White Paper

Establishing Lean Metrics:
A Quick Start to your Data Based Reporting System

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Strategic Foundation

In my previous white paper, *"Establishing Lean Metrics – Using the Four Panel Approach as a Foundation for a Lean Scorecard",* I outlined the essential steps required to establish a data based reporting system. It is necessary to systematically define the categories for measurement, and then develop a vision statement, objectives, measures, and strategy for each category.

While establishing these foundational steps will dramatically increase the effectiveness of a metrics system, additional tools are needed in order to make the system functional. The system relies on charts and graphs to communicate issues. It relies on discipline from management and staff to effectively drive continuous improvement. The essentials of putting this visual reporting and management system in place are outlined in the following pages.

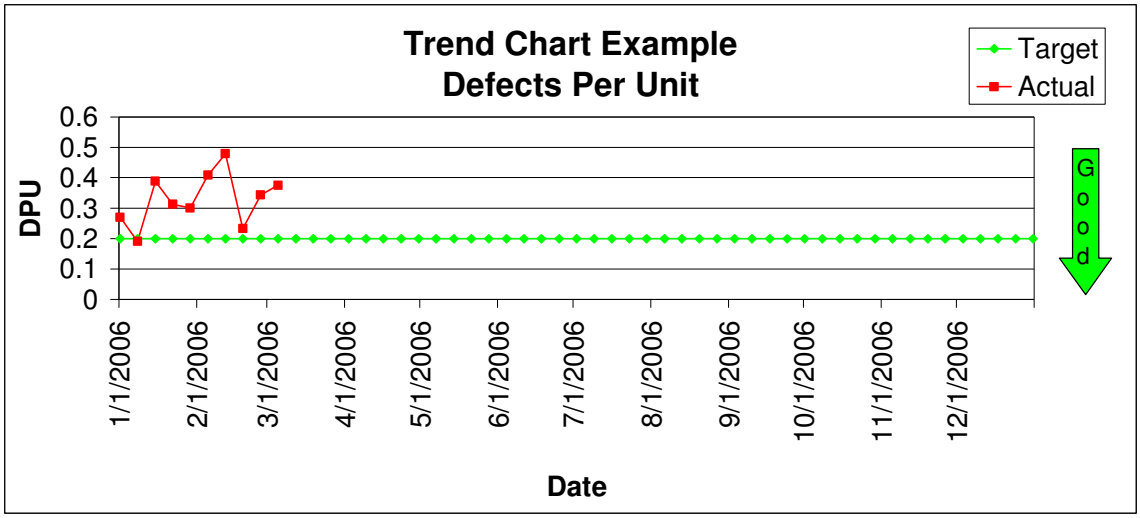
Metrics Reporting System

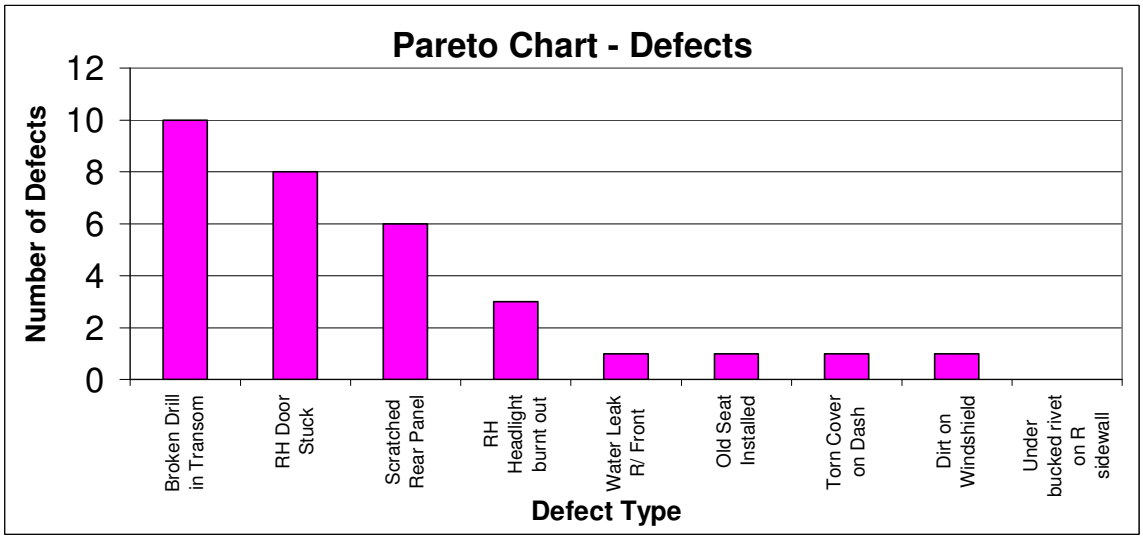
One of the outputs from the Four Panel work sessions is a list of measures. But each of the measures needs a reporting system, i.e. set of charts, that includes these four elements;

a. Demonstrate performance changes over time and compare performance to targets *(Trend Chart)*
b. Illustrate clearly the current issues and their relative severity *(Pareto Chart)*
c. Show historical trends of issues and the relative severity of past issues *(Paynter Matrix)*
d. Record actions that have been taken and report the effectiveness of those actions. *(Action Log)*

These requirements can be easily satisfied via a single, one page report. A simple Excel spreadsheet allows for tracking and charting the data with relative ease. A sample of the finished product is shown on the following page; each of the measures will require a sheet with these four charts. I have developed a template for this which you can review by visiting my website.

To make charts more powerful and easier to use, make sure to clearly label the charts and the units used, and avoid complex formulas or transformation of the data; stick with the data in the form most likely to be understood by everyone.





Paynter Matrix

	1-Jan	8-Jan	15-Jan	22-Jan	29-Jan	5-Feb	12-Feb	19-Feb	26-Feb
Broken Drill in Transom	7	8	10 **3**	2	29	22	25	18	10
RH Door Stuck	9 **1**	0	8	2	0	5	9	2	8
Scratched Rear Panel	0	11 **2**	21	25	0	13	10	3	6
RH Headlight burnt out	6	0	0	1	1	0	1	1	3
Water Leak R/ Front	3	0	1	1	0	0	1	0	1
Old Seat Installed	1	0	0	0	0	0	1	0	1
Torn Cover on Dash	1	0	0	0	0	0	0	0	1
Dirt on Windshield	0	0	0	0	0	0	0	0	1
Under bucked rivet on R sidewall	0	0	0	0	0	0	0	0	0

Action Listing

Item	Description	Status	Owner	Target Date
1	Corrective Action P16-001 Opened to Redesign Door	Open	Jack Bigbelly	3/1/2006
2	Corrective Action P16-003 Opened to why drills are breaking	Open	Iam Hogg	4/5/2006
3	Corrective Action P16-002 Opened to Identify source of scratch	Open	Jeff Leancurtain	5/15/2006

Trend Charts

Sometimes known as run charts, trend charts are used to show changes in performance over time. (See previous page). Run charts are used to provide a visual indicator of performance. Since there will always be some variation in results, displaying them over time makes it easier to see and understand how our actions are changing the results, and how we are performing relative to the target.

Resist the temptation to set the time periods too short for the individual data points on the trend chart. Short time periods can make it difficult to see the real trends. Occasionally, it is acceptable to use time periods as short as one week, but generally monthly buckets are preferred.

When setting up trend charts, be sure to include and clearly label the targeted performance. Place an arrow labeled "GOOD" and indicate the direction the results are desired to move.

To make your trend charts the best they can be, make sure to follow these guidelines.

1. Label the chart with a brief, but descriptive title.
2. Label the Y Axis with the units being used. Label the X Axis with the time periods.
3. Don't crowd the data to the top or the bottom. Use most of the range available, but allow for future movement. Don't include impossible numbers. (i.e. 110% On-Time Delivery)
4. Don't change the scale of the chart once established. These same reports will be used month after month. Changing scales tends to confuse and make interpretations more difficult.
5. Use one chart per measure. Don't add extraneous data or try to combine related measures on a single chart.

Pareto Charts

A Pareto chart is a special form of a bar chart that puts items in order from highest to lowest (occurrence, time, cost, etc.). It is the visual manifestation of the Pareto Principle which states that when several factors effect a situation, 20% of factors will account for 80% of the issues.

Pareto charts are valuable because they help us to quickly identify the vital few factors on which to focus in order to maximize our overall results. They break big problems into smaller pieces and help direct our limited resources.

Pareto charts always present the data from highest to lowest. If a bar chart doesn't present the data in this format, then it isn't a Pareto chart. The data on which Pareto charts are built can usually be categorized in multiple ways. For example, should the quality data be sorted by number of occurrences, by total

cost, or by its impact on the customer? Chose carefully, the way you decide will impact the actions which will be taken down the road.

Paynter Matrix

The Paynter Matrix is a tool which illustrates the effectiveness of containment and corrective actions. It allows us to track the cumulative effect of corrective actions on the results. It actually uses the same data as the Pareto charts, but adds a time element by showing the data for previous time periods.

It is essentially a matrix with categories in the leftmost column with a time series in the succeeding columns. When corrective actions are implemented for a particular category, the action is noted on the time series. When the corrective action is effective, there will be a corresponding improvement in the results.

	1-Jan	8-Jan	15-Jan	22-Jan	29-Jan	5-Feb
Broken Drill in Transom	7	8	10 **3**	2	29	22
RH Door Stuck	9 **1**	0	8	2	0	5
Scratched Rear Panel	0	11 **2**	21	25	0	13
RH Headlight burnt out	6	0	0	1	1	0
Water Leak R/ Front	3	0	1	1	0	0
Old Seat Installed	1	0	0	0	0	0
Torn Cover on Dash	1	0	0	0	0	0
Dirt on Windshield	0	0	0	0	0	0
Under bucked rivet on R sidewall	0	0	0	0	0	0

Item	Description	Status	Owner	Target Date
1	Corrective Action P16-001 Opened to Redesign Door	Open	Jack Bigbelly	3/1/2006
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Action Log

The action log is a tool for recording and tracking required actions. It provides clarity for what is to be done, a mechanism to conduct regular review of the actions and their status, defines the responsibility for the actions and provides a date certain for completion. The action log is the tool that connects the metrics system to the continuous improvement process.

Establishing Discipline and Conducting Reviews

The data based reporting systems are of no use if we don't follow through and establish the discipline to use them. In my visits to plants, it is common to find measurement systems that have been abandoned; the charts are posted on the bulletin boards, but the data isn't current. It just serves as a reminder of another failed attempt at improving our operations.

Establishing the foundation and the charts for a measurement system is fairly easy. Most companies and experienced managers can define the vision, objectives, measurements, and strategy in a few days. Within a couple of weeks, the charts and spreadsheets can be set up and put in place. But this effort is valueless if the tools aren't used once deployed.

If you want your measurement system to beat the trends and really become a tool that drives improvement, here are some tips for making your data based reporting system more successful:

1. Get buy-in from facility managers while developing the system. Don't develop it in a vacuum and force it down their throats. Involvement in the process is the key to success.
2. Follow up. This is important. Travel to the manufacturing facilities and review the results face-to-face. Don't fall into the trap of just following up by telephone, or even worse - just reviewing reports submitted by e-mail. Visiting the plant to review the results will emphasize their importance and will dramatically improve results.
3. Hold the operations team accountable for the results. Performance on the metrics should be reflected in bonuses, performance reviews or other performance based rewards. However, this only works when there is buy-in from the facility team on the performance targets. They cannot be held accountable (or rewarded) for performance on metrics which are not achievable or those that are not in their direct control.
4. Make the metrics clear and easy to understand. Clear definition of exactly what data to collect and how to calculate results will help prevent manipulation. When employees can see how their individual actions improve the results, they will respond in a positive manner.
5. Insist that local management include first line supervisors and hourly associates in the reviews. The more they understand the measures and why they are important, the sooner improvement will be realized. Hourly associates should regularly be asked to present the results and the action steps to the management team – it can help break down barriers and establish open communications.

6. Always demand action plans, improvement teams, workcell kaizens, or other proven problem resolution methodologies be employed to resolve issues once identified. This system can help drive improvements in your facility, but only if you use it as a tool to drive continuous improvement.

Use a Scorecard to Summarize and Report to Management

It isn't uncommon for these systems to have 20 to 25 individual measures. In order to see trends that may occur between the measures, and to rapidly report facility results to executive teams, it is necessary to consolidate the results on a single report; commonly referred to as a scorecard.

The data for the scorecard comes directly from the trend chart. The monthly results from the trend chart are inserted into the appropriate cells in the scorecard and color coded; green - results are on track for the month and for the year; yellow – results are on track for the month, but not for the year; red – the results are not on track for the month or for the year.

		Jan	Feb	Mar	Apr	May	Jun
People	Absenteeism %	29.3%	36.4%	34.9%	27.7%	11.7%	29.7%
	Turnover %	1.0%	1.5%	2.0%	3.0%	1.0%	1.0%
	Associate Involvement						
	Training hours / associate						
Safety	# OSHA recordables						
	Safety Audit Compliance %						
Quality	PPM						
	First Time Capability-Process %						
	Process Audit Compliance %						
Responsiveness	Schedule Attainment %						
	Premium Freight Runs						
	Freight % of Sales						
	Inventory Accuracy %						
	Inventory Turns						
Cost	Gross Margin Var. to Budget %						
	Scrap % of Sales						
	Material Cost % of Sales						
	Direct Labor Cost % of Sales						
	Controlled Expenses						

The entire system is very visual. The trend charts and the Pareto charts display results in a visual format. This visual orientation continues with the scorecard. In addition to color coding of the results, the categories themselves are color coded.

1. People – yellow
2. Safety – green
3. Quality – purple
4. Responsiveness – blue
5. Cost / Finance – red

These tools, combined with the discipline required to use them, the proper application of lean manufacturing techniques, problem solving methodologies, and mistake proofing methodologies can greatly increase the velocity of change within your operations. It isn't magic, it requires much work and a willingness to change, but the results can be spectacular.