calendar year 2001, the housekeeping budget was reduced by \$672K to reflect the savings accumulated by the project. As stated in the previous section, an additional savings at the end of 2001 was the reduction of one supervisory headcount essentially attributable to the results of this project.