Webster Plastics' "Afterburner"

Robert W. Hall

At Webster Plastics, Inc. (WP) people are driven by intrinsic interest in their work, confident, but not cocky — behavioral traits of a maturing, high-competence work culture. There's no panic, and not much rah-rah. They have won an award for lean manufacturing while seldom using the term "lean." Quality is an obsession without subscribing to any publicized "school" of quality.

Brick at a time, WP assembled their system their way, guided by the Webster Plastics Strategic Framework, visible to everyone. The 2003 version starts from a review of customer needs, then their mission and vision, culminating in 28 improvement projects. All 130 people in WP contribute to at least one of them. Over time, these projects have covered every process within WP, but that's just the planned improvement.

The "afterburner" is *everyone's* daily, ongoing improvement as "part of the job responsibility." These little nips and tucks apply the finishing touch to quality and leadtimes. Cost savings add up to so big a chunk of WP's profit that it's one of the few numbers WP doesn't want to share. Most other "lean" companies use similar "tools;" few use them to so much as see the little improvements that WP makes regularly. The difference is the culture, described at WP as "the way we do things around here."

Innovation in polymer molding, WP's original key to success, remains a strong streak in the Webster culture. But after the arrival of Vern DeWitt as president in 1990, process improvement began evolving as a complementary strength. Both product design and process development became more scientific, and the culture became much more collaborative, both internally and with customers.

WP constantly pushes the envelope of polymer application technology. An aging example is the transmission fluid accumulator piston, one of their award-winning designs. By replacing cast iron, this piston saved GM tons in weight and millions in cost, but a dozen years after the original idea, making it remains no small trick. It's 65 percent filler, so it looks and feels like a ceramic with ±0.0002 in. circumferential tolerance. The ring (different resin) is molded in, so there are no secondary operations. The binder is Fortron supplied by Ticona, which specializes in high-end resins. Loaded with filler, Fortron is an abrasive, equipment-chewing brew at any temperature, and it is injected at a toxic

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About Webster Plastics, Inc.
Fairport, New York
"Innovation is Our Business"

The company began in 1946 in Webster, NY near Rochester, from the beginning specializing in injection molding difficult parts. Over time they became known for expertise in metal-to-plastic conversion, devising unique, better-performing, polymer-based solutions. They mold around metal inserts. High-precision microcellular molding is a licensed process for which they are developing applications. Composites with abrasive filler are a specialty, so dies and equipment are both robust and well-maintained. To an outsider, some processes resemble molding high-precision concrete blocks using polymers as a binder instead of cement. Annual sales are about $25 million.

Of Webster Plastics' 30 customers, they work intensively with seven that account for almost 85 percent of revenue. WP prefers open-minded customers, willing to collaborate trying new ideas, shunning those interested only in more parts at lower cost. To protect themselves from industry cycles, WP's customers cover a broad spectrum: automotive, medical, aerospace, electronics/electrical, consumer products, and industrial.

Webster Plastics is a division of Acadia Polymers, in turn owned by The Jordan Group LLC, a private investment company in New York City. Sister divisions are Acadia Automotive Sealing and J. M. Clipper, both also well-known for polymer technology.

Significant events in Webster Plastics' history:

1946	Founding in Webster, NY.
1973	Began production of composite wiper system pivot housing
1989	Sold to Bunzl (UK)
1990	New president, Vern DeWitt, starts migration of Webster culture
1994	All employees begin to engage in planning a new plant designed for lean
1995	Most Innovative Use of Plastics Award from the Society of Plastics Engineers for the accumulator piston for automatic transmissions (first plastic part to be used in a transmission)
1996	Most Innovative Use of Plastics Award from the Society of Plastics Engineers for the self-adjusting clutch ring
1998	Sold to The Jordan Group; move to new Fairport plant in four days, staying in the Rochester area
1999	Advance the use of teams, beginning the next stage of cultural advance; form tighter cells; work the plan for the new plant
2000	Win the IEE/NIST Outstanding Achievement Award for Successful Lean Manufacturing
2002	Win *IndustryWeek* Ten Best Plants Award
2002	Receive Society of Plastics Engineers lifetime achievement award for the wiper pivot housing (350 million made; no known field failures in 30 years).

The Fairport location, housing all operations, has 75,000 square feet. Administration, sales, and engineering consume 8000 square feet. All other space "moves product," operating 24/7 using five shifts, fully staffed at all times, including tool room and maintenance. The total workforce, including the president, is only 130 people. Twenty-one of those are the total "office." Product engineering consists of only eight people; sales has four more; customer service, two. In the plant, people are cross-trained. At Webster, everyone has work to do, and finds work to do.

The plant has 43 injection molding machines, from 22 ton to 1000 ton size. Setup times range from 10-40 minutes depending on process complexity (multi-shot with color change is pretty complex). All machines are fed by a closed loop automated material handling system with ten miles of piping. While that keeps lift trucks out of the plant, the big payoff is quality. For example, WP vacuums the particulates from all returning material for regrind, garnering up to 800 pounds of particulate each day. Precision blending is a must; many blends are a technical challenge. Besides that, synchronized timing of feedstock delivery to machines is so important that material handling, the operation of this system, requires the highest certification of any operative work in the plant.

WP has 350 different blends of resin (and filler) and 650 end item SKUs. It ships to an average of 450 pull system signals per week, usually for same-day or next-day delivery in standard returnable containers. Flexibility is a must; weekly customer forecasts are only 60 percent accurate; WP averages 99.8 percent on time delivery to their actual needs.

650°F. Like many other WP parts, the accumulator piston's field record is unblemished by any known field failure. Process control is dialed in and held. No uproar in the plant betrays that WP processes such wicked stuff.

By the 1990s, mastering such demanding processes without clamor and waste called for a transition from reliance on process "art" to science. The major hurdle wasn't learning new techniques. Technically, WP personnel are astute. The cultural shift to collaboration, making fact-based process improvement non-threatening to someone's presumed control, was a much greater challenge.

Firing Customers

Vern DeWitt, the president, believes in leadership, not control. As he puts it, "Everything is much simpler when all I have to do is paint them a picture and they make it come alive. Letting the people run the business beats the hell out of trying to control a bunch of control freaks." He pays little attention to the numbers. Do everything else well, and good numbers pop out.

But it took most of the 1990s to get to that point. A one-time manufacturing supervisor, when he became president, Vern understood that WP had to fail-safe quality and lean the operations. He began this personally, with about ten people in a corner of the shop floor, drawing the first spaghetti diagram of a long, confusing flow. He figured that if improvement was obviously beneficial, and he gave encouragement, one or two leaders in a group would launch further initiatives on their own. It generally works.

Vern calls this a disease model of best practice growth. Start an infection and maintain ideal cultural conditions for it to spread. (Public health officials use quantitative epidemic growth models, but Vern only uses them as an analogy.)

But back then, manufacturing conversion was not WP's biggest problem. General Motors accounted for 87 percent of sales — in the Lopez era when only price mattered — while WP needed customers to partner in innovation, the greatest value opportunity to both parties. WP began to "fire customers." In the next four years they replaced 70 percent of them and drastically reduced sales to GM. DeWitt recalls that developing customer partnerships and improving customer service was the big hump. It gave WP breathing room to do all the rest.

When selecting customer partners, being picky pays. WP looks at the resources each customer consumes monthly. They want industry leaders in innovation that recognize the value that WP can bring to them, growing, but financially stable so they pay, and on time. To maintain close working relationships, WP lavishes attention on seven customers, but stays alert for more. No relationship is apt to last forever. Before paying a visit, sales engineers research prospective customers, approaching only those that fit the pattern and where they can contact the right people. Occasionally WP takes a chance on a customer that needs a little "shaping up" — but only if the long-term promise is something better than wilting on their commodity treadmill.

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Cultural Migration

All change at WP was limited by the speed of culture shift. In 1990, Webster had a control culture. Managers thought that success was control of others, or resources, or a process. Despite this, the organization could and did execute planned improvement. They instituted more scientific, process-centered problem solving, and developed process monitoring, DOE, fail-safe, setup time reduction, and other tools. In 1994, they began planning a new plant having the infrastructure to put quality in the process and take the waste out. Everyone had a part in the planning. By the time they made the move in 1998, everyone was committed not only to making the plan work, but to improving on it.

The move-in was choreographed to the last detail and executed in four days with no pre-build of inventory. Aghast customers were astounded when WP pulled this off without missing a shipment.

The new plant was only the most visible change of 1998. It catalyzed a new phase in leadership and culture building. Gripped by a control mentality, WP could not fire up the "afterburner." People wouldn't open up and share little things they learned with each other. The company was a confederation of little teams rather than one big improvement team, daily looking for opportunities to improve, exploiting them, and passing on anything learned to everyone else. Not having the "want-to," the control-oriented could not comprehend the "how-to."

Al Gross arrived to become director of operations. Joe Buonocore became plant manager. Expected: Regular participation in improvement and self-directed teamwork. Control-oriented managers could no longer cope; neither could workers unable to shake the need to be directed. Whenever personnel proved incapable of participating in free-flowing initiative instead of being told what to do, WP helped them find another job at a more suitable place. After a period of high-turnover turmoil, most people signed up for the duration; turnover returned to the six percent range.

WP develops very skilled people. Some, enticed by the promise of green grass elsewhere, left for a time, but returned to a freer environment — with "pretty good benefits" as a bonus. Figure 1 summarizes a few notable process achievements from tuning up the new plant.

"Firing" An Owner

Move-in signaled the beginning of the second phase of culture building for continuous, detailed improvement — the afterburner — which could not fully ignite without a change in ownership. The parent company until 1998, Bunzl, didn't "get it."

Selected Process Metrics: Webster Plastics, Inc.

	1999	2003
Customer quality (ppm)	750	10
Yield efficiency	92%	99.8%
On-time delivery	75%	99.8%
Lot size reduction index*	100	20
Operating equipment effectiveness (OEE)**	70%	87%

* Lot sizes vary considerably, and so do setup times. Easy setups are in single digits; complex ones up to an hour of down time. To synchronize the machine, tool, and resin to meet at the same time; setups, or changeovers, are a total team effort with operators, material handling, tool room, and maintenance. With this big reduction, WP became much more responsive. They can ship to an urgent call for non-scheduled, same-day delivery within two hours — don't enjoy the surprise, but they can do it. About two-thirds of all shipments are routinely same-day or next-day by customer pull signals anyway.

** The average across all injection molding operations is 87%, but OEE varies from 60-95% depending on the abrasion and toxicity of the resin, and the dimensional demands of the particular part.

Figure 1.

In general, anything unrelated to dollar line accountability was off their map. They dimly understood the logic of robust tooling and equipment, or of quality processes. The value of training and teamwork escaped their ken. Anything as heretical as one big team of people running processes and spontaneously improving them was utterly incomprehensible.

Exasperated, Vern DeWitt told Bunzl, "This isn't working," and shopped for a new investor. He found one with a completely different attitude in The Jordan Group, which specializes in investments in basic industry with good potential. They don't leverage to the hilt to buy, then milk a company as a cash cow to pay the debt. They expect to infuse more money to build the business. In return, they expect growth and a good return, and they expect that leadership will make it happen. Vern meets with them once a year.

Although they are serious about a good return on their money, the Jordan Group takes a big-picture, long-term view evaluating a company. They like to see increasing sales and profitability, but ask, "What do you do that makes you of value to all the stakeholders?" That's your company's real value, not how much investors can wring out. Being private, no quarterly number games need be played to keep the stock price pumped.

This outlook made a big difference. The Jordan Group gets it when Vern (or anyone) describes robust processes, process monitoring, teamwork, adventurous innovation, continuous improvement, and even epidemiology theories of spreading best practices.

Innovation

All WP production entails some degree of technical challenge; WP doesn't "shoot and ship" commodity parts just to maintain volume. The fun part of innovation, however, is constantly looking for something never done before, interacting with sales engineers, customers, resin suppliers, and others, taking challenges that at first look impossible. Every swing for the fence doesn't hit a home run — a long-running, high-margin product, like the accumulator piston. Base hits count too. John Beswick, engineering manager, says that innovation is the only reason WP is successful, and to innovate, you're constantly trying to see something that no one else has seen.

Ed McManus, customer development engineer, loves the job; he has a green light to innovate — and patents on three of his "wacky" ideas. At customer sites, he looks for metal parts with peculiar angles, or that require multiple steps to form, or swathed in fasteners begging to be displaced. He helps customers solve problems. Many solutions don't always yield new parts for WP, or even for a sister division, but it's important that customers know that he is trying to make them better. When he does stretch them with a mind-boggling proposal, his competency and his motives are much more credible.

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An experienced innovator like Ed foresees paths to technical feasibility for each novel idea. Foundering technically is less likely than getting beat up in a gauntlet of business issues: The customer has a five-year contract to make the existing part in China. It's part of a big package with another supplier. End users lack confidence in a polymeric substitute; engineering logic works out; marketing logic doesn't. WP prefers to resolve these issues before launching a New Product Development project; reality is that show stoppers aren't always self-evident early on.

Once a product idea is in development, WP emphasizes to customers that to preclude mixed messages, they have a single point of contact, a project engineer, but development is by a team consisting of at least two other people, a manufacturing engineer and a quality engineer. The New Product Development process is a rigorous, gated Advanced Quality Planning Process (APQP) with 37 check points from FEMA to package approval. They try out a new die on a production machine with just one cavity first, and cut the rest when that checks out. Establishing initial process parameters for an SPC-ready start up is a scientific process; WP cannot afford extensive trial and error. After establishing the initial process standard, continuous improvement takes over.

Robust Precision

Most of the molds are owned by customers, but built to last by one of eight partner tool houses using WP specifications. After that, WP takes good care of them in their own tool room. Some have lasted 30 years.

Tool and equipment precision are crucial to quality, so WP doesn't mess with equipment fluttering on the edge of process capability, but replaces it early, before wear is obvious. Doing so helps to keep processes in their limits, and it cuts "machine issue" maintenance, now down to about 1.5 percent of all scheduled time. WP practices both predictive and preventive maintenance. Indeed, the mission of everyone in the plant is to keep each process well within its capability, or "in the green" using their process monitoring system.

Few injection molding machines are kept more than five years. Barrels and screws are replaced more frequently — before wear is detectable. WP constantly works with equipment suppliers to improve precision of injection — repeatability of their core process step. For example, "cushion," a much-studied machine characteristic, refers to the stopping point in forward thrust of a screw with each injection cycle. The more precisely it repeats, the better the control of volume and pressure on each shot. Consequently WP has begun to convert from hydraulic injection molding machines to electric. They offer an 8-10 X advantage in cushion repeatability, are quieter, and take less maintenance.

Integrating this approach into the culture at WP was a long journey. Instinct is "if it ain't broke, don't fix it" — wait until the need is obvious rather than rely on prediction to replace or maintain tooling and equipment. Breaking this psychology, learning to trust data and analysis, was the big hurdle to thorough acceptance of scientific molding.

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To prevent non-standard maintenance and unplanned downtime, durability is a must. Equipment wear is a leading cause of waste of both time and quality, often the top Pareto item of reasons molding processes go out of control, either as a slow drift or a sudden lurch. So WP tries to extend the trouble-free life of molds and equipment. For example, they have a program with Westland, the primary supplier of screws and barrels, to develop a screw and barrel with 10 X the life of previous designs.

Like many other improvements, this screw and barrel project depends on measurements from WP's process monitoring system. Among much other data, the system keeps counts of work cycles on molds, robots, screws & barrels, and other equipment.

Process Monitoring: Mattec

Mattec is a commercial package used by many plastic molders; WP has enhanced the system until, in use, it's relatively "Websterized." On every machine in operation, every three seconds, the system monitors five times, three temperatures, two volumes, and three pressures. If each of these 13 parameters is within control limits, the monitor for that machine stays all-green. If a parameter needs attention, that section of the screen lights yellow, and an andon light begs for attention. If it goes red, the machine instantly shunts all parts into a hold container, so they are not shipped. Counts from hold containers are the record of molding process defects; actually shipping a defective part is an extremely rare event.

This system is accessible from any computer. Summary screens signal when any process at any machine flips out of control; anyone can switch over to the detail screens for that machine. Sample screens are illustrated in Figures 3 and 4. Everybody doesn't run to a problem, of course. Response is a team effort; everyone has a walkie talkie. After initial assessment, an operator (or anyone) calls whoever can best provide immediate help — if any is needed. The walkie talkies help coordinate the team effort for quick changeovers too.

Process Monitoring Phases From Start to Continuous Improvement

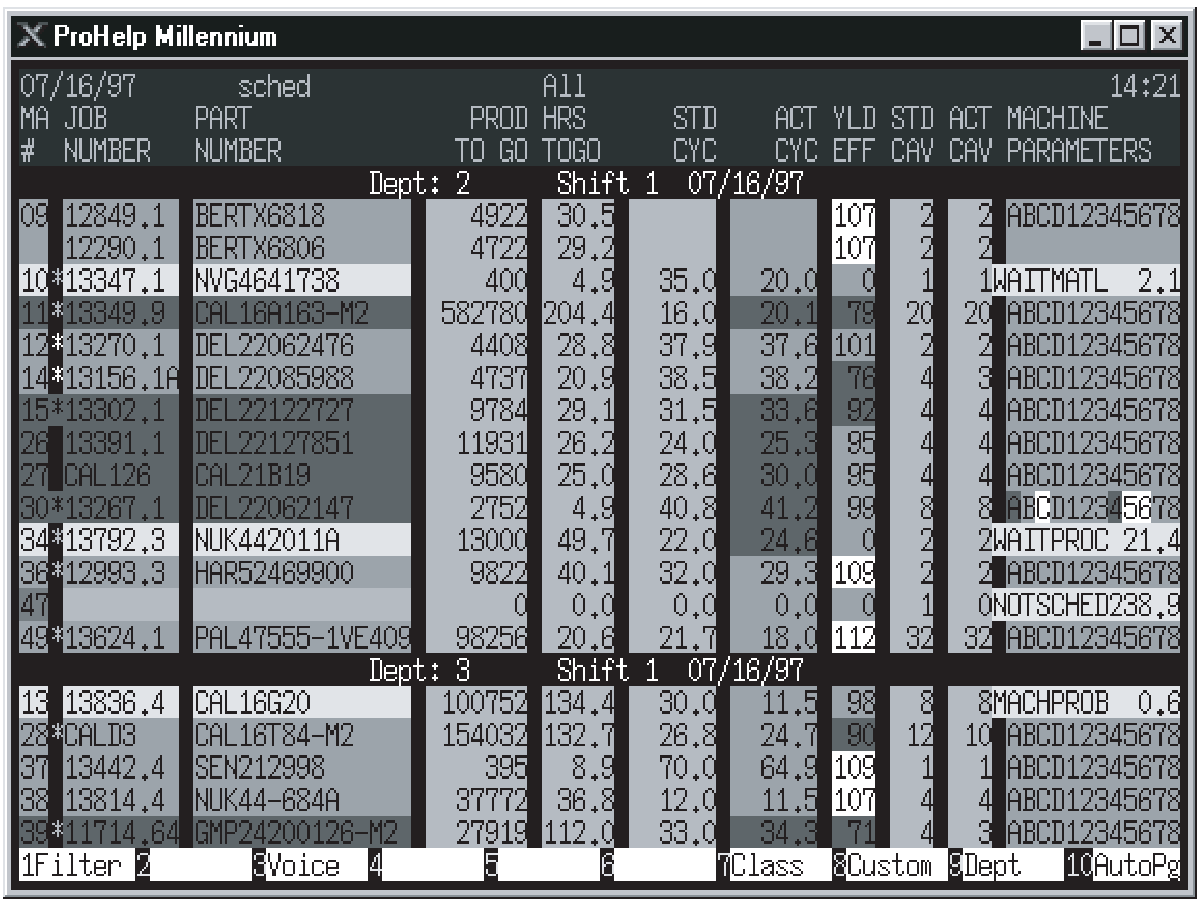
- Phase 1: Machine Qualification
- Phase 2: Hardware Installation (sensor placement, etc.)
- Phase 3: Characterization (initial parameter limits)
- Phase 4: Optimization (DOE; cycle time reduction, etc.)
- Phase 5: Simplification (reaction plans; fail-safes; alarms, etc.)
- Phase 6: Institutionalization (education, centering for initial setups).

Hereafter, process monitoring becomes part of regular process improvement.

Figure 2.

Process monitoring, as practiced at WP, is more than using an information system, as described in Figure 2. Mattec creates process visibility, vital for process improvement. Unaided vision prompts improvements like layout changes, but the focal process, molding, takes place unseen inside hunks of tool steel. A quality resin

Mattec Process Monitoring Summary Screen



ProHelp Millennium

07/16/97 sched All 14:21

MA #		JOB NUMBER	PART NUMBER	PROD TO GO	HRS TOGO	STD CYC	ACT CYC	YLD EFF	STD CAV	ACT CAV	MACHINE PARAMETERS
			Dept: 2		Shift 1 07/16/97						
09		12849.1	BERTX6818	4922	30.5			107	2	2	ABCD12345678
		12290.1	BERTX6806	4722	29.2			107	2	2	
10	*	13347.1	NVG4641738	400	4.9	35.0	20.0	0	1	1	WAITMATL 2.1
11	*	13349.9	CAL16A163-M2	582780	204.4	16.0	20.1	79	20	20	ABCD12345678
12	*	13270.1	DEL22062476	4408	28.8	37.9	37.6	101	2	2	ABCD12345678
14	*	13156.1A	DEL22085988	4737	20.9	38.5	38.2	76	4	3	ABCD12345678
15	*	13302.1	DEL22122727	9784	29.1	31.5	33.6	92	4	4	ABCD12345678
26		13391.1	DEL22127851	11931	26.2	24.0	25.3	95	4	4	ABCD12345678
27		CAL126	CAL21B19	9580	25.0	28.6	30.0	95	4	4	ABCD12345678
30	*	13267.1	DEL22062147	2752	4.9	40.8	41.2	99	8	8	ABCD12345678
34	*	13792.3	NUK442011A	13000	49.7	22.0	24.6	0	2	2	WAITPROC 21.4
36	*	12993.3	HAR52469900	9822	40.1	32.0	29.3	109	2	2	ABCD12345678
47				0	0.0	0.0	0.0	0	1	0	NOTSCHED238.9
49	*	13624.1	PAL47555-1VE409	98256	20.6	21.7	18.0	112	32	32	ABCD12345678
			Dept: 3		Shift 1 07/16/97						
13		13836.4	CAL16G20	100752	134.4	30.0	11.5	98	8	8	MACHPROB 0.6
28	*	CALD3	CAL16T84-M2	154032	132.7	26.8	24.7	90	12	10	ABCD12345678
37		13442.4	SEN212998	395	8.9	70.0	64.9	109	1	1	ABCD12345678
38		13814.4	NUK44-684A	37772	36.8	12.0	11.5	107	4	4	ABCD12345678
39	*	11714.64	GMP24200126-M2	27919	112.0	33.0	34.3	71	4	3	ABCD12345678

1Filter 2 3Voice 4 5 6 7Class 8Custom 9Dept 10AutoPg

Data shown are for illustration of the format only; not the real thing.

Figure 3.

history produces a quality part, and this ongoing story is largely described using Mattec data. To see improvement opportunities, WP personnel learn to interpret the process from its data, then try to "think like they were the resin."

Process Improvement

At Webster, everyone whose responsibility is "getting it out the door" focuses on process, first by keeping processes "in the green," which is the system code for all parameters in spec; then on making the green greener by improvement. Process improvement is not clearly separable from process monitoring.

About half of all "afterburner" improvements are "cashed" by technicians working the processes.

The plant is divided into cells, a multifunctional team responsible for each cell on each shift. Machine operators tend the cell at all times, augmented by a quality process technician, a molding process technician, and a material handling technician. The objective is not to keep people extraordinarily busy, but to keep the machines making quality parts, giving people time to think about the process, and tools to help them think about it.

Every part is run to a set of parameter standards representing the best conditions documented at that time. Everyone is encouraged to come up with ideas for betterment, either to keep a process in the green, or to improve the standard. When an idea is tried and it works, a process is apt to run "above 100 percent efficiency" until that standard is changed at the end of the quarter. Every quarter, the workforce "cashes" their improvements by evaluating the cost differences between the new standards and the previous ones. And the game begins again.

About half of all "afterburner" improvements are "cashed" by technicians working the processes. The other half involve John Doucette, a roving process checker, who sniffs out best practice wherever he can, issuing a "tip of the day" to everyone on all three shifts. Once a quarter, after old standards are cashed in, he summarizes his best findings in a class given to everyone on all three shifts. This not only stimulates finding best practices, but that everyone knows them and uses them.

Typical of Webster's organization, John is formally a process engineer who reports to maintenance. Actually, he's everyone's idea prompter, advisor, and improvement assistant. He and others check whether ideas are going to work using tools like Design of Experiments (DOE) almost daily. Figure 4 illustrates one of his findings.

Training at Work; For Work

The effectiveness of Webster's training has been cited as outstanding more than once. Most of it is on the job; little in a classroom. They take it in small bites, learning to do as they go, so there are no big time gaps between instruction and performance. WP operations abound in check sheets, instructions, and system prompts of times to do something, like clean molds. Figure 5 shows the detail of just one training check sheet. Turning in a fully-initialed check sheet fills in another block on an employee's training matrix (Figure 6). As the improvement processes uncover better methods, the training and the training check sheets are regularly updated.

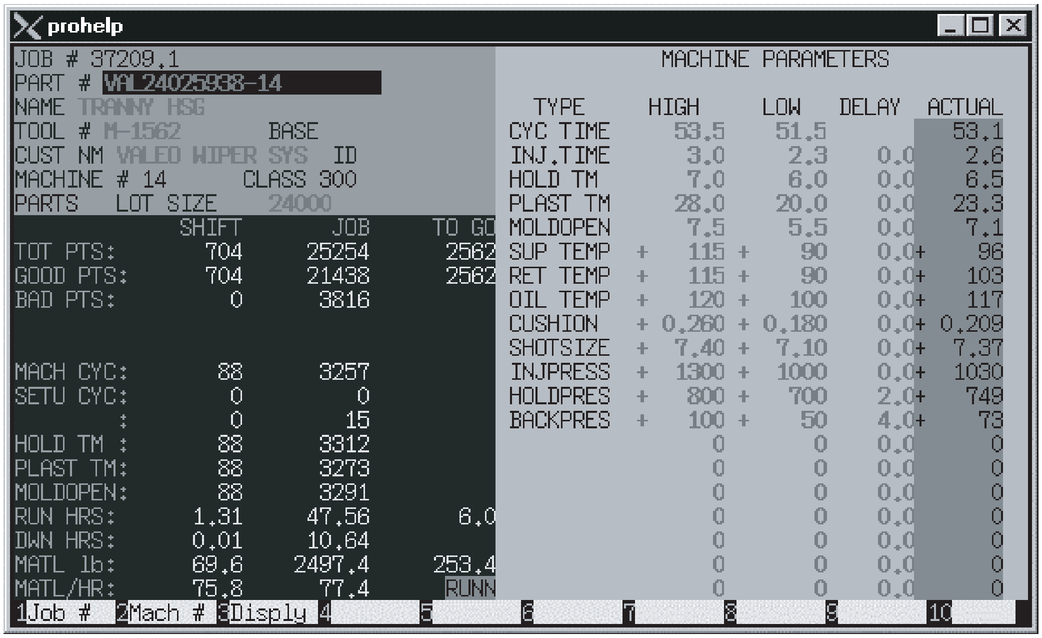
Everyone at WP has a training matrix. Figure 6 illustrates the master record kept by Roxanne Emler, the one and only HR manager. Her office is next to the employee's entrance, and she mixes her hours so as to interact with everyone on all shifts. From employee selection onward, a big part of Roxanne's job is workforce development. The matrix is also a key document to schedule the right mix of people on every shift.

Learning to be an auditor, or on-the-job trainer, is part of the matrix, so as they progress, everyone should eventually become a trainer. WP has at least one certified trainer on every shift. The pay system is set up to encourage people to increase skills. Merit increases depend on a mix of cross-functional job performance assessment and pay-for-knowledge. Everyone gets an annual profit sharing bonus too.

PROCMON 'TIP OF THE DAY'

8/31/03

BEFORE: CYCLE TIME & MOLD OPEN TIME SLIGHTLY ABOVE PROCMON LIMIT CENTER



JOB # 37209.1
PART # VAL24025938-14
NAME TRANNY HSG
TOOL # M-1562 BASE
CUST NM VALEO WIPER SYS ID
MACHINE # 14 CLASS 300
PARTS LOT SIZE 24000

	SHIFT	JOB	TO GO
TOT PTS:	704	25254	2562
GOOD PTS:	704	21438	2562
BAD PTS:	0	3816	
MACH CYC:	88	3257	
SETU CYC:	0	0	
:	0	15	
HOLD TM :	88	3312	
PLAST TM:	88	3273	
MOLDOPEN:	88	3291	
RUN HRS:	1.31	47.56	6.0
DWN HRS:	0.01	10.64	
MATL lb:	69.6	2497.4	253.4
MATL/HR:	75.8	77.4	RUNN

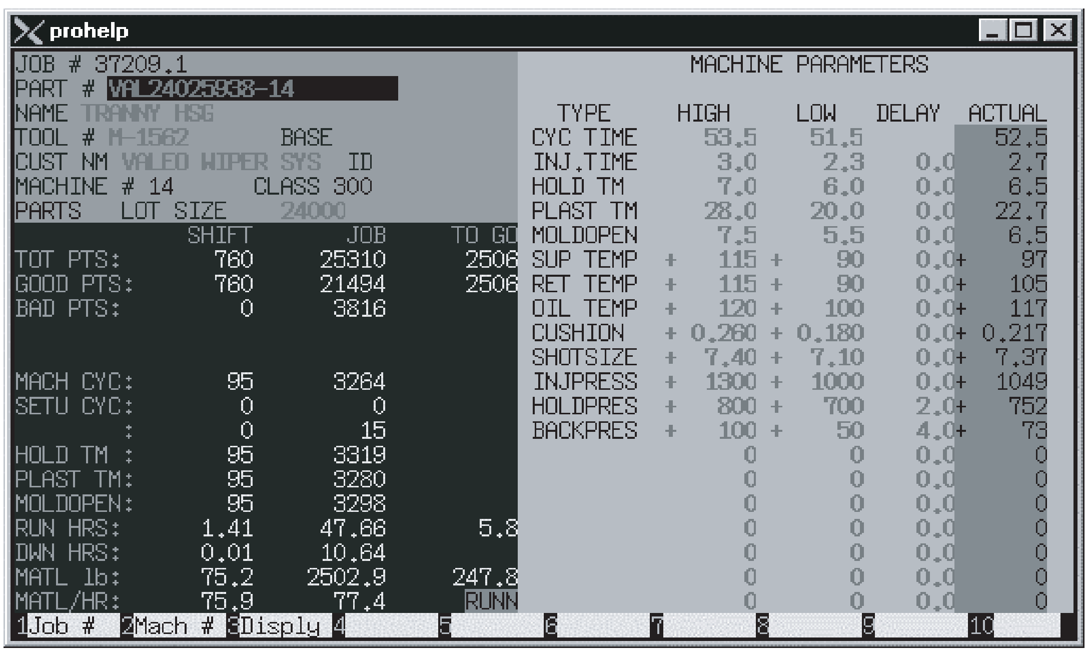
MACHINE PARAMETERS

TYPE	HIGH	LOW	DELAY	ACTUAL
CYC TIME	53.5	51.5		53.1
INJ.TIME	3.0	2.3	0.0	2.6
HOLD TM	7.0	6.0	0.0	6.5
PLAST TM	28.0	20.0	0.0	23.3
MOLDOPEN	7.5	5.5	0.0	7.1
SUP TEMP	+ 115	+ 90	0.0+	96
RET TEMP	+ 115	+ 90	0.0+	103
OIL TEMP	+ 120	+ 100	0.0+	117
CUSHION	+ 0.260	+ 0.180	0.0+	0.209
SHOTSIZE	+ 7.40	+ 7.10	0.0+	7.37
INJPRESS	+ 1300	+ 1000	0.0+	1030
HOLDPRES	+ 800	+ 700	2.0+	749
BACKPRES	+ 100	+ 50	4.0+	73
	0	0	0.0	0
	0	0	0.0	0
	0	0	0.0	0
	0	0	0.0	0
	0	0	0.0	0
	0	0	0.0	0
	0	0	0.0	0

1Job # 2Mach # 3Disply 4 5 6 7 8 9 10

AFTER: CYCLE TIME CENTERED BY ADJUSTING CLAMP SPEEDS

Note: I know this may seem trivial, but every little bit helps ... - 0.6 sec = extra 745 parts a week!



JOB # 37209.1
PART # VAL24025938-14
NAME TRANNY HSG
TOOL # M-1562 BASE
CUST NM VALEO WIPER SYS ID
MACHINE # 14 CLASS 300
PARTS LOT SIZE 24000

	SHIFT	JOB	TO GO
TOT PTS:	760	25310	2506
GOOD PTS:	760	21494	2506
BAD PTS:	0	3816	
MACH CYC:	95	3264	
SETU CYC:	0	0	
:	0	15	
HOLD TM :	95	3319	
PLAST TM:	95	3280	
MOLDOPEN:	95	3298	
RUN HRS:	1.41	47.66	5.8
DWN HRS:	0.01	10.64	
MATL lb:	75.2	2502.9	247.8
MATL/HR:	75.9	77.4	RUNN

MACHINE PARAMETERS

TYPE	HIGH	LOW	DELAY	ACTUAL
CYC TIME	53.5	51.5		52.5
INJ.TIME	3.0	2.3	0.0	2.7
HOLD TM	7.0	6.0	0.0	6.5
PLAST TM	28.0	20.0	0.0	22.7
MOLDOPEN	7.5	5.5	0.0	6.5
SUP TEMP	+ 115	+ 90	0.0+	97
RET TEMP	+ 115	+ 90	0.0+	105
OIL TEMP	+ 120	+ 100	0.0+	117
CUSHION	+ 0.260	+ 0.180	0.0+	0.217
SHOTSIZE	+ 7.40	+ 7.10	0.0+	7.37
INJPRESS	+ 1300	+ 1000	0.0+	1049
HOLDPRES	+ 800	+ 700	2.0+	752
BACKPRES	+ 100	+ 50	4.0+	73
	0	0	0.0	0
	0	0	0.0	0
	0	0	0.0	0
	0	0	0.0	0
	0	0	0.0	0
	0	0	0.0	0
	0	0	0.0	0

1Job # 2Mach # 3Disply 4 5 6 7 8 9 10

***ADDITIONAL NOTES:* SHOT SIZE & INJ PRESS NOT EXACTLY CENTERED = THAT'S OK !!**

This finding made it into Doucette's stack of training slides, something to embed in the way everyone looks at molding. Few molding shops can detect that they are losing fractions of a second here and there in their molding cycles.

Figure 4.

Training Checklist for Processor Function

Minimum training period is 3 weeks.

TRAINEE:	TRAINING PERIOD:		
DESCRIPTION OF TRAINING SUBJECT	**DATE**	**TRAINER INITIAL**	**PASS?**
How to start a molding machine	/ /		
How to shut a molding machine down	/ /		
Using Mattec (schedule, downtime codes, SPC, etc.)	/ /		
Adjustments on robots and pickers (timers, functions, etc.)	/ /		
How to set machine process parameters	/ /		
How to use process monitoring	/ /		
Importance of running to setup sheet values	/ /		
How to investigate and trouble-shoot defects	/ /		
Definition and understanding: cutoff	/ /		
Definition and understanding: cushion	/ /		
Definition and understanding: shot size	/ /		
Definition and understanding: velocity	/ /		
Definition and understanding: pack and hold	/ /		
Definition and understanding: profile	/ /		
Understanding and correction: flash	/ /		
Understanding and correction: short shots	/ /		
Understanding and correction: burn	/ /		
Understanding and correction: sinks	/ /		
Understanding and correction: splay	/ /		
Understanding and correction: stress	/ /		
Understanding of water and oil heating systems (basics, in/out, etc.)	/ /		
Heating/cooling systems: core, ejector plate, front plate, sprue plate	/ /		
Oil and water systems for heaters	/ /		
Machine operator responsibilities, processor supervision responsibilities	/ /		
Packing parts: quantities, labels, identification stamps	/ /		
Use of the weigh-count scales	/ /		
Use of a multimeter	/ /		
Basic concepts: material grinders	/ /		
Basic concepts: product-handling systems (robots, conveyors, etc.)	/ /		
Basic concepts: material dryers	/ /		
Basic concepts: materials (regrind %, dye mix, additives, loading)	/ /		
Basic setup concepts: molds (vents, parting line, slides/horns, cores)	/ /		
Basic setup concepts: heating/cooling systems	/ /		
Basic setup concepts: high/low pressure settings	/ /		
Basic setup concepts: rods	/ /		
Processor responsibility for conforming (“good”) parts	/ /		
Safety basics: machine, plant, personal	/ /		
QA Database basics: requesting mold repairs, reports, etc.	/ /		
Cell concept basics (responsibilities, etiquette, teamwork)	/ /		
Housekeeping (on floor, at inspection station, in lab, etc.)	/ /		

Trained by (please print): ______________________________ Initials used above: _____

Trainer’s signature: __________________________ Position: __________________
Comments:
____

I have been trained in the material listed above, and understand what is expected of me.

Trainee’s signature: _____________________________________ Date __/__/__

Figure 5.

A Sample from Webster Plastics' Training Matrix

DEPARTMENT TRAINING MATRIX

DEPARTMENT: Process Technicians

KEY: (Blackened-in square means operation completed)
A= Need identified C= Trained
B= Training scheduled D= Training verified

EMPLOYEE	POSITION	SHIFT	Orientation	QS Departmental	Internal Auditor	Basic Safety/MSDS	HazMat	Job Specific Training	Forklift	VanDorn Demag	Injection Molding Tech			
Bilbao, John	Process Technician	1st	■	■	■	■		■	■	■	■			
Hornung, Mike	Process Technician	1st	■	■		■		■	■	■	■			
Granger, Louis	Process Technician	2nd	■	■		■		■	■					
Riggins, Grover	Process Technician	2nd	■	■		■		■	■					
Emford, Steve	Process Technician	3rd	■	■		■		■	■	■				
White, Jalen	Process Technician	3rd	■	■		■		■	■					

This sample, with names changed, is from a departmental training matrix. But everyone at Webster Plastics has the equivalent of a training matrix. Everyone is expected to self-improve.

Figure 6.

Vigorous Fun

Never having had much publicity outside their industry, Webster is easy to underestimate. Much comes out of a small organization and physical plant. Although not flashy in style, they do promote their past accomplishments while obviously eager to get on with new ideas in their hopper. The overall impression is of a group of people that have now put themselves into a healthy stress zone — having fun tackling challenges most organizations would avoid. You come away feeling that they will not be obscure forever.

In process improvement, Webster Plastics is also a clear example of a company that has developed a culture of spontaneous improvement. That's the soft side of lean operations that proponents often talk about, but which many companies miss while pushing to adopt the techniques. Sustaining the initial gains from lean translates into using the techniques to make ongoing gains never possible to see before, and the big barrier to B-Class is cultural change. Since it took Webster a long time to break through that barrier, others should not become discouraged too soon.

As in Webster's case, the "big humps" may not be on the shop floor, but in getting compatible customers, evolving a different culture, and even an understanding ownership.

… Webster Plastics is also a clear example of a company that has developed a culture of spontaneous improvement.

Webster Plastics' Ratings by the A-B-C Framework

Assumed in the cultural maturity scale by which Webster Plastics is rated is that a company has learned techniques for process improvement and implementing innovation. The bullet points are a few features to look for in each category. F is a failure in any but the cushiest business environment. D (or pre-C) is functional "business as usual," successful through most of the 20th century. C is the first learning stage of a tightly integrated, highly effective operating organization; most lean implementations stop at C-class in process improvement. B is a culturally integrated operating business unit; a company can "go for" B-Class. A is a capability to strive for, but only after surviving the gales of major change can one be sure of having arrived. This is not a process examination, like Baldrige, and it is a very tough "Ivy League" scale.

Class	Process Improvement	Innovation	External Responsibility
A	Process improvement routine; eliminates waste from all-new processes very early. • Very fast learning curves on new products, new technologies, and new processes.	Capable of transforming its industry; can adapt business model to innovate. • Has led a major transition in technology, in markets served, or both. • Has caused customers and others to change behavior. • "Leading edge"	Unified by social mission; serves *all* stakeholders well; resilient to change/surprise. • Communications with customers and suppliers are open and extensive. • Probably has a relationship-based, novel business model. • Environmental leader.
B	Autonomous improvement; embedded in the culture. • Total organization is "lean;" like a "value stream organization." • Process improvement is spontaneous, not directed. • Very low overhead. • Develops or selects customers/suppliers that are also "lean."	Innovate by collaborating; part of everyone's job. • Strong cultural inducements to innovate. • NPD is routine. • Excellent customer insights to stimulate innovation. • Constantly changing. • Good technical infomation networks are actually used.	"Outside in;" much more customer focused. • Everyone has contact with customers; no customer (or supplier) has difficulty communicating with them. • Very open. Few "secrets." • Everything done makes it easy to work with them. • Environmentally compliant.
C	Integrated core operations; directed improvement; still coaching the tools. • "Empowerment" stage. • Metrics are mostly on core operations (plant). • "Blitz" dependent. • Still compare themselves to D class.	Structured new product/ service development; some collaboration. • Has a "gated" NPD process. • Cross-functional teams used for development. • Understanding of customer may be from a distance. • NPD still "disruptive."	Serves customers well; great quality, efficiency, and delivery. • Do what they promise, but few extras impress customers or other stakeholders. • Customer-oriented, but not customer-inviting.
D or Pre-C	Process improvement is fragmented; any integration is engineered by a system.	Minimal integration of NPD; probably "over the wall." No systemic promotion of innovation.	Concentrate on the customer; no special regard for other stakeholders. Regard many external relations as "win-lose."
F	Random and reactionary; poorly organized operations.	Reactionary; sporadic attention to it is ineffective.	Inward-centered; customer service is erratic.

Webster Plastics' A-B-C Rating:

Class	Process Improvement	Innovation	External Responsibility
A	X		
B		X	X
C			

Notes on Webster Plastics' A-B-C Ratings

Process Improvement: Webster Plastics' system stimulates autonomous process improvement, and they consciously shifted their culture to acquire this capability. That alone would nudge WP into B Class. Everyone is involved in process improvement, and all processes are subject to it, although molding remains the focus of most people. In addition, WP regularly takes the waste out of novel products and new injection molding technology at a fairly rapid clip; however, they have not had to grapple with new processes very far outside their expertise — not yet. That qualifies them for a low A rating.

In use of techniques, experts in either lean methodology or quality methodology can spot opportunities for improvement. However, by an A-B-C rating of cultural and overall effectiveness, WP's "afterburner" provides a kick that many companies more closely "following the book" don't have.

Innovation: Innovative design has long been a Webster characteristic. They have awards for it. In addition, WP is among the leaders in polymer molding, developing new molding technology and technique. The culture strongly encourages innovation; many people within Webster are engaged in product and process development from time to time. It is not a specialty function on the side.

The extent to which Webster has thus far shaken the industry is more doubtful. Most product innovations are incremental improvements for their industrial clients, not particularly noticed by end users. Their process innovations, ability to do something significant that others can't, is more likely to rattle competitors than any specific metal-to-plastic application. And these competitors might be companies in such materials areas as powdered metallurgy rather than plastics. That could happen, but does not seem to have happened yet. That merits a high B rating.

External Responsibility: WP certainly tries to consider the welfare of all stakeholders in anything they do. The business is built on maintaining close relations with selected customers and suppliers — and with sources of advanced polymer technology, always with the antenna out for applications opportunities. And WP is customer-flexible; for example, it can interact with customers using many different engineering CAD packages. It engages in many community support activities. For a company in this business, it is very open — relatively "outside in," and not hard to do business with, at least not for the customers of the type it favors. That merits a high B rating.

WP leadership is remarkable for "firing" customers and an owner in order to develop its present culture and business model. However, it has yet to survive a major shock to its chosen business model. The company is environmentally conscious and safety-observant in operations, ready for ISO-14000 certification. But it is not yet a leader in, for example, attacking the problem of end of life disposal of its products.

Robert W. Hall is editor-in-chief of Target *and a founding member of AME.*