

G. RINGGER CONSULTING, INC.

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and Airworthiness services
to the aviation industry*

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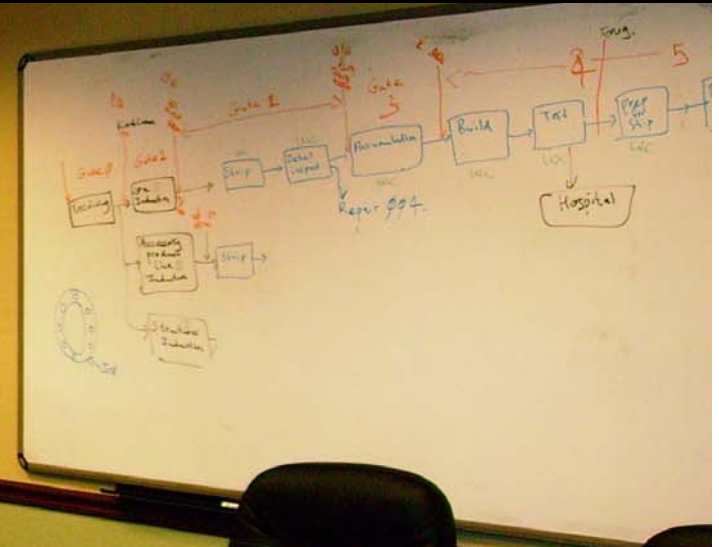
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- Supply Chain Auditing
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- Jump-start your training program. *“Are your employees competent?”*
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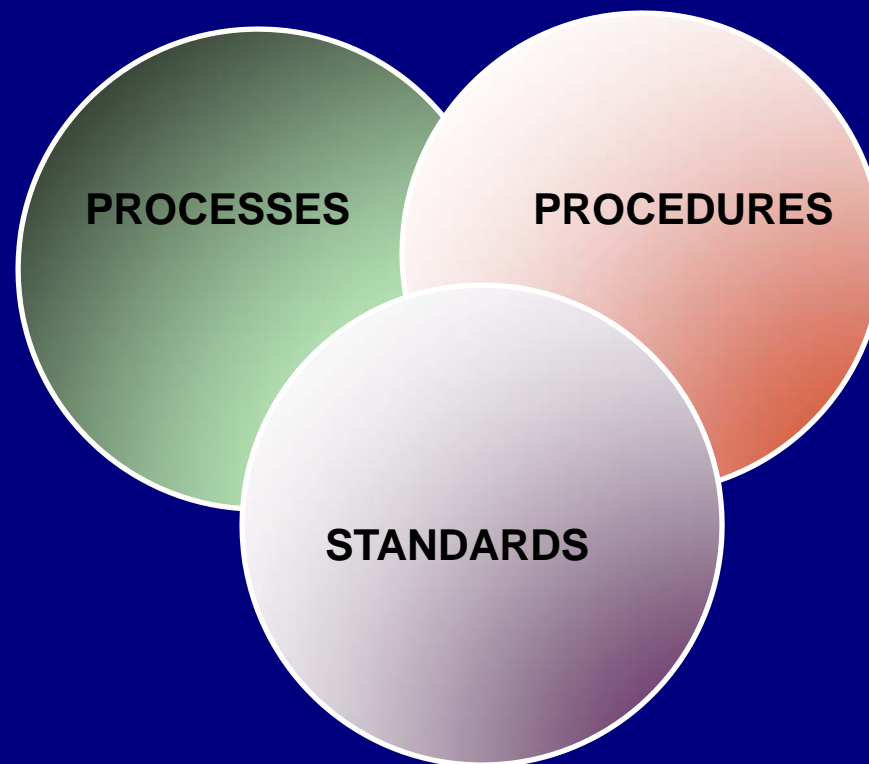
Supplier Performance – Best Practices for Supplier Control

*So, how should I manage my
Suppliers?*

Why is Supplier Control so Important?

- More and more companies outsource manufacturing to strategic sub-tier partners
- Supply chains have become very long.
- Many products are manufactured in other countries
- Many manufacturers have (1) streamlined their supply chain and (2) implemented lean inventory techniques; making them prone to stock shortages
- Supplier product quality and OTD are critical
- Manufacturers must maintain their approved suppliers' status to comply with regulatory (FAA, EASA, NASA, DOD, etc.) and customer requirements.

Suppliers operate their businesses using Processes / Procedures / Standards



We manage our suppliers in the following areas:



We manage Supplier Quality using:



- Audits & Inspections
- Corrective actions
- Incentives
 - (Pricing / Charge-backs)
- Partnerships
- Metrics

We manage our suppliers performance using:

- Supplier selection criteria via:
 - audits,
 - corrective actions,
- Product conformance via:
 - inspections,
 - Metrics



**Supplier /Product
Performance
Management**

We manage our supplier Risk by:

- Identifying Risk
- Assessing Risk
 - Likelihood & consequence
- Mitigating Risk
- Accepting Residual Risk



A few examples of Supplier Risk

- Early/late shipments or delivery to the wrong location
- Non-conforming/wrong products or quantities
- Supplier processes deficiencies
- Supplier country political stability and undesirable events
 - (e.g. volcanoes, storms, floods, earthquakes)
- Contract, legal, and regulatory non-compliance
- Information system failures and compromises

Best Practices from Industry

Industry studies identify
6 Best Practices used in
supplier management

Ref: http://www.metricstream.com/insights_insights_supplier_quality_management.htm

Best Practice #1:

Measuring & tracking cost of poor supplier quality

- Most organizations do not track and measure the cost of poor supplier quality (COPSQ) attributed to their suppliers.
- Some companies only track supplier COPSQ by measuring scrap and increase in MRB inventory.
- Materials costs only account for < 50% COPSQ

Managing supplier performance improves profits (Total cost – Not Price!)

“Total cost, not price, is the more important measure when selecting a supplier. Total cost includes the cost of **incoming inspection**, the cost of **managing defective product** (e.g., the cost of rework, re-inspection, or scrap), and the cost of **material of unknown variability** entering the buyer’s processes and products (e.g., the cost of delays.)”

Thomas J. Cartin & Donald J. Jacoby, *A Review of Managing for Quality and a Primer for the Certified Quality Manager’ Exam* (Milwaukee: ASQ Quality Press, 1997), pp 18, 20

Costs

(15 to 25% of Sales)

Traditional Costs:

- Material costs
- Waste
- Customer returns
- Inspection costs
- Testing Costs Rejects
- QC Dept. expenses

Additional costs:

- Pricing or billing errors
- Re-inspection costs
- Inventory segregation costs
- Lack of planning
- Additional Purchases
- Excessive overtime
- Premium freight costs
- Excess inventory
- Loss of market share
- Expediting costs
- Complaint handling
- Late paperwork
- Excessive systems costs
- Delayed receivables
- Credit/debit memo costs
- MRB costs
- SCAR tracking costs

Let's compare two companies...

	COMPANY #1	COMPANY #2
SALES	\$1,000,000	\$1,000,000
MATERIAL	\$700,000	\$700,000
OVERHEAD COSTS	\$200,000	\$200,000
COPSQ	\$50,000	\$15,000
TOTAL COST=	\$950,000	\$915,000
PROFIT=	\$50,000	\$85,000

3% - 4% COST REDUCTION = +70% PROFIT!!!

Best Practice #2: Cost recovery

Total COPQ = your COPQ + inherited supplier's COPQ

Companies need to proactively work with your suppliers to improve product quality, so that they can reduce your own COPQ.

Suggestion: Implement incentives (pricing or a cost-recovery system, where suppliers either make more or are charged back for providing poor quality of components.

- Introduces business discipline & accountability into the supply chain.

Reality: < 50% of companies pursue incentive programs with suppliers.

- Majority of these companies only recover material costs from their suppliers.

Best Practice #3: Supplier Audits

- Supplier Audits are one of the best ways to ensure suppliers follow the processes & procedures you agreed to during the selection processes.
- Supplier audits identify non-conformances in manufacturing, shipment, engineering change, invoicing and quality processes.
- Supplier and YOU jointly identify corrective actions within an agreed-upon timeframe.
- Future audits ensure corrective actions have been successfully implemented.
- > 50% of manufacturers do not follow audit best practices.
- By auditing suppliers, YOU ensure the audit process is effective and efficient.

Best Practice #4: Supplier Scorecard

Supplier Scorecards are one of the best techniques in using **facts (not opinions, bias or emotion)** to:

- Rank a supplier's relative performance within your supply base;
- Tracks improvement in supplier's quality, over time;
- Provides accurate data for future business negotiations.

Following are key operational metrics leading manufacturers track in their supplier scorecard:

- # of Corrective Actions in Last Quarter
- Average Response and Resolution time for Corrective actions
- # RMAs Processed per month
- MRB Inventory Levels
- # of in-house Rework Hours due to Supplier Components
- % of Actual COPSQ Recovered from Suppliers
- # of Customer Complaints or Warranty Reserves needed
- Relative ranking of supplier
- Performance against benchmark
- Supplier Non-conforming Product Quality

Let's look at the use of scorecards

An effective Supplier management tool

A recent industry study...

- Conducted by Wells Fargo Services Company and presented at the 89th Annual International Supply Management Conference
- This study included companies from a variety of industries, including aerospace, agriculture, electronics, financial, household manufacturing, semiconductor, telecommunications, and utilities.

Ref: Valerie J. Stueland, A.P.P. – Supplier Manager Wells Fargo Services Company

Study focused on 4 scorecard areas

1. Factors and Criteria;
2. Weighting;
3. Rating Scale;
4. Ease of Use & Effectiveness
 - in providing data for decision making.

1. Factors and Criteria

In all cases both **quality** & **delivery** were always present.

In majority of the cases **cost** & **service** were present.

- **Service factors** included:
 - service levels,
 - support,
 - responsiveness.

2. Weighting

- Majority of supplier evaluations include weighting.
- Scales include % per criteria & # values.
- Weighting is based on the number of categories under each factor criteria.
 - e.g. 5 measures related to quality vs only 2 related to delivery.
 - infers quality is weighted more than delivery.

2. Weighting (continued)

For scorecards using a weighting scale, total percentages for each category is shown:

Quality 25%
Delivery 24%
Total Cost 22%
Service 19%
Design control 4%
R&D 4%
Diversity 2%

3. Rating Scale

Scorecards use the Likert-type scale;

- Typically 1 (negative) to 5 (positive)

Some scorecards used a Likert-type scale using mathematical computations for their ratings.

No scorecard provided a completely objective rating scale.

Majority of scorecards used both subjective & objective aspects.

4. Ease of Use and Effectiveness in providing data for decision making.

The following analysis assumed all relevant data needed to fill out the scorecard was available.

The actual process of assembling the data was difficult.

- Is data gathering process manual or electronic?
- Is the data supplied by the supplier accurate?

Ease of Use and Effectiveness

The study calculated the time to fill in one page of an evaluation would take about **5 minutes**.

Therefore, an average 12-page scorecard would take approx 1 hour.

of Criteria on scorecards studied :
7 min to 16 max.

The Study found...

- ~ 70% of the scorecards could be completed within approximately **1 hour**.
- ~ 30% of the scorecards would have taken > 1 hour to complete.

The Study also found...

Scorecard instructions impact the ease of use and effectiveness.

- ~ 1/2 of scorecards provided instructions that would allow a new user to pick up the scorecard and evaluate any supplier.
- ~ 1/2 of scorecards provided instructions that were either very complex, or did not provide any type of instructions whatsoever.

Scorecards vs Trending

- IDs isolated performance:
 - Good vs Bad
 - Short-term
- Reactive
- Punitive
- Encourages “quick-fixes”
- Tracks direction of performance:
 - Getting better or worse
 - Long-term
 - Proactive
 - Partnership
 - Encourages long-term continual improvement

Trend Analysis...

- Helps cut through the data:
 - Rolling averages
 - Run charts
 - Control charts

Better?

The same?

Worse?

Better?
The same?
Worse?

Real data from a real company...

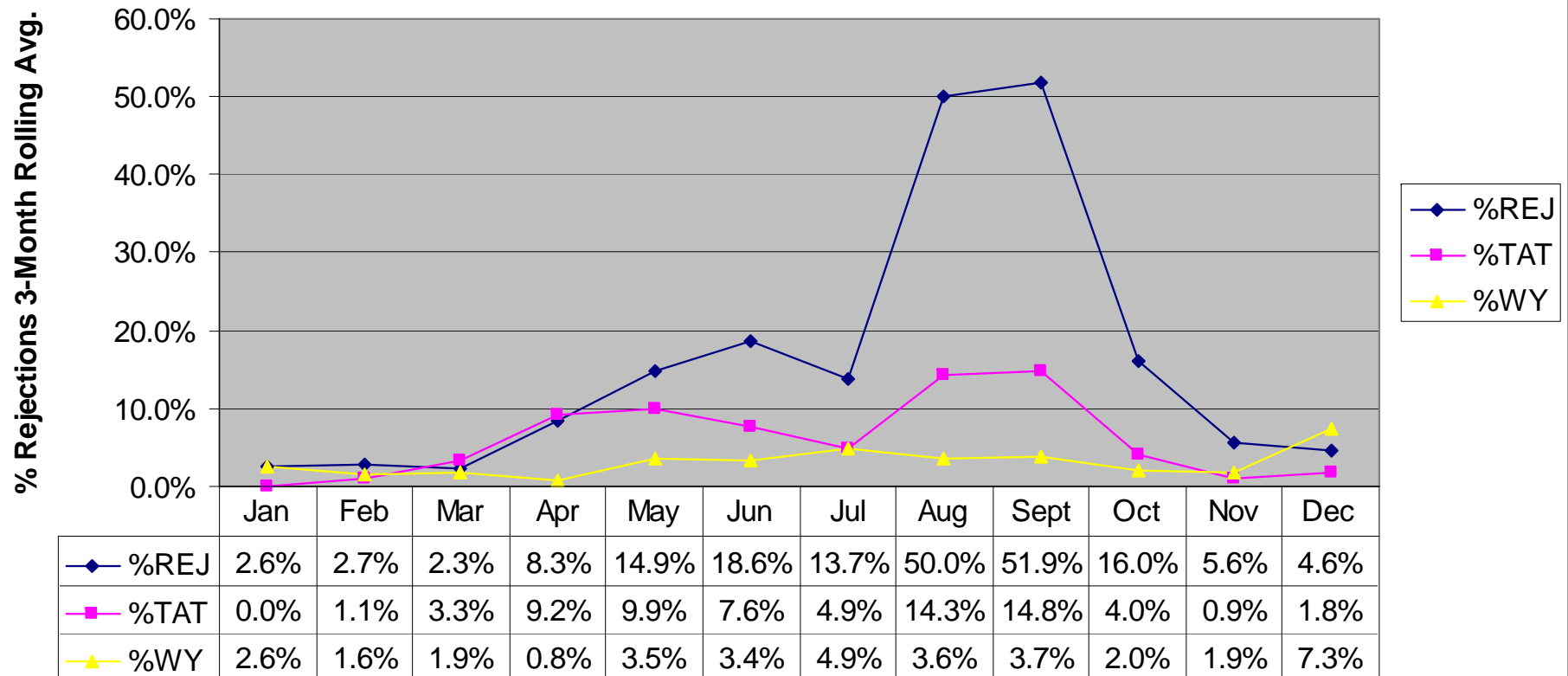
								3 month Rolling Avg		
<u>Month</u>	<u>QTY</u>	<u>REJ</u>	<u>TAT</u>	<u>WY</u>	<u>%REJ</u>	<u>%TAT</u>	<u>%WY</u>	<u>%REJ</u>	<u>%TAT</u>	<u>%WY</u>
Jan	116	3	0	3	2.6%	0.0%	2.6%			
Feb	68	2	2	0	2.9%	2.9%	0.0%			
Mar	31	0	5	1	0.0%	0.0%	3.2%	2.3%	3.3%	1.9%
Apr	21	8	4	0	38.1%	19.0%	0.0%	8.3%	9.2%	0.8%
May	89	13	5	4	14.6%	5.6%	4.5%	14.9%	9.9%	3.5%
Jun	8	1	0	0	12.5%	0.0%	0.0%	18.6%	7.6%	3.4%
Jul	5	0	0	1	0.0%	0.0%	20.0%	13.7%	4.9%	4.9%
Aug	15	13	4	0	86.7%	26.7%	0.0%	50.0%	14.3%	3.6%
Sep	7	1	0	0	14.3%	0.0%	0.0%	51.9%	14.8%	3.7%
Oct	78	2	0	2	2.6%	0.0%	2.6%	16.0%	4.0%	2.0%
Nov	23	3	1	0	13.0%	4.3%	0.0%	5.6%	0.9%	1.9%
Dec	8	0	1	6	0.0%	0.0%	75.0%	4.6%	1.8%	7.3%
Totals:	469	46	22	17	9.8%	4.7%	3.6%	9.8%	4.8%	4.6%

Better?
The same?
Worse?

% 3-MONTH ROLLING AVE

Now, we can answer the questions!

VENDOR 'A' 3 MONTH ROLLING PERFORMANCE



Benchmark the Industry

- ✓ Boeing
- ✓ Rockwell Collins
- ✓ Lockheed
- ✓ Northrop Grumman
- ✓ Many others, as well

Each have their own excellent supplier programs.
These Scorecards combine Likert KPIs with trending!

Example

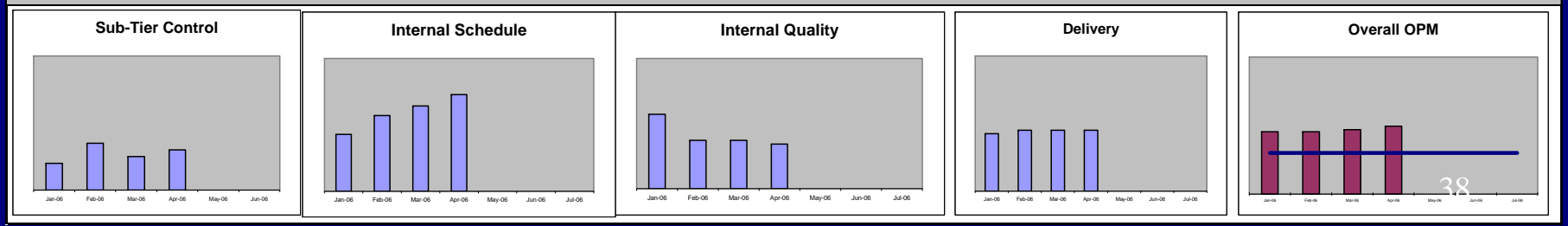
Key Performance Indicators (KPIs) and their grouping

[Supplier X] - [REDACTED]										
[Enter Supplier Name]			Reporting Period			Quality Rating		99.10%		
LM Supp Num 123456			OPM Start Date			Delivery Rating		97.30%		
DUNS Num 1234567891011					Overall OPM		495			
Score	Sub-Tier Control		Manufacturing Performance		Internal Quality		Delivery		Score	Comments
	Average Quality Rating	Average Delivery Rating	Kits Late to Floor (# days)	On Time back from processor	DPMO at 1st sub assembly	Fist Pass Yield	Discrepancies at ATP	On-time to internal schedule		
10	100.00	100.00	0.00	100.00	200	100.00	10.00	100.00	10	KPI 1 Comment
9	98.00	98.86	1.43	95.71	352	97.14	15.00	99.29	9	Category 1 Comment
8	96.00	97.71	2.86	91.43	504	94.29	20.00	98.57	8	
7	94.00	96.57	4.29	87.14	656	91.43	25.00	97.86	7	
6	92.00	95.43	5.71	82.86	809	88.57	30.00	97.14	6	
5	90.00	94.29	7.14	78.57	961	85.71	35.00	96.43	5	
4	88.00	93.14	8.57	74.29	1113	82.86	40.00	95.71	4	
3	86.00	92.00	10.00	70.00	1265	80.00	45.00	95.00	3	
2	84.00	90.86	11.43	65.71	1417	77.14	50.00	94.29	2	
1	82.00	89.71	12.86	61.43	1569	74.29	55.00	93.57	1	
0	80.00	88.57	14.29	57.14	1721	71.43	60.00	92.86	0	
Performance	91.00	89.00	9.00	96.00	500.00	70.00	30.00	93.00	Performance in Reporting Period	
Score	5	1	3	9	8	0	6	0	Score	
Weight	5	5	10	25	15	20	15	5	Weight	
Value	25	5	30	225	120	0	90	0	Value	
Category	Sub-Tier Control		Manufacturing Performance		Internal Quality		Delivery		Overall OPM	
Stretch Goal	100		350		350		200		1000	
Baseline	30		105		105		60		300	
Actual	30		255		120		90		495	

Sub-Tier Control	Internal Schedule	Internal Quality	Delivery	Overall OPM

Average of three to six months data equals baseline performance

[Supplier X] - [REDACTED]										
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Weight	5	5	10	25	15	20	15	5	Weight	100.00
Value	25	5	30	225	120	0	90	0	Value	
Category	Sub-Tier Control		Manufacturing Performance		Internal Quality		Delivery		Overall OPM	
Stretch Goal	100		350		350		200		1000	
Baseline	30		105		105		60		300	
Actual	30		255		120		90		495	



Weight

Weighting the KPIs

[Supplier X] [REDACTED]										
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3	86.00	92.00	10.00	70.00	1265	80.00	45.00	95.00	3	
2	84.00	90.86	11.43	65.71	1417	77.14	50.00	94.29	2	
1	82.00	89.71	12.86	61.43	1569	74.29	55.00	93.57	1	
0	80.00	88.57	14.29	57.14	1721	71.43	60.00	92.86	0	
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Weight	5	5	10	25	15	20	15	5	Weight 100.00	
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Category	Sub-Tier Control		Manufacturing Performance		Internal Quality		Delivery		Overall OPM	
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Sub-Tier Control	Internal Schedule	Internal Quality	Delivery	Overall OPM

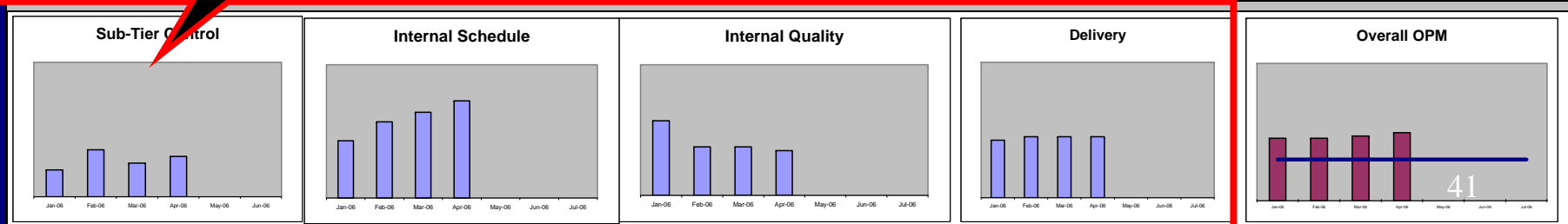
Bar Chart for KIP Group

[Supplier X]

[Enter Supplier Name]									99.10%
LM Supp Num	123456								97.30%
DUNS Num	12345678910								495
Score	Sub-Tier	Average Quality Rating							
10	100.00								
9	98.00	98.86	352	97.14	15.00	99.29	9	Category 1 Comment	
8	96.00	97.71	504	94.29	20.00	98.57	8		
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0	80.00	88.57	1721	71.43	60.00	92.86	0		
Performance	91.00	89.29	500.00	70.00	30.00	93.00	Performance in Reporting Period		
Score	5	3	9	8	0	6	0	Score	
Weight	5	10	25	15	20	15	5	Weight	
Value	25	30	225	120	0	90	0	Value	
Category	Sub-Tier	Manufacturing Performance		Internal Quality		Delivery		Overall OPM	
Stretch Goal		100	350	350	200			1000	
Baseline		30	105	105	60			300	
Actual		30	255	120	90			495	

Metric Group Bar Charts:

This bar chart plots 4 months of actual values for the Supplier Performance metric group.



Best Practice #5: Closed Loop Corrective Action

- Systematic reductions in COPSQ can be attained by ensuring a **closed loop** corrective action process is functioning.
- It is critical to deploy a closed-loop, integrated QMS, rather than a set of loosely connected responses from one or or a few suppliers.

Best Practice #6:

Engaging Suppliers in quality systems

Key engagements include:

- Supplier not having to deploy a mandated QMS within their organization **just-for-you**.
- Supplier should be able to **proactively** feed performance data to you.
- Receiving **real-time** supplier performance data should allow you to monitor supplier performance **in real-time**.

Summary

- ✓ Reviewed the importance of controlling supplier performance
- ✓ Identified how Suppliers operate their businesses using:
 - Processes / Procedures / Standards
- ✓ Identified how companies control suppliers through:
 - Quality Management / Supplier /Product Performance Management / Risk Management
- ✓ Walked through the Best Practices used by industry for controlling supplier performance.

Thanks for attending!

and remember...

“To stop learning.... is to stop living.”

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Questions?



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