Streamlining Laboratory Efficiency

Presented by: Greg Cenker Metrologist and Product Manager, IndySoft Hosted-PJLA, Tracy Szerszen, President

> December 6, 2022 1:00-2:00 PM EDT





Presentation Overview



Hosted By-Tracy Szerszen President Perry Johnson Laboratory Accreditation (PJLA)

Discuss lab management turnaround times, performance measurements

Detecting bottlenecks and tools to evaluate to improve

Questions & Answers



PJLA

Webinar Housekeeping

- This webinar will be recorded
- All PJLA webinars are made available on our website & YouTube channel
 - https://www.pjlabs.com/trai <u>ning/</u>

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- All attendees are muted
- Please utilize the question tool bar to submit questions
 - To be answered at the end of presentation

ISO/IEC 17025, Management Review 8.9.1-8.9.2

- 8.9.1 The laboratory management shall review its management system at planned intervals, in order to ensure its continuing suitability, adequacy and effectiveness, including the stated policies and objectives related to the fulfilment of this document.
- **8.9.2** The inputs to management review shall be recorded and shall include information related to the following:
- a) changes in internal and external issues that are relevant to the laboratory;
- b) fulfilment of objectives;
- h) changes in the volume and type of the work or in the range of laboratory activities;
- i) customer and personnel feedback;
- k) effectiveness of any implemented improvements
- l) adequacy of resources;
- o) other relevant factors, such as monitoring activities and training.
- 8.9.3 The outputs from the management review shall record all decisions and actions related to at least:
- a) the effectiveness of the management system and its processes;
- c) provision of required resources;
- d) any need for change.



Think about how these areas. How do you measure and evaluate performance trends and resource needs??

You can't manage what you don't measure.

Peter F. Drucker

Welcome Greg Cenker, IndySoft



Greg Cenker is a metrologist and the Calibrations.com product manager with IndySoft. He works closely with development, marketing, and sales to ensure that Calibrations.com becomes the go-to source for calibration related content, software, and support.

Greg has over 38 years of experience in the calibration industry starting in the United States Marine Corps and most recently as metrology engineering manager with Northrop Grumman. There, he managed SureCAL, Northrop Grumman's software platform for automated calibrations. Previously, he has held metrology roles at American Technical Services (ATS), SpaceX, Southern California Edison, and Fluke. Cenker has long been an active member of the calibration and metrology community. He has contributed as a speaker at many industry conferences and was presented the Woodington Award at the Measurement Science Conference in 2021. In addition, he was a contributing member of the NCSLI RP-1 committee "Establishment and Adjustment of Calibration Intervals."



Streamlining Laboratory Efficiency Greg Cenker – Metrologist and Product Manager

Learning Objectives

- Understanding Key Performance Indicators (KPI)
- Estimating laboratory throughput and capacity
- Estimating Turn Around Time (TAT) with respect to workload
- Identifying easily missed bottlenecks
- Estimating additional human resources for prolonged workload increase
- Possibly revising TAT

Learning Objectives

The big question ...

"Why are we doing this and why should I care?"



Lab Performance – KPI's

What are typical lab manager concerns?

- Turn Around Time (TAT) what drives it
 - Backlog
 - Lack of resources (Human and/or Standards)
 - Lack of procedures
 - Items inducted into lab mostly OOT
 - Lack of training or are the items bad (OOT)

Lab Performance – KPI's

What are typical lab manager concerns?

- Lab Capacity
 - Sufficient resources allocated
 - Staff overwhelmed
 - Potentially ongoing or temporary
 - Too many collateral duties for current staff
 - Finding vendors, procedures, calling customers, returning emails – these are built-in inefficiencies

Lab Performance – KPI's

What are typical lab manager concerns?

- Overtime how much is needed in order to reduce backlog
- Is the time allocated to the job/task reasonable

Problem Identification

Summary of Overall Problems Discovered

- High internal TAT >38 days for 95% of work inducted
- High vendor TAT > 180 days for 95% of all outsourced items returned to the customer
- High rate of new calibration tools added to inventory
- High rate of tool inventory loss ~4,000 Unable to Locate (lost)
- High re-calibration delinquency rate, >18%
- Lack of department ownership
- Lack of corporate visibility

Primary Problem ...

- No standard hours established for any items currently calibrated
- The only solution presented was using the metric of calibrations received/week based on previous year processing throughput
- With a backlog of 300 items, 5 employees, working 10hrs./day, with a rate of incoming at ~162 items per week, calculates to a maximum workload of ~8,132 cals/year
- Even worse, this doesn't address the terrible TAT (>38 days)

Primary Problem

Lab Turn Around Time (in-house)

Month	T	Median 🚽	% Comp 🖉	Average 🔽	% Comp2 🛃	> 95% complete 🖉	% Comp3	🗸 Lab Throughput 🛛 🚽
Jan-13		4	56.3%	11	70.3%	52	95.3%	536
Feb-13		2	51.9%	8	72.5%	29	95.8%	640
Mar-13		4	52.3%	9	70.4%	26	95.3%	598
Apr-13		4	54.5%	14	81.0%	72	95.4%	784
May-13		6	53.8%	9	60.3%	22	96.2%	910
Jun-13		5	52.8%	10	74.5%	29	95.4%	439
Jul-13		7	57.5%	11	69.0%	33	95.3%	577
Aug-13		5	52.9%	11	75.8%	33	95.6%	652
Sep-13		5	55.0%	11	74.2%	41	95.6%	803
Oct-13		5	53.8%	13	81.7%	49	95.9%	809
Nov-13		3	53.4%	10	80.8%	44	95.4%	761
Dec-13		6	50.2%	10	68.4%	29	95.4%	915
Average:	=	5	53.7%	10	73.2%	38	95.6%	702
StDev:=		1.31	1.9%	1.68	5.9%	14	0.3%	144

Primary Problem ...

Lab Turn Around Time (in-house)



Growth Forecast (in-house)

Projected growth, linear and ARIMA methods

Workload Planning	No Growth	XL Lin. Growth	ARIMA Growth
Project Start Date =	1/1/2014	1/1/2014	1/1/2014
Project End Date =	12/31/2014	12/31/2014	12/31/2014
M-F Days =	251	251	251
Saturdays =	52	52	52
Weeks =	52	52	52
New Cals/wk. =	162	222	231
Received/day approx.=	32.4	44	46
Cals per Yr.=	8,424	11,534	11,994
Projected Growth =	0.0%	36.9%	42.4%
Any Backlog?	300	300	300
Work performed per. Employee - Monday - Friday			
Number of employees =	5	5	5
Hrs. per/day =	10	10	10
Cals/day (1 emp.) based on prev. yr.=	6.48	6.5	6.5
Capability of Cals processed by present staff =	8,132	8,132	8,132
Employees needed to keep at current pace =	0.4	2.3	2.6

Growth Forecast (in-house)

Projected growth, linear and ARIMA methods

Trend Analysis & Prediction Interval (90% Confidence)



Growth Forecast (all tools)

Inventory Status

Total Calibrated Tool Status Company-wide as of 8/28/2014

- 19,596 Total Active Tools All Values Approximate as the Environment is Dynamic
- 8,980 Have Shop Resource Codes (~46%)
- 5,977 Assumed to be Engineering and R&D (~30%)
- 4,639 Unable to Locate (~24% lost)

Growth Rate

- Keeping track since 3/31/2014
- Tools gained in last 150 days 2,968
- Rate ~ 20 new tools per day
- If rate remains constant, by EOY MegaCal will have over 22,000 active calibration tools

Actual - 3/31 to 8/28 all tools



Additional Findings

High re-calibration delinquency rate

- External audit found ~18% total calibrated tool inventory delinquent
- Primary Reasons
 - Lack of department ownership
 - Lack of corporate visibility
 - o Certain departments "transferring" tools to another shop
- Corrective actions
 - Physical department inventory
 - Director level acknowledgement for known "lost" calibration tools
 ✓ Digitally signed "lost" record attached to database
 - Director level approval required if a lost tool is later discovered required for re-activation
 - Corporate dashboard of tool status visible to everyone, in every shop, along with the shop manager name and delinquent rate Zero tolerance mandate
 - ✓ Digital acceptance required, of receiving manger, for all tool transfers

Solution 1

Bring high level visibility to all process owners *Public Awareness* Items Due For Calibration Next 30-Days



Solution 1

Bring high level visibility to all process owners *Public Shaming*

Delinquencies YTD



■ Delinguent Counts ■% of Inventory

Addressing the high, in-house, TAT

- Utilize the PERT distribution to understand probability of delivering >95% of all items inducted back to the customer
- PERT = Program (Project) Evaluation and Review Technique is a statistical tool often associated with project management. It was designed to analyze and represent the tasks involved in completing any given project

Addressing the high, in-house, TAT

Estimating calibration time is no different than estimating a program or project

- The PERT distribution takes the following arguments;
 - Minimum time (5)
 - Likely time (10)
 - Maximum time (38)

Month 星	Median 🖵	%Comp 星	Average 星	% Comp2 星	> 95% complete 📮	%Comp3 星
Average:=	5	53.7%	10	73.2%	38	95.6%

Addressing the high, in-house, TAT



Why 25 days and not 38 days?

 The PERT function is a distribution using probability theory, not simply averages – it has the following shape for our data ...



 The 95% success rate vs probability of failure can be calculated to an estimated value of ~25 days



Now the question becomes "Why is the internal TAT ~25 days?"

- Arriving at that answer required mapping out the laboratory flow process
- Once the process was fully mapped out, time stamps were pulled from the database
- The time any item went from one status to the next was calculated to determine if it was a bottleneck

Time markers inserted along the entire process



The Reveal ...

- Most received equipment, selected for internal calibration, was processed in about 3 days
- The real time culprit was the length of time the items remained in the lab, after the calibration is complete
- The clock kept on ticking until the item(s) were picked up by the customer – this is considered dock to dock time

Solution 2

- Solving this dilemma entailed creating an escalating, daily, email reminder until the item(s) were checked out of the lab
- With the calibration completed, an automatic email was fired back to the equipment owner, stating the item is complete and they could pick it up at the service window
- If it wasn't picked up by the next day, the customer was automatically emailed again, and their supervisor notified
- By the 3rd day, the owner, supervisor, and manager were automatically notified, stating in the email "This is notice n of n"
- The pickup problem, and high TAT, now resolved. Internal TAT now ~5days for internal calibrations

Unintended Consequences

- With high visibility regarding delinquent calibration, shop managers were now scrambling to turn in their test tools, so they weren't counted as delinquent. This presented another problem ..
- The Cal Lab isn't staffed 24/7 but the factory works 24/7 no personnel were available to check items into the lab
- The solution? Create a self-check-in Kiosk in the Cal Lab service area
 - The customer enters the Cal Lab service area
 - They scan the "Begin Check-in process" QR tag
 - Then, scan their badge, and all test tools to be received by the lab
 - When all tools are checked-in, they scan the QR tag "Complete Check-in process"
 - An automatic email now generated and sent to the customer with a list of items inducted into the Cal Lab – the delinquent clock is now stopped

Secondary Problem ...

Vendor Turn Around Time (Outsource)

Month 📮	Median 🖵	% Comp д	Average 🚽	% Comp2 🚽	> 95% complete	% Comp3 🖕	Vendor Throughput 💡
Jan-13	26	54.17%	57	79.17%	150	95.83%	48
Feb-13	25.5	50.00%	31	81.15%	68	95.90%	122
Mar-13	43	64.58%	61	80.21%	178	94.79%	96
Apr-13	30	50.84%	70	64.25%	181	96.09%	179
May-13	28	51.33%	47	74.34%	174	94.69%	113
Jun-13	29	51.14%	42	68.18%	101	95.45%	88
Jul-13	46	53.13%	58	62.50%	121	94.79%	96
Aug-13	34	56.10%	41	73.98%	78	95.93%	123
Sep-13	24	51.28%	57	84.62%	286	95.73%	117
Oct-13	25	50.71%	57	75.00%	356	95.00%	140
Nov-13	26	53.51%	33	71.93%	73	94.74%	114
Dec-13	32	57.60%	64	80.00%	381	96.00%	125
Dec-14							162
Average:=	31	53.7%	51	74.6%	179	95.4%	113
StDev:=	6.81	4.0%	11.83	6.6%	103	0.5%	30

Secondary Problem ...

Vendor Turn Around Time (Outsource)



2013 Vendor Throughput

Solution 3

- Vendor TAT was atrocious as well contributing ~180 days for 95% of all items outsourced returned and placed back into service
- Lack of visibility was part of the problem I could see how many items were out to vendor, and for how long (if I ran a report), but personnel limitations (lack of) contributed to this being overlooked
- Many vendors required constant follow up time simply wasn't available
- Installed a blanket PO system consolidating 40+ vendors to a single source streamlined process
- The vendor chosen could perform most higher echelon calibrations
- A bi-weekly pick-up/drop-off ensured more timely service and reduced overall TAT from ~53% being returned in 30-days to ~92% being returned in 30-days

Summary Wrap-Up

IndySoft

- Understanding Key Performance Indicators (KPI)
- Estimating laboratory throughput and capacity
- Identifying easily missed bottlenecks by inserting time captures along the entire process
- Bringing visibility to the process owners, directors, and company
- Estimating and revising TAT by the utilization of the PERT distribution
- Innovate efficiencies before adding additional personnel
- Delinquent calibrations went from ~18% to <0.02% companywide



Contact Information

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Time for Questions and Answers

Join us for future Webinars

Thursday, December 22, 2022 - 1:00pm EST Requirements for Personnel in ISO/IEC 17025:2017 Section 6.2, Michael Kramer, PJLA Program Manager

Tuesday, January 17, 2023 - 1:00pm EST Top FDA Warning Letters Related to Calibration with Walter Nowocin, IndySoft





PJLA

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Thank You!

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