

Uncorking the Genie from the Bottle

Robert W. Hall

Genie Industries wants their customers to feel as if a genie had granted them a wish. Their forte is innovation and customer service that the customer sees. Inside the magic lamp, supporting this, are lean operations among the best in North America.

Without thinking much about it any more, constant attention is given to the Genie Value Proposition, shown in Figure 1, throughout the company. It's embedded in the culture. This value proposition, guiding what is important to the customer, preceded the development of lean manufacturing. Although lean operations and lean product design have progressed to becoming lessons for others, their value isn't appreciated by customers unless the thinking extends to customer care and feeding.

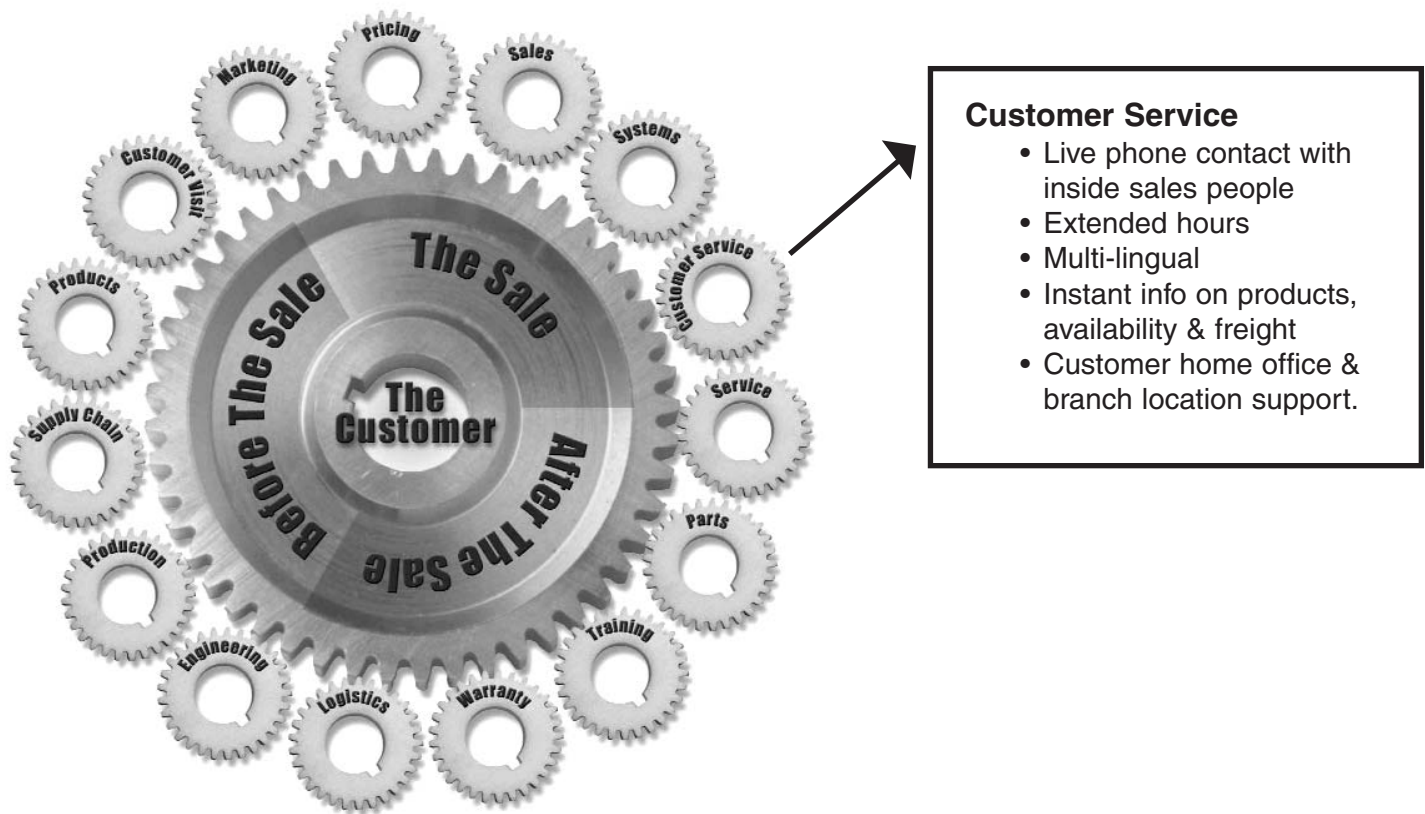
In Brief

Genie Industries is well-known for innovative products and customer service. It's also relatively mature in lean and quality, becoming "Toyota-like" in process improvement. Recently purchased by Terex, Genie's system is being used as the model to transform all of Terex. Besides the working culture, Genie has extended lean thinking into product development, and into development of detailed work improvement at the work station level, called rapid kaizen. Few North American companies have gotten to this stage.

Genie began in 1966 with a novel pneumatic lift, and ever since Genie has been very entrepreneurial designing and delivering solutions to customers' lifting problems. As the company grew, the eclectic informality of the early years had to be replaced by more systematic ways of doing things. Operating improvements developed gradually, step-by-step, over the past 15 years, adding to the ability of customers to distinguish Genie from all brand-X competitors, but by developing more process discipline than bureaucratic controls, a much bigger organization has sustained much of the close-to-the-customer, entrepreneurial drive of its founders.

Each of the gears in the Genie Value Proposition represents a set of strategic implications and how-to procedures. In total, it is a good guide to action within a large, dispersed organization. Without explicitly mapping them, it guides what should be considered in full-service value streams to customers.

Now Genie is entering a new phase of development. After its 2002 acquisition by Terex Corporation, a broad-line construction equipment company, headquartered in Westport, CT, Genie has begun to transform into Terex — "think Terex first" — while Genie is influencing Terex. Genie's operat-



This diagram suggests how the organization developed specific capabilities to support Genie's overall value proposition to customers. Each of the "gears" has a set of capabilities to make that gear turn, similar to that shown for Customer Service, and all the gears should mesh with all the others.

Figure 1. How Genie turns the gears to produce quantitative value.

ing philosophy and lean operating journey became the model for the Terex Business System, while Genie's new system is the Terex system. "Synergy" of this kind, the dream of corporate strategists, is difficult to execute in practice because of culture and systems clash. Thus far, the new Terex seems on track to produce a case on how to organize a large, diverse, global organization so that business units at the operating level have the flexibility to be highly responsive to customers. Creating a new system for everyone based on lean principles and lean thinking helps to overcome the usual clashes. (See "About Terex Corporation").

Fundamentals First

Genie's journey to operational excellence began in the early 1990s with quality.

They began with development in Total Quality, and they dug into it, exploring how to hear the voice of the customer, not stopping with quality tools. That fit well with the philosophy that the customer is the center of all their activity. Without having a good foundation in quality practice, they felt that plunging deeply into lean manufacturing was not wise.

The lean journey began in earnest in 1997. Genie had been guided by a number of consultants from Deltapoint, and that year several of the consultants left the consulting world, entering Genie in leadership positions. They started a lean promotion office, with lean leaders assigned to departments. Within a year all this had been absorbed into line management so that the managers understood that the changes were their responsibility; someone else

About Terex Corporation Genie Industries, Aerial Work Platforms Segment

Genie Industries of Redmond, WA (same hometown as Microsoft) is part of the Aerial Work Platforms Operating Segment of Terex Corporation. Through a series of acquisitions, Terex has become a major global player in construction equipment, with a full line from construction cranes to asphalt mixing plants, including every kind of moving equipment from off-road hydraulic excavators to concrete mixer trucks. One of the few lines it doesn't offer is standard warehouse lift trucks. In total, Terex has about \$6 billion in sales, over half of that in Europe, but it sells in over 100 countries from 50 plants world-wide. Genie itself has substantial export sales. Terex has five operating units, or operating segments:

- Construction
- Cranes
- Aerial Work Platforms (includes Genie)
- Mining
- Roadbuilding, Utility Products, & Other

And no, Genie Industries is not the garage door opener company, equally well-known. The two companies have a gentlemen's agreement to share the name, and they routinely route inquiries to each other when potential customers become confused.

The Genie product line starts with small aluminum pneumatic hoists, or Genie lifts. Under the Genie brand, they make stick booms, articulated Z booms, trailer-mounted booms, and scissor lifts. Booms range from 30 feet to 135 feet in height; scissor lifts from 15 to 53 feet. Under the Terex brand, Genie makes a line of trailer-mounted light towers and generators, plus "telehandlers" (flexible, rough-terrain telescopic lift trucks). Now the Genie business is being integrated into Terex as Terex Aerial Work Platform Operations, with Genie being retained as a brand name. A Genie stick-boom is shown in Figure 2.

In the United States, the lion's share of Genie's sales is to the equipment rental market, either by equipment dealers, or through rental agencies. Robust durability, reliability, and end-of-rental-life value are crucial to the business. Terex's (and Genie's) primary full-line competitor in North America is JLG Industries.

When Terex acquired Genie Industries in September 2002, it added about 15 percent to Terex revenues, and a bigger percentage to its profit, in contrast with some other Terex acquisitions of sick companies in need of turnaround. After a year of getting acquainted, in 2004, Genie Industries became de facto a leading learning lab for all of Terex. The Terex CEO, Ronald M. DeFeo, led a switch in strategy from acquisition to operating reform and organic growth based on the Toyota Production System. Terex switched to a right-sourcing strategy, in-sourcing in selected instances. Like Toyota, Genie and Terex want to control all quality-critical operations. Re-thought and expanded, Genie's system became the kernel of the new Terex Business System (TBS) for the entire corporation. Calling it a business system emphasized that much more is involved than production. The Terex Operating System (TOS), which resembles those various "house models" of lean manufacturing, is a subset of TBS. Terex as a whole has begun not only its "TOS journey," but several others simultaneously.

World-wide, construction equipment is a boom-bust business, and end users renting equipment is a market that demands reliability, robustness, and forethought for safety. Quality in every sense is a big factor. Throughout Terex, value streams to customers must be designed to cope with this. Historically, Genie began by seeking solutions to those genie-wish problems of their customers, creating whatever seemed to help hoist people or material into the air. Consequently, production for Genie Industries and for almost all other Terex operations is made to order. Equipment needs vary by geography and local conditions, and Terex wants customers to have it their way all over the world. Product variation is significant.

Genie Industries began "in a garage" in 1966 with a unique, portable pneumatic lift, the original Genie Hoist, so successful that designing all kinds of material hoists and aerial work platforms to overcome customer problems became fun, built into the Genie culture from the start. Each design was intended to be a breakthrough, but spare parts, vital for excellent field service, get high priority. Because equipment safety and reliability was so important, Genie always supported its innovation with excellent quality and delivery for the time. As the rigor of this operating challenge grew and grew, in the 1990s, Genie began first a TQM initiative; then what is now called a lean initiative.

Today, most Genie operations are in Redmond, WA, and Moses Lake, WA. Genie has about 3000 employees in total, and six major operating locations. Operating buildings are 1-200,000 square feet in size with 2-400 people working in each. All employees are non-union. Operations including design engineering and customer service are deliberately kept small in size with functions co-located in order to promote smooth teamwork serving the customers. That is, Genie is organized by value streams.

This is one of the few articles you will read about Genie process development. Both Terex and Genie shun excessive publicity, preferring that customers see benefit without fanfare about how good it is. No executive names are mentioned. The tradition at Genie, and now the policy for all Terex, is not to trumpet the accomplishments of either the operational improvement, or of specific individuals. Instead, much like Toyota, the intent is to let performance speak for itself. Select talented people not bent on stardom; then develop them into the best that they can be, motivated because they really enjoy the challenges of the work. Turnover of all employees at Genie is very low. How low? "In a year's time we might lose a couple of engineers out of a hundred." Genie Industries wants everyone to focus on the real stars of their show, their customers.

could not, and would not, do it for them.

In 1997, Genie also acquired the scissor lift line, so this took place during a strong expansion. In 1998, the centralized staffs were dispersed among the various product lines, so that everyone reorganized by value streams. Support people were physically located as close as possible to the operational areas they supported. By 1999, Genie was having quarterly kaizen learning weeks with Shingijutsu. These sessions were very successful because by that time the culture had come to accept drastic changes in thinking. Whenever a kaizen event occurred, learning would be fast, uninhibited, and sometimes surprising. Six years later several value stream groups still have quarterly learning weeks with Shingijutsu. They are still learning; still improving.

They began to choke off MRP, abandoning the use of job shop work orders in production. They introduced kanban systems. They introduced 3P (Product, Process, Planning) in product development. Each shop floor kaizen event revealed changes in support areas necessary to make the new methods a sustainable standard. In time, most people at Genie became involved in kaizen, learning the tools and accepting constant change. This transformation is more than a sudden streamlining of flows; Genie regards it as a never-ending process of human and organizational development. Compared with where they want to be, Genie

and Terex still have a long way to go.

However, as a result of changes up to 2001, Genie enjoyed the margins to make good use of a downturn when sales volumes dropped by half. The lull gave them time to increase the speed of change, make sure all people understood, and commit them ever more deeply to process improvement.

A Typical Genie Stick-Boom



Figure 2.

Organization for Transformation

Most importantly, the top management team of Terex is committed to genuine change; no excuses, no pretend-to, no weaseling out. Although Terex headquarters is in Westport, CT, the center of gravity for the change is Genie in Redmond, WA. Thirty-eight of the Genie leadership team have transferred elsewhere in Terex, and a few capable new leaders have come from outside. Overall, Terex is in the beginning stages of a Genie-like transformation in most operations, while Genie must re-set the foundation with recent new hires, and at the same time press on into more advanced stages of lean development.

To orchestrate this change, Terex has a half-dozen internal change agents attached to headquarters, and each of the five major business segments has a Terex Business System manager with two or three more people capable of guiding people through kaizen events and experiences, educating them in improvement tools by actually using them. The goal is to develop the people in each unit to make improvement daily. Genie calls this rapid improvement or rapid kaizen.

Each Genie plant has three support areas for process improvement. One is a "Moonshine Shop" where carts, fixtures, and other devices can be quickly fabricated for trial. Skilled operators love to take turns working moonshine, reconfiguring "Tinkertoy" mechanisms — Tinkertoy because nothing is ever considered a permanent installation. All work flows through cells that are subject to improvement at any time. The general thinking is to keep final assembly lines short, and fed directly by subassembly cells and fabrication areas. Month-to-month, or even week-to-week, the appearance of a shop floor can change considerably.

A second support area is a tooling shop supplying more skill to modify tooling or equipment where process capability is important for holding dimensional tolerances or other tolerances. A third area is a kaizen space where changes and change

projects can be tracked, keeping the revisions coordinated.

In each Genie plant, workers have a morning stand-up meeting, and another at noon, or at mid-shift. Part of each meeting is stretching exercises, intended to keep down ergonomic injuries, and process modifications to maintain ergonomics are considered in each kaizen. In general, assembly operations are one-shift, while some fabrication operations are two-shift. Up to twenty percent of the workers may be temps in order to cope with the fluctuations of a highly cyclical sales pattern.

All staff and management have offices close to the operations for which they have responsibility, and their work is designed to have them view the scene of the value-adding work as much as possible, not "closeted away" doing remote analysis. Team leaders are expected to back up operators. When an andon goes yellow or red, they go to the spot instantly, doing whatever is necessary to right the problem. Managers and supervisors have morning and evening system status meetings, usually brief.

Spare parts support is so important to Genie that this area also has a heijunka board, and a regular pick pattern to collect parts for each order. Frequently shipped parts are a short walk; rarely used ones are at the back of the layout. About ninety percent of all spare parts orders ship complete within 24 hours. Service parts in current production have equal priority with those to be used in assembly. Out-of-production parts are made in a different area.

Within Genie, process design comes before IT development, so that IT supports the process. IT is not a problem, but a help and a solution.

The same is true of accounting. There is nothing special about the accounting system, but they do not manage to piece part variances. Budgets are by department, and the management instinct is to look at overall departmental performance without pressuring anyone on departmental budget variances alone.

Exploded Diagram of THE TEREX BUSINESS SYSTEM

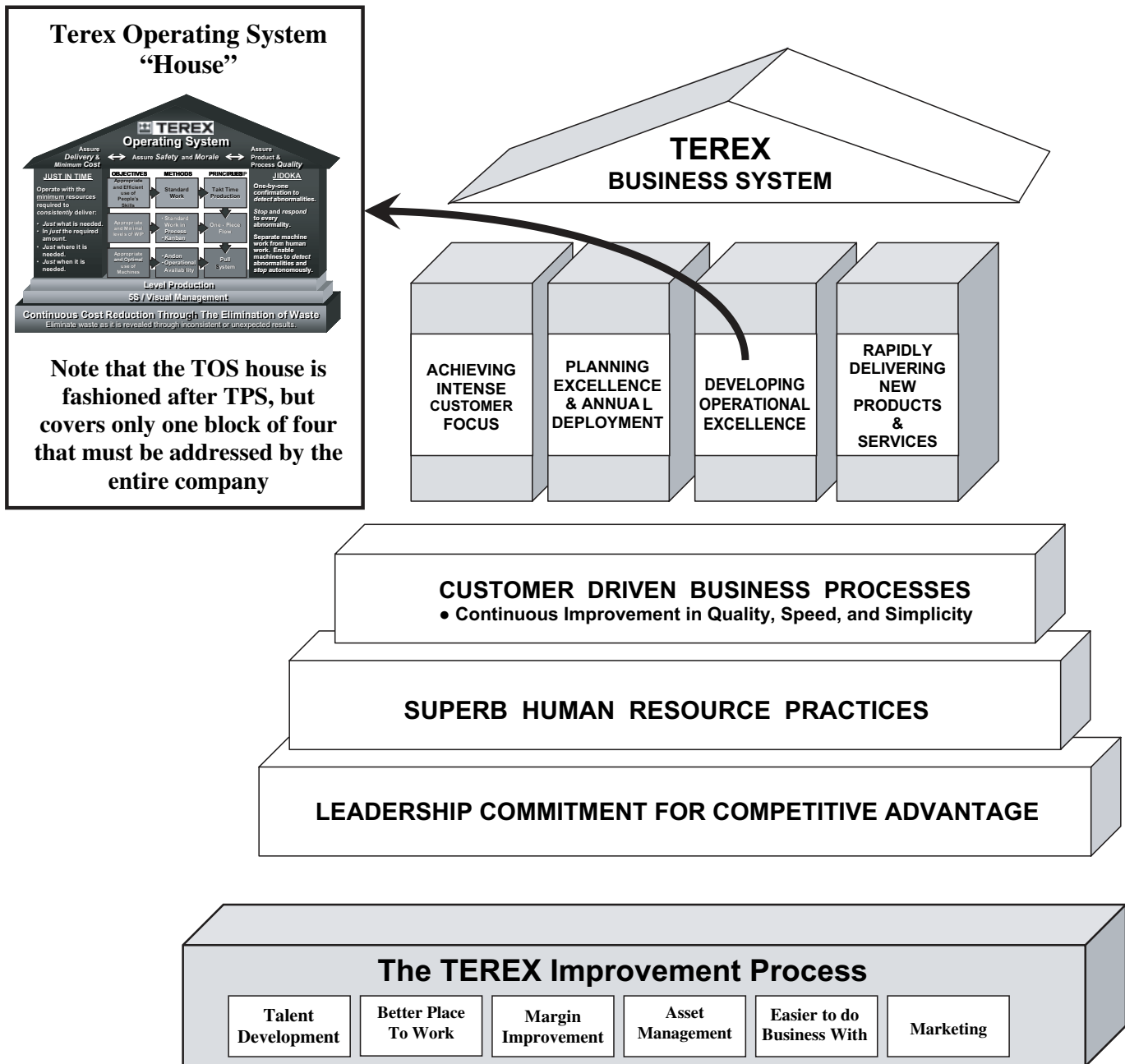


Figure 3.

The Moosewerks

This area takes its name from an old movie set for Northern Exposure, which was in the building before Genie acquired it. A big moose head displayed at the entrance gave the building its name. Actually it is an experimental production area. The objective is to move to the "next stage" of lean building a scissor lift, organizing so that a small

production area could be replicated, therefore enabling production volumes to ramp up and down with little or no change in resources consumed per unit. In other words, the idea is to escape that old bugaboo, economy of scale. Cutting takt time to increase production rate may take the process into a zone that is inherently loaded with more waste, so run at the "right rate," not a maximum rate.

In the Moosewerks, Genie personnel build much of their own equipment, and they freely modify all of it. Machines are sized and configured to function side-by-side in *chukka-chukka* cells. A different twist on a piece of equipment might be tried almost daily.

Here the workers make improvement at the detail level in each work station. Work procedure improvement is guided by feedback on each work cycle, with a takt time of around ten-minutes. All stations in an area are connected to a central light board, representing each of the work stations. When work at a station is complete, that station's light switches from red to green. Near the end of a work cycle, the central board starts "going green." Work on the next cycle will not start until all work stations have lit up green. Watching this board will give anyone clues to where the problems are, and how to better balance the workload between stations.

In addition, the actual work cycle time versus takt time is computer-projected onto an overhead screen that everyone can see. Add that to the detail visibility afforded by 5S at each station, and the system provides both imaginative and correctional feedback after every work cycle, and some-

times within a work cycle. Genie calls this "rapid kaizen," but it is very similar to Toyota's "standardized work."

The Moosewerks is part of product development as well as process development. The idea is to start with full-size mock ups and simulate the production process before starting to devise real equipment and organize it for flow production. Then go through rapid kaizen to refine the process before transferring it to regular production.

Product Development

Genie introduced 3P to product development in the late 1990s. Learning how to do this well takes time. They made a number of mistakes in the early years, only recently have they matured to the point where mock-ups and 3P seem to be the natural way to do it.

Development is done by a cross-functional team looking at a newly designed machine from a number of angles: primarily use, durability, and maintenance in addition to the usual problems of configuration, footprint, weight balance, operator safety, tolerances, and so on. They start by examining the customers' needs detailed as might be done for QFD, then throw on the table a lot of conceptual design sketches from everyone on the team. A design then melds together by combining the best ideas from the different "wacko" sketches. Then they build a full-scale wooden mock-up, checking further for interferences and other problems. Only when the mock-up is refined do they begin the CAD drawings that will convert actual material into a working prototype.

For really different kinds of parts, they may also mock up a production process for them, but most of this work is put off until the prototypes are tested. By the time a new machine hits production, start up should be very smooth; most of the engineering changes were worked out before hand. Figure 4 shows members of a team looking at a wooden mock-up — no detail explained. Most companies do not want to explain many details of an actual new

Members of a Genie Cross-Functional Product Team with a Mock-Up



Figure 4.

product development, and Genie is no exception, but it was evident that members of a team designing in this way were having a ball at work.

Performance Measurement

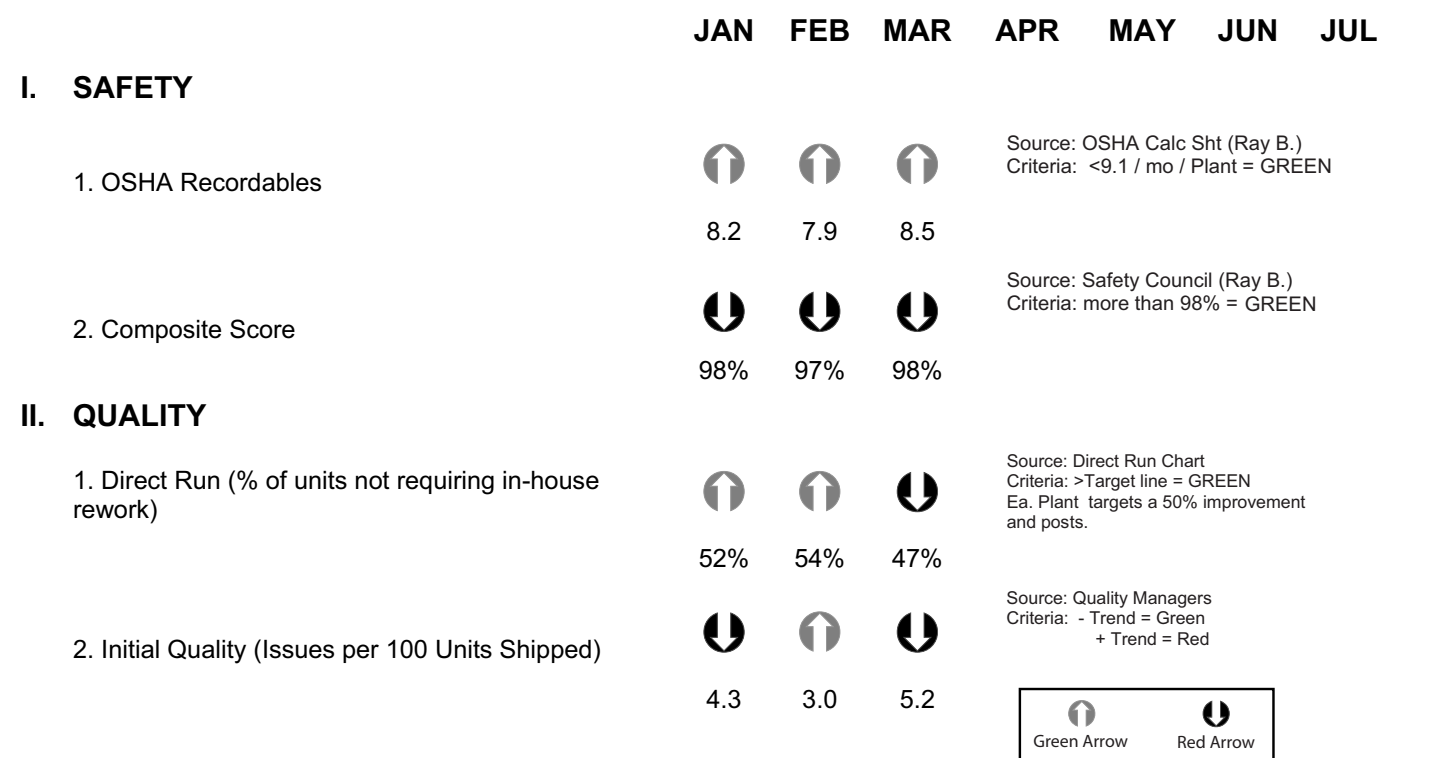
Genie has a unique red-light, green-light system for displaying summary performance measurements. Most of the time, the exact metrics are less important than whether performance to a metric is improving or degenerating. Red arrows are the signal to check for corrective action, and when posted in an area, the implications are obvious without anyone having to say much.

A sample of one of these summary boards is in Figure 5. Performance measurements cover six major categories:

1. Safety
2. Quality
3. Delivery
4. Cost
5. Morale
6. Improvement Activities.

Genie wants both managers and operators to judge performance more by being at the scene than with the metrics, which should never be prejudged without knowing the context of the performance.

Sample of Genie Green-Arrow and Red-Arrow Performance Chart



Note: Down arrows are in a red circle; up arrows are in a green circle. Color coding allows a chart to be read at a distance at a glance, especially if one is familiar with all the performance categories. The performance numbers shown are for illustration only.

Figure 5.

21st Century Working Culture Capability Classification

Enduring: Capable of rapid, drastic changes in any process.

Vigorous: The system embodies the means by which people learn and improve processes.

Proficient: System learning is “engineered” with worker participation; then operated.

20th Century Business-as-Usual: Financially-directed Taylorist management (not shown).

Organization Class	Process Improvement	Innovation	External Responsibility ¹
Enduring Change Resilient	Eliminates waste from new processes quickly. Creates “self-improving processes.”	Can rapidly “do new science” and act on it. Extends “self-improving processes” to customers.	Unifying social mission. Environmentally sustainable. Rapidly adaptable.
Vigorous Habitually Learning	Autonomous process improvement – daily. Learning processes are habitual – built into the self-design of work.	Rigorously learns new science & technology. Everyone “does NPD.” ² Anticipates new needs of customers.	“Outside-in;” focused on real customer needs. Serves all stakeholders. Going for environmental sustainability.
Working Culture Gap			
Proficient Structured Flow Operations	Core operations integrated; improvement is directed, blitz-by-blitz; coaching the tools.	NPD is project-structured; with cross-functional collaboration on projects. Fast NPD. ²	Good basic service to customers; cost-quality-delivery; good corporate citizen, environmentally compliant.

1. External responsibility starts with customers, but includes performing well for all stakeholders, including the general public. 2. NPD = New Product Development.

Figure 6.

Therefore there's little reason to strain for some perfect set of performance measures. They simply add to what you can see by carefully looking, and some things can't be measured directly. For example, morale is exceedingly important, but attendance and turnover are the only two surrogates that Genie managers use to complement what they can sense by being with the people.

Cost is a measurement category, but it's not measured by budget variances. Instead Genie looks at cost surrogates that people can actually affect: Overuse of material, revenue per total headcount, overtime, and inventory turns.

Conclusion

Terex as a whole is in many stages of operational revolution. Genie, being Terex's most mature organizational unit, is moving toward becoming a vigorous

organization according to the classification shown in Figure 6. That is very evident in the Mooseverks production laboratory. The objective is not to stop until all of Terex can perform at the level exhibited by that laboratory. This is long journey, not a quick trip, so they are still some years away from this objective. However, their story, and their attitudes about improvement constitute an instructive case on how to go about getting there.

Robert W. Hall is Editor-in-Chief of Target and a founding member of AME.

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