PULP & PAPER PPI
INTERNATIONAL

BRINGING THE WORLD OF PULP AND PAPER TOGETHER IN ONE PLACE

www.risi.com - January 2011

Outlook 2011:
Expect less growth than 2010

RISI

PULP & PAPER PPI INTERNATIONAL

By JOSEPH NOBLE

The Simpson Tacoma mill transformed maintenance into a predictive process using measurable metrics to track efficiency and reliability

MAINTENANCE METRICS FOR THE 21ST CENTURY

On a clear day looking south from a dart of land in the Inner Commencement Bay in the heart of Tacoma, WA, Mt. Rainier dominates the landscape. The mountain's white summit is both a reminder of a proud past and a stark expression of life's volatility: Change happens; and if we miss the call to adjust, amend and evolve, we wither
and fade.

That dart of land is also home to the Simpson Tacoma Kraft Company (STK) paper mill, which produces about 1,300 tons/day of bleached and unbleached packaging-grade paper and bleached and unbleached kraft pulp. Employing approximately 400 people, it has a rich past and the possibility of a richer future. But its future was not so optimistic just 14 months ago.

Like most industry, change came calling in 2008 when a recession blew through the US economy and for most of the past two years destabilized the world's markets. For STK, "business as usual" was tantamount to deficit, debt and possibly worse, an unacceptable rendering for a company with a proud past.

STK needed to redefine several areas of its business, in particular how it consumed maintenance services. In short, mounting costs and diminished reliability had put maintenance in disarray.

Maintenance had become reactionary to operations' needs, yet responsible for spending expectations it could not control. It accused operations of poor planning. Operations blamed maintenance for poor quality and unreliability. Everybody blamed everyone else for problems in the mill, and few solutions surfaced.

"Our maintenance process had become just putting out fires; there was no 'process'," says Leslie Grimm, assistant maintenance manager. "Everyday there was a new emergency to react to, and this despite having planning capabilities. Out of 100 planned jobs per week, we'd get maybe 20 done. So we'd hire a bunch of outside contractors. Costs were rising; reliability was declining; and we just spiraled downward from there. This was the opposite of what every business model tells you. We needed an organized approach to maintenance."

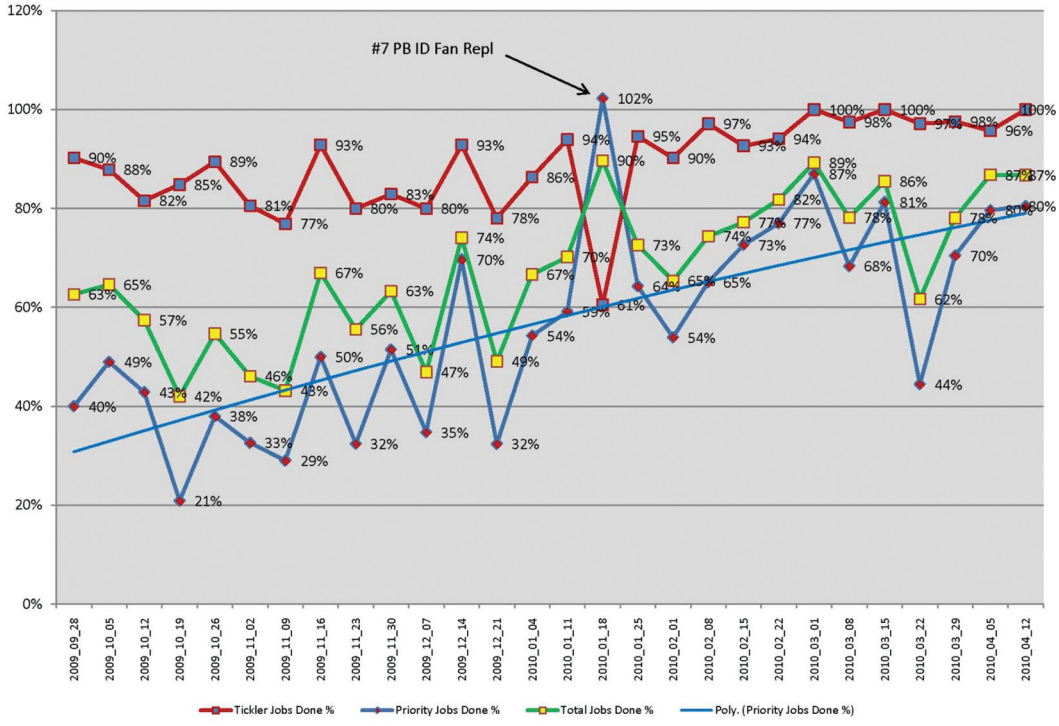
Despite a history of change initiatives — for example, being in the forefront of paper recycling technology for decades, recycling more than 500 tons/day of waste paper and boxes and instituting environmental initiatives through its Sustainable Forestry Initiative, STK was struggling.

"Larry (Larson, maintenance manager) would get beat up because of rising costs and lower reliability, but he was just responding to his internal customer, operations," says Grimm. "I think he was extremely frustrated and may have worried that he was going to be replaced."

If the mill couldn't come together and find a solution to reverse Grimm's observed downward spiral, more than just the maintenance manager was going to be replaced; jobs would be at risk and the business' viability would be in doubt.

ASSESSING THE SCOPE OF CHANGE

In spring 2009, mill manager John Conkle asked Larson, to conduct a benchmark study of maintenance processes, and to interview outside consultants to help assess the scope of needed changes. Conkle, the one-time pulp mill manager, had been watching friction in the interactions with maintenance and other areas increase, and tracking the trends. As pulp mill



BOTH GRAPHS ARE DESIGNED TO PROVIDE TIMELY VISIBILITY OF PRACTICAL RESULTS IN MAINTENANCE PROCESSES TRANSFORMATIONS. THE GRAPHS ARE PRINTED WEEKLY AND REVIEWED AT THE MONDAY MORNING SUPERVISORY MEETING

Fig. 1 -
Red - percentage of ticklers (or preventative maintenance jobs) completed
Green - percentage of total jobs completed
Blue - percentage of priority jobs
Blue line - denotes the trend of improvement of priority jobs completed

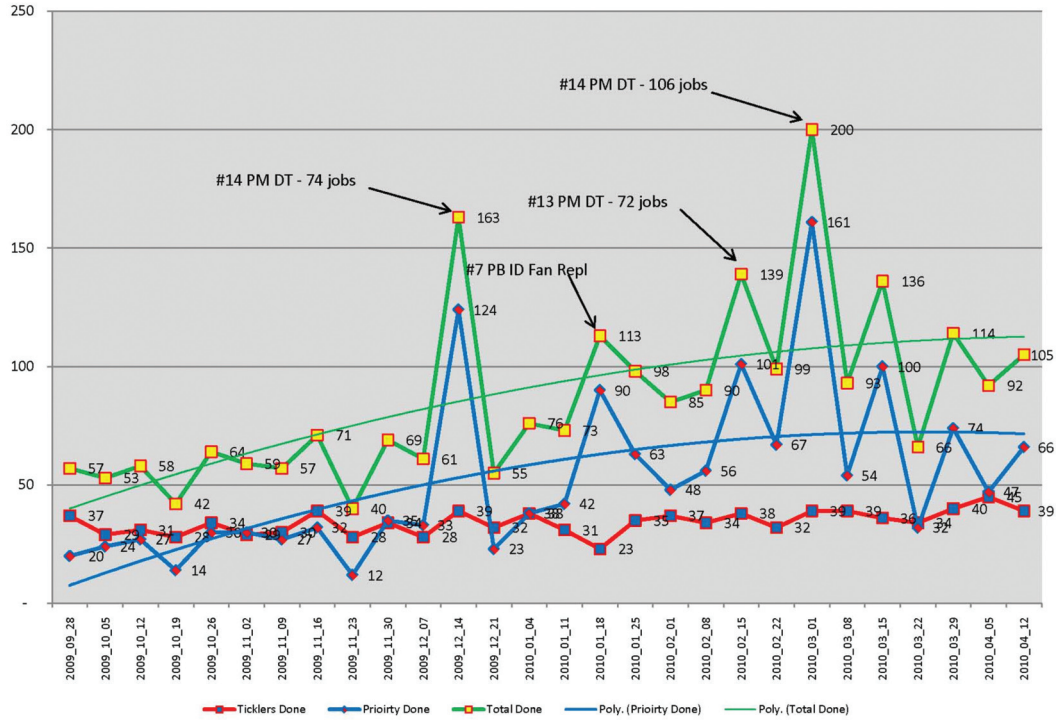


Fig. 2 -
Red - ticklers completed (or preventative maintenance jobs)
Green - total jobs completed (140 jobs/week as of nov. 1, 2010)
Blue - priority jobs completed (nearly 100 jobs/week as of nov. 1, 2010)
Blue line - denotes the trend of improvement of priority jobs completed

manager, he could only observe; as mill manager, he had the authority to make changes.

After interviewing several organizations, STK chose Team Development Group (TDG), led by Terry Whalen, to initiate changes. Conkle and Larson selected TDG because of its experience in the pulp and paper industry, in particular, its past success in implementing the exact kinds of changes STK needed; and because it had a holistic approach to how maintenance should interact with other departments in the mill.

"We chose TDG because of their experience in the industry and for their leadership," explains Larson. "TDG spent two weeks doing a maintenance assessment. They interviewed everyone in the mill — operations, maintenance, accounting, leadership — about where we were at."

TDG went to work developing a needs analysis document. That document summarized everything Maintenance did and the affect on paper production. It was the benchmark John Conkle wanted, and it laid out a strategy to make changes that everyone wanted. It also revealed the state of maintenance personnel.

"What we found was a group that felt beat up on," says TDG's Don Reynolds. "Most of its people were focused on whatever kept them running. The priority job was the last one that came in. They were disorganized and inefficient, which is an expensive way to do maintenance. They knew it. They told us about it. They just couldn't change it without help."

"I knew I needed everyone's support to implement such far-reaching changes in how maintenance does its job; I knew it would affect everyone at the mill," adds Larson. "With their support, we were going to achieve this change. I had to get more confident and say, 'This is what we are doing.'"

With Conkle's blessing, TDG commenced the work. The effort was dubbed "The Maintenance Initiative," but it was about so much more than maintenance tasks. It was about how individuals are empowered to change processes and create efficiencies in the mill. It was about how they do their everyday work. It stirred maintenance employees to be more than what they were and what they wanted to be. And more than that, it was not some arbitrary program that TDG forced upon these people. "This was our program, we created it, and we take pride in it — this is about us," says Larson.

DESIGN TEAM

The project kick-off was September 2009. It began with the creation of a design team that was made up of representatives from throughout the maintenance, purchasing, engineering and stores and operations departments, anyone directly affected by maintenance's work. In essence, the design team was the internal force for change: It set priorities, established planning, implemented scheduling, oversaw execution of the change initiative, and was responsible for follow up.

"It's hard to step back to fix the problems when you're working to keep everything running," notes TDG's Reynolds, "so we took a core group of people, called the design team, and began strategizing solutions and creating implementation tactics."

Although some people were optimistic during the first few meetings, industry veterans at the mill, who had experienced many "changes du jour", were sceptical. Assistant maintenance manager Gimm, for example: "On a scale of one to 10, I was a negative five." Grimm had just completed management of a multi-million-dollar construction project and was tapped to help Larson lead the change initiative. "Until operations is on board, nothing changes in our industry. So I was sceptical."

As in any change initiative, some people resisted from the get go. As word spread that a different kind of change was brewing, people became curious, yet cautious. Conkle personally intervened to get key people on board. Eventually, people realized they had a direct influence in making the mill run smoother and their jobs more enjoyable, and they actively started supporting the initiative.

MAINTENANCE PROCESS FLOW

At the start of the change initiative, according to Grimm, STK was completing only 30 out of every 100 jobs per week using a break-in, emergency response approach. These were jobs chosen by operations exclusively. Maintenance simply reacted to the emergency requests. No planning. No engineering. No

scheduling. And if maintenance couldn't complete the request, outside contractors were hired with little or no concern for costs; after all, to keep paper rolling out the door, repairs to production-based systems are essential.

To break the cycle of break-in repairs, work identification became a key factor in initiating full-scale change. Relationships between operators and work planners needed to be enhanced and, in some cases, created from scratch. Communication channels needed to be opened and free flowing. To accomplish this, the planners' jobs were restructured. A strategy of recruiting specialists in each of the trades into the planner positions to incorporate experience and training was implemented. They recruited a pipefitter, an electrician, a machinist and an instrument technician and trained them to be effective planners.

While the job planners were being trained and developed, operations supervisors, maintenance

Maintenance weekly metrics

A key provision of the STK transformation was the implementation of tracking metrics used to measure improvements in performance. The metrics developed for the STK Maintenance initiative were comprehensive in scope, touching every aspect of Maintenance responsibilities. For example, the metrics not only covered Maintenance performance but also Stores activities. The metrics are used to pinpoint maintenance issues, indicate possible course changes, and provide statistical support for the reallocation of resources.

The graph below is a compilation of one set of metrics used weekly at STK. The left one-third of the graph lists: Efficiency improvement goals by calendar date; equipment availability improvement goals; break-in, or emergency, maintenance improvement goals; and Storeroom improvement goals. The right two-thirds of the graph displays performance by week. Green indicates meeting the improvement goal; yellow indicates partially meeting the goals; red points to a significant problem that prevented achieving the goal.

Week Starting	4/4	7/4	7/5 +		4-Jan	11-Jan	18-Jan	25-Jan	1-Feb	8-Feb	15-Feb	22-Feb	1-Mar	8-Mar	15-Mar	22-Mar	29-Mar	5-Apr	12-Apr
Metric					10-Jan	17-Jan	24-Jan	31-Jan	7-Feb	14-Feb	21-Feb	28-Feb	7-Mar	14-Mar	21-Mar	28-Mar	4-Apr	11-Apr	18-Apr
Non Tickler Jobs Completed					38	42	90	63	48	56	101	67	161	54	100	32	74	47	66
Tickler Jobs Completed					38	31	23	35	37	34	38	32	39	39	36	34	40	45	39
Total Jobs Completed					76	73	113	98	85	90	139	99	200	93	136	66	114	92	105
% Non Tickler Jobs Completed	70%	75%	80%		54%	59%	102%	64%	54%	65%	73%	77%	87%	68%	81%	44%	70%	80%	80%
% Tickler Jobs Completed	85%	90%	95%		86%	94%	61%	95%	90%	97%	93%	94%	100%	98%	100%	97%	98%	96%	100%
% Total Jobs Completed	75%	80%	85%		67%	70%	90%	73%	65%	74%	77%	82%	89%	78%	86%	62%	78%	87%	87%
Break In Jobs	<30	<20	<10		29	23	21	36	29	26	16	31	33	21	27	28	21	22	23
Call In Jobs	<15	<12	<8		9	16	13	8	8	6	10	4	9	13	3	11	7	8	7
Total Unscheduled	<45	<32	18		38	39	34	44	37	32	26	35	42	34	30	39	28	35	30
Add-On Jobs					0	6	2	0	2	4	4	3	5	6	2	15	2	1	2
% Step Plan Jobs on Weekly List	>50%	>65%	>80%					13%	37%	29%	49%	43%	64%	36%	37%	46%	34%	43%	54%
Hours worked on Scheduled Jobs					This Metric cannot be calculated until schedule is done in WAM														
Equipment Availability																			
Paper Mill				YTD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
#13 PM	97.0%	97.0%	97.0%	98%	98%	100%	98%	98%	99%	100%	95%	98%	100%	100%	95%	98%	100%	100%	98%
#14 PM (Incl Sched)	97.0%	97.0%	97.0%	99%	99%	100%	92%	100%	100%	100%	100%	100%	96%	100%	100%	96%	100%	100%	100%
Pulp Mill																			
OCC Plant	95.0%	96.0%	97.0%	94%	95%	100%	93%	98%	95%	94%	97%	98%	68%	87%	96%	98%	98%	100%	96%
#1 Kamyr	97.0%	98.0%	99.0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	98%	100%	100%	100%	100%
#2 Kamyr	97.0%	98.0%	99.0%	100%	100%	99%	100%	100%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
#1 Pulp Dryer	96.0%	97.0%	98.0%	99%	100%	100%	100%	100%	100%	100%	95%	100%	100%	100%	100%	100%	100%	100%	89%
#2 Pulp Dryer	96.0%	97.0%	98.0%	98%	100%	100%	100%	95%	100%	100%	100%	98%	100%	100%	95%	100%	95%	86%	100%
Recaust	97.0%	98.0%	99.5%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
#1 Lime Kiln (Mud on the Kiln)	95.0%	97.0%	99.5%	99%	100%	100%	100%	100%	95%	99%	100%	100%	100%	90%	95%	100%	100%	99%	100%
#4 BSW	97.0%	98.0%	99.5%	100%	100%	100%	100%	94%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Bleach Plant	97.0%	98.0%	99.0%	98%	100%	100%	95%	93%	100%	100%	100%	99%	93%	95%	100%	99%	100%	100%	98%
ClO2 Plant	97.0%	98.0%	99.0%	99%	100%	100%	100%	100%	100%	100%	100%	100%	93%	100%	100%	100%	99%	100%	100%
Co-Gen				100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Hog Fuel System	95.0%	97.0%	99.0%	96%	88%	93%	100%	95%	97%	100%	82%	96%	99%	96%	99%	100%	95%	98%	100%
#7 Power Boiler	97.0%	98.0%	99.5%	88%	100%	62%	11%	100%	100%	100%	100%	100%	99%	100%	100%	100%	56%	97%	99%
#4 Recovery	99.5%	99.5%	99.5%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Pulp Equip Availability Overall	**96.6%**	**97.7%**	**98.9%**	**97.9%**	99%	97%	93%	98%	99%	100%	98%	99%	97%	98%	99%	100%	96%	98%	99%
Store Room Issues																			
Stock Outs	<=5	<=3	<1					0	2	0	4	4	4	2	0	3	0	0	0
Inventory Discrepancies	<=10	<=7	<5					12	6	13	19	8	11	13	5	25	15	13	20
Receiving	<=10	<=7	<5					10	18	2	2	15	8	12	6	8	3	3	4
Warehouse	<=5	<=3	<3					0	0	0	0	0	0	0	0	0	1	0	0
Kitted Jobs	15	25	40						6	11	11	10	41	19	13	14	18	24	23
JSA's Completed/Week	4	4	4						6	8	5	6	6	5	6	5	5	5	6

engineers and other production personnel began meeting to plan the following week's work and place it on a weekly schedule. The weekly schedule was then distributed to all other departments to coordinate efforts; this process continues today. Maintenance supervisors meet every morning to identify the scheduled work from the master list they plan to complete that day.

Taking the change a step further, the maintenance supervisors and production representatives meet every afternoon to review the day's completed jobs. This provides a feedback loop so managers know why particular jobs couldn't be completed—whether it was a parts issue, a manpower problem, a systemic glitch, or more. These issues are noted and corrected so repairs can be rescheduled.

"Since these meetings began, I'm more in tune with what's going on," says Craig Hulsey, assistant paper mill manager. "We now fix things and make them better than before, and if something keeps breaking, we fix the cause. We were reacting; now we are proactive. We're more organized, more efficient."

And the scheduling meetings were just the beginning. A key part of the overall strategy is to develop step-plans for all maintenance jobs at the mill. Step-plans are written guidelines for repair jobs at the mill. They perform a crucial role in implementing a predictive maintenance strategy because they standardize maintenance processes, establish quality norms for internal crews as well as outside contractors, and predict costs.

At the beginning of the project, Simpson had no step-plans. One year later it has about 1,400 step-plans in place, and the number is growing steadily. The goal is to have 80% of all maintenance jobs step-planned. The mill is averaging a completion rate of 110 of 120 jobs per week. Of those, about 40% are step-planned.

"That's about right," adds Craig Richmond, a maintenance planner for the paper mill and a member of the design team. "I've seen spikes into the 60-70 step-planned jobs per week, as well. We're gradually getting better at this."

"This is the first time this mill has seen such extensive planning," says 25-year veteran, Chris Spaun, paper mill maintenance engineer. "We needed to get more work done with fewer people, be more efficient, and have better communication among the mill areas. That takes planning."

MATERIALS MANAGEMENT

Further, step-planning allowed for the implementation of a "kitting" procedure that enabled stores personnel to collect the necessary parts and put them in kits. The kits are ready for pick up by maintenance personnel or outside contractors, or for delivery to a job site. Kitting ensures parts availability for more efficient completion of jobs and allows for more efficient tracking of parts and material costs.

"Prior to kitting, they had people rummaging through the stores area for whatever parts they needed," says TDG's Reynolds. "Now, parts are stored and tracked. They know what they have available and what they need to order."

By the beginning of June 2010, 78% of maintenance jobs were being completed on time or early. In addition, break-in, or emergency maintenance jobs have fallen from a one-time high of 98% in October 2009 to a low of 30% at the end of June 2010.

"TDG helped standardize the mode of maintenance operations—work orders, job plans, schedules, metrics, etc.," said Mark Rohwedder, electrical and instrumentation departments, supervisor. "It was standardized. They helped us develop a maintenance management system."

"TDG helps us measure our performance and be more efficient," adds Tom Blake, assistant paper mill manager. "We know now how much work we can expect from the number of people we have."

NEXT STEPS

STK's change initiative is an evolving process with subsequent steps to implement. Next steps include an equipment failure analysis that Grimm is leading; and implementing cost containment measures. Failure analyses will help correct root problems and provide the company with equipment histories; it's about monitoring assets and taking care of them.

As with many such efforts, with maintenance's improved productivity, it is spending more money because it is getting much more work accomplished.

Cost containment will reduce maintenance spending by eliminating unnecessary contractor costs and repetitive work, and by realizing materials management efficiencies.

"When you improve maintenance efficiency by 100%t, guess what? Your costs go up because you're getting so much more done," said Conkle. "The increase in costs probably represents a more accurate reflection of what it costs to maintain this mill. So we're implementing some cost containment measures that will allow us to keep the efficiencies and decrease costs."

"We're working on cost containment now," adds Jim Barnett, maintenance engineer, power and recovery. "We were so disorganized we didn't have the capability to know what our costs were until we did the early phase of the process. With the fixed costs in place and variable costs identified, reducing costs won't be so difficult."

In the end, STK is on a pathway of continuous change. As current changes are driven deeper into existing processes and they cross over to other areas of the mill, the fundamental manner in which STK approaches manufacturing is affected. Employees feel more empowered to make more changes. Financial discipline spreads into other departments. The Maintenance Initiative is seen as a positive experience that others want to copy. A single change initiative, when done correctly, reverberates throughout the mill.

"If we hadn't hired TDG, we wouldn't be where we're at," says Grimm. "We had the ability and the leadership; we just needed somebody to guide us through the changes. TDG was a good opportunity to open everybody's eyes: spending maintenance dollars is the whole mill's responsibility, not just the maintenance department's. It's forcing financial discipline deeper into the various areas of the mill."

FINAL COMMENTS

"I am very excited about what we're doing," says Larson. "I have a lot of great people around me. They know what to do. We're driving the break-in work down. We will meet all our projections because our people are more efficient. One of the biggest changes has been to see people bring up issues and fix them instead of blaming others for them. People are talking to each other. There haven't been extra labor grievances since the process began."

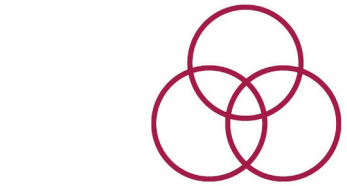
"Larry (Larson) was under a tremendous amount of pressure to significantly transform maintenance," says Grimm. "He's really done things differently and I think everybody sees it. It's a really positive change."

"We'd had predictive maintenance ideas in the mill for 30 years, but they fell to the wayside," adds mechanical maintenance supervisor and longtime employee, Steve Jones. "TDG helped us actually implement the practice, to get to the next level and make it all work."

"Changing how we do maintenance is an extremely high priority for us — one of the top three I have as general manager," says Conkle. "TDG brought a lot of realism to our mill. They're experienced, straightforward, and credible people. That credibility came through with the guys. We can't afford to go back to the way things were."

"Simpson exemplified many maintenance departments in the pulp and paper industry and industrial North America," adds TDG founder Whalen. "Maintenance is fundamental to profitable operations, yet, as Simpson demonstrated, you need processes and systems that can evolve with a changing business atmosphere. TDG helps industry transform their work structures, practices and spending habits. To compete globally, we all have to be in this together, seeking higher efficiencies and better reliability." **PPI**

For more information about TDG, log onto its Web site at www.teamdevelopmentmn.com, or contact Terry Whalen directly at 612-802-8063.



Team Development Group
10650 County Road 81
Suite 203
Maple Grove, MN 55369

Terry Whalen
President
Mobil: 561-310-6511
twhalen@teamdevelopmentmn.com

Michael Fitzpatrick
VP Business Development
Mobil; 360-749-4677
mfitzpatrick@teamdevelopmentmn.com

www.teamdevelopmentmn.com