Six Sigma Project
First-Time-Through of
Engineering Change Notices

See the possibilities™

FTT of Engineering Change Notices

D M A I C

Champion: Gary Clark, Electrical Conversion (EC) SBU Director

Team:

Gary Clark	Champion - Electrical Conversion (EC) SBU Director
Todd Gross	Deployment Champion – Energy Trans. Systems Quality Manager
Jon Hobgood	Six Sigma Black Belt, EC SBU
Dave Paborsky	EC Business Planning Manager
Bob Kittridge	EC CAD supervisor
Sherman Allen	CAD Design Primary, Wiper/Washer Systems
Tim Bodenmiller	CAD Design Primary, Alternators
Tom Ruediseuli	CAD Design Primary, Ignition
Jim Gibbs	CAD Design Primary, Starters
Bill Kirk	Timing and Release Supervisor
Don Miller	Senior Release Analyst, Alternator
Pam Johnson	Release Analyst, Wiper/Washer Systems
Margaret Washington	Release Analyst, Starters and Ignition
David Smith	CAD Design Analyst, Starters and Washer/Wiper Systems
Dennis Skvarce	CAD Design Analyst, Starters and Ignition
Dale Bemben	CAD Design Analyst, Alternators

Note: Also requires interaction and support from all engineering activities in EC SBU.

FTT of Engineering Change Notices

D M A I C

Problem:

Engineering change notices are not completed efficiently or in a timely manner. Many must be “reworked” in CAD Design area because initial information was not accurate or complete.

	Initial Process	Conclusion of Project	Improvement
First Time Through	30%	72%	140%
Sigma of process	0.38	1.10	189%
			$240,000 Annual Labor Savings

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trans·ac·tion

- an exchange or transfer of goods, services, or funds
- communicative action or activity involving two parties or things that reciprocally affect or influence each other

Product Areas:
Alternators, Starters, Ignition, Wiper/Washer, Hybrid Motors

From *Merriam-Webster's Collegiate Dictionary* online at http://www.webster.com

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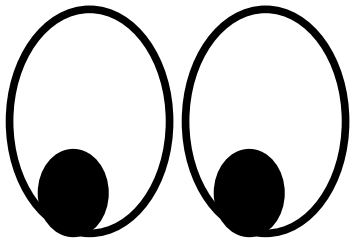
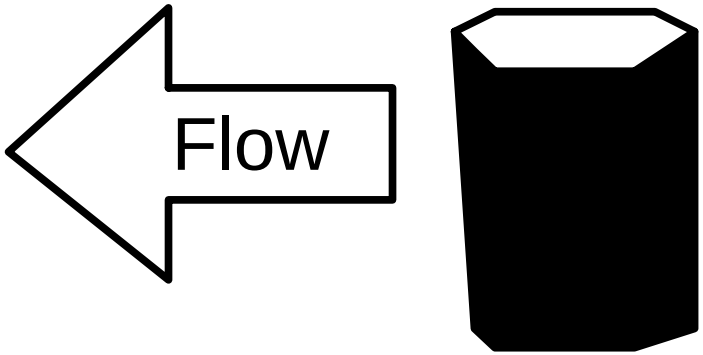
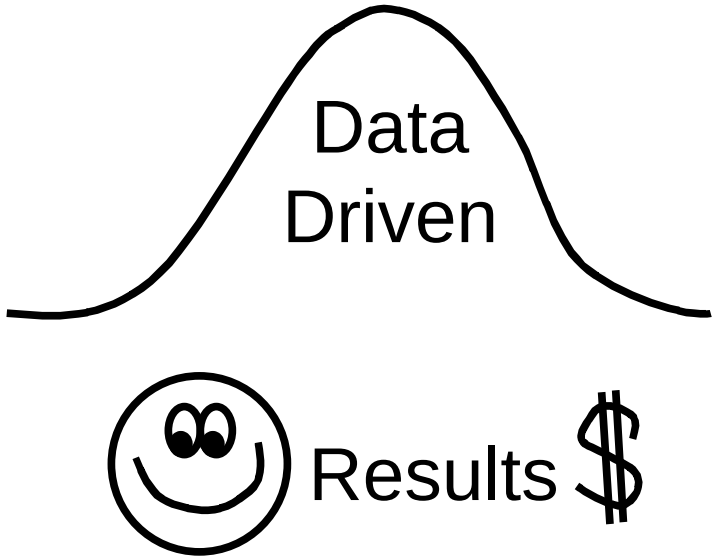


Lean Principles



Six Sigma



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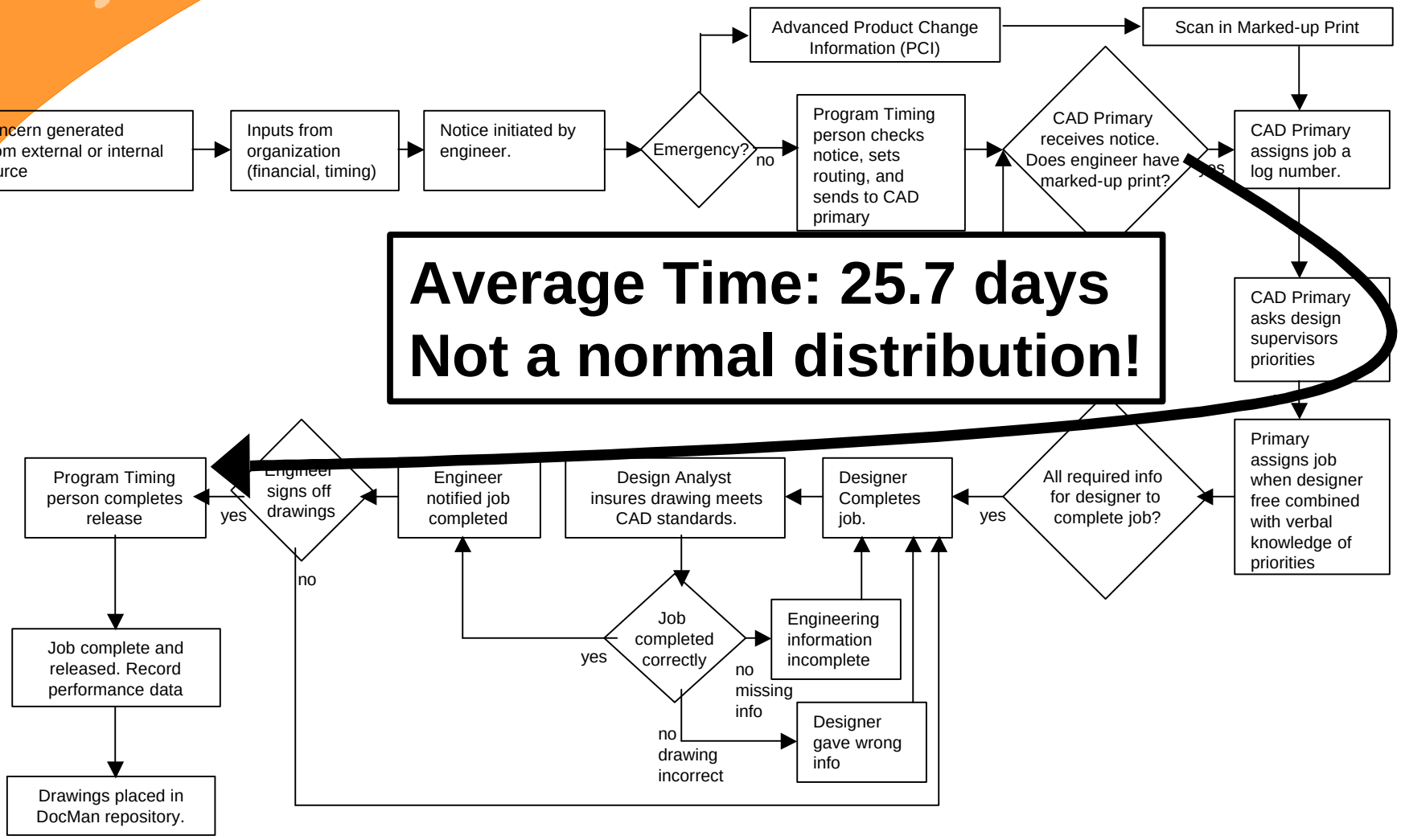
Current State Roadmap of Design Change Process 8/00



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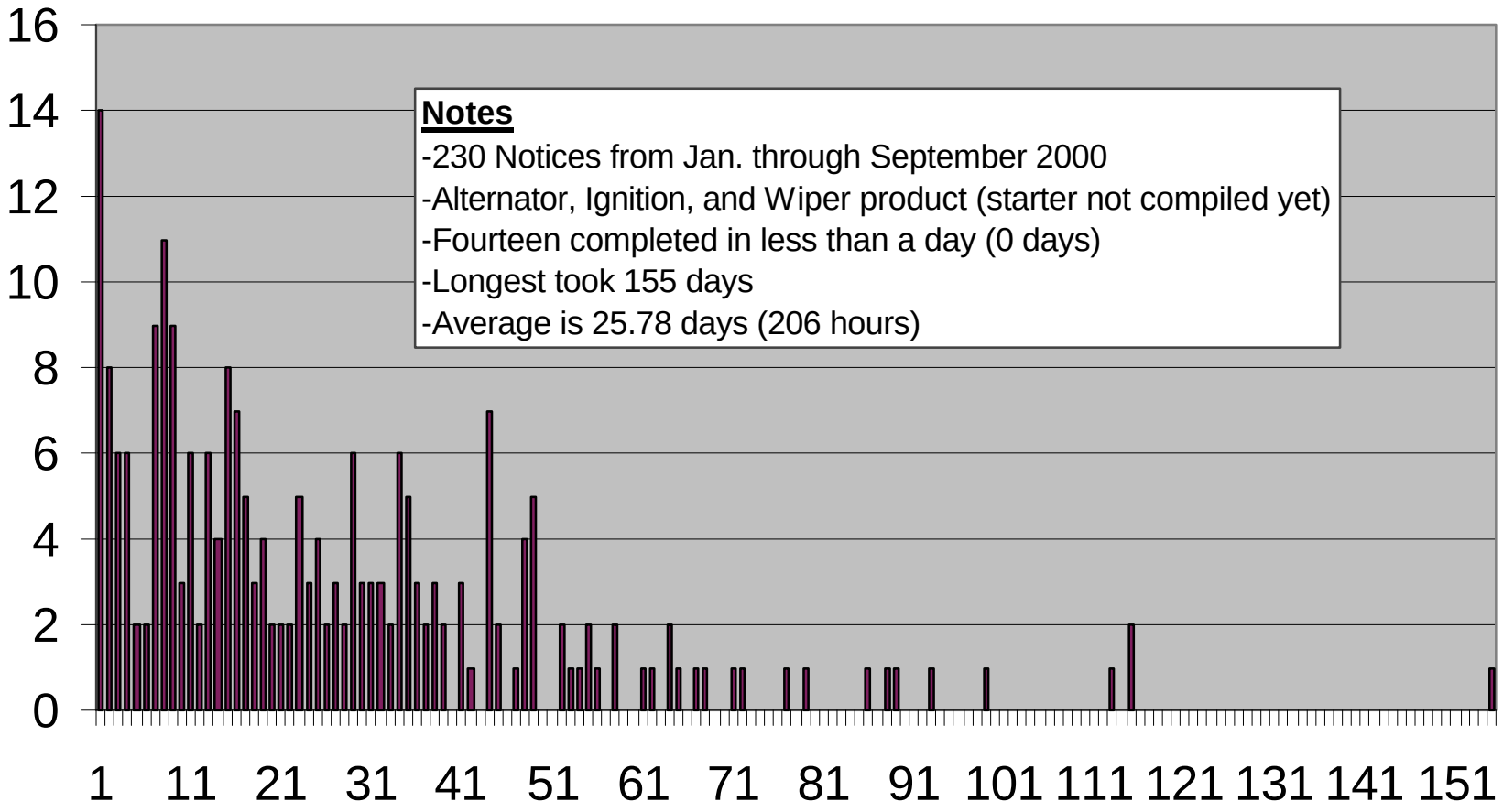
Number Days to Complete Design Change Notices



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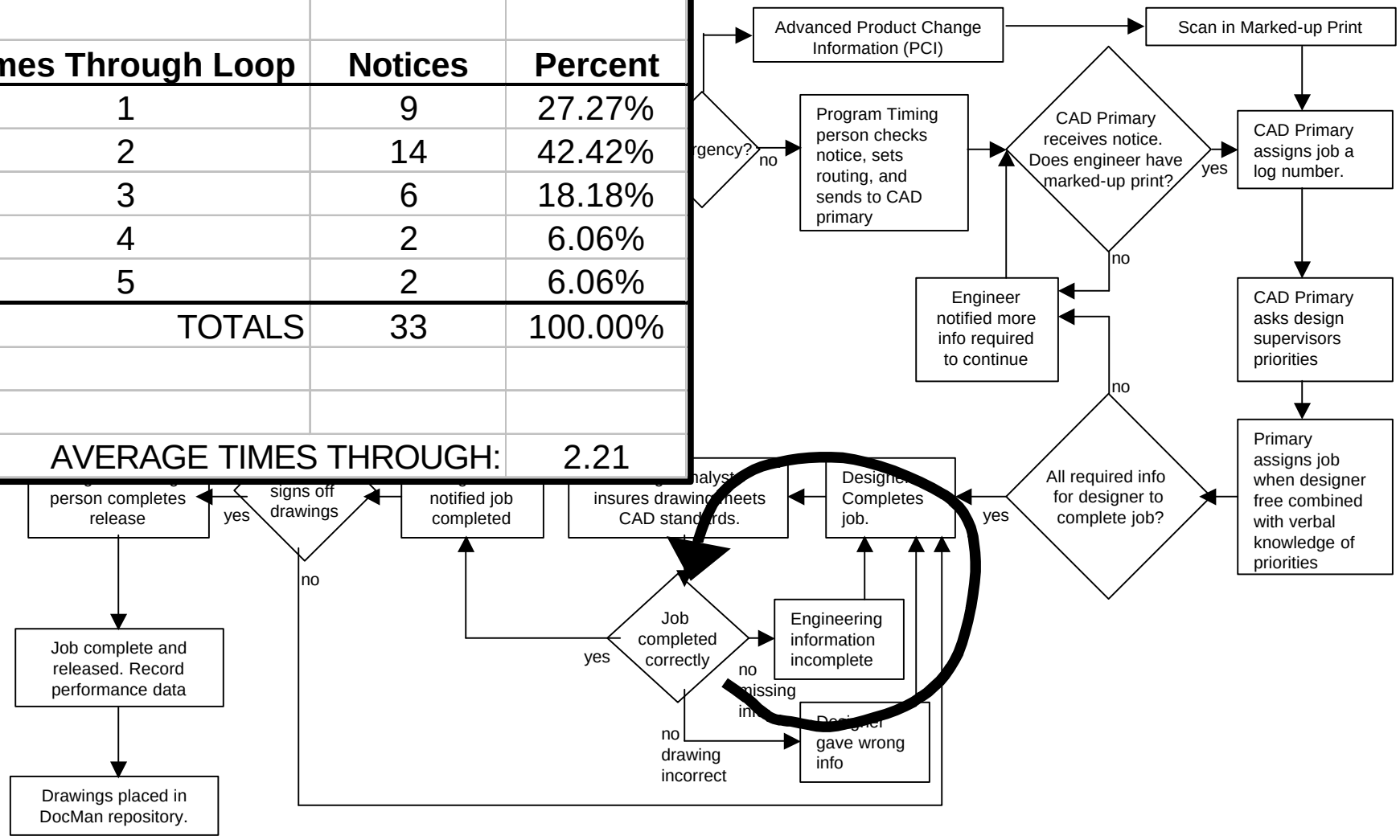
Starter data for May and June 2000

Times Through Loop	Notices	Percent
1	9	27.27%
2	14	42.42%
3	6	18.18%
4	2	6.06%
5	2	6.06%
TOTALS	33	100.00%
AVERAGE TIMES THROUGH:		2.21



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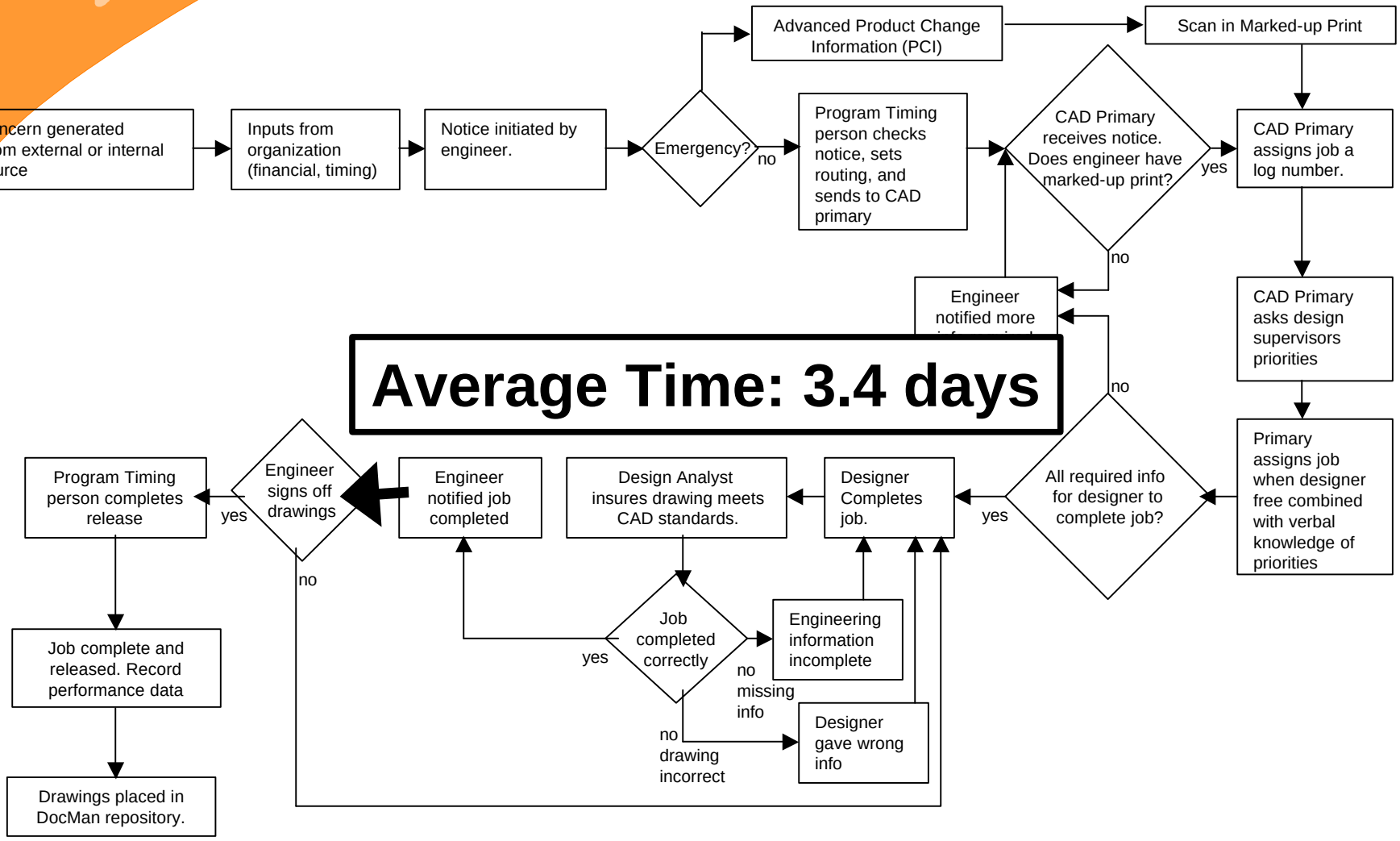
Current State Roadmap of Design Change Process 8/00



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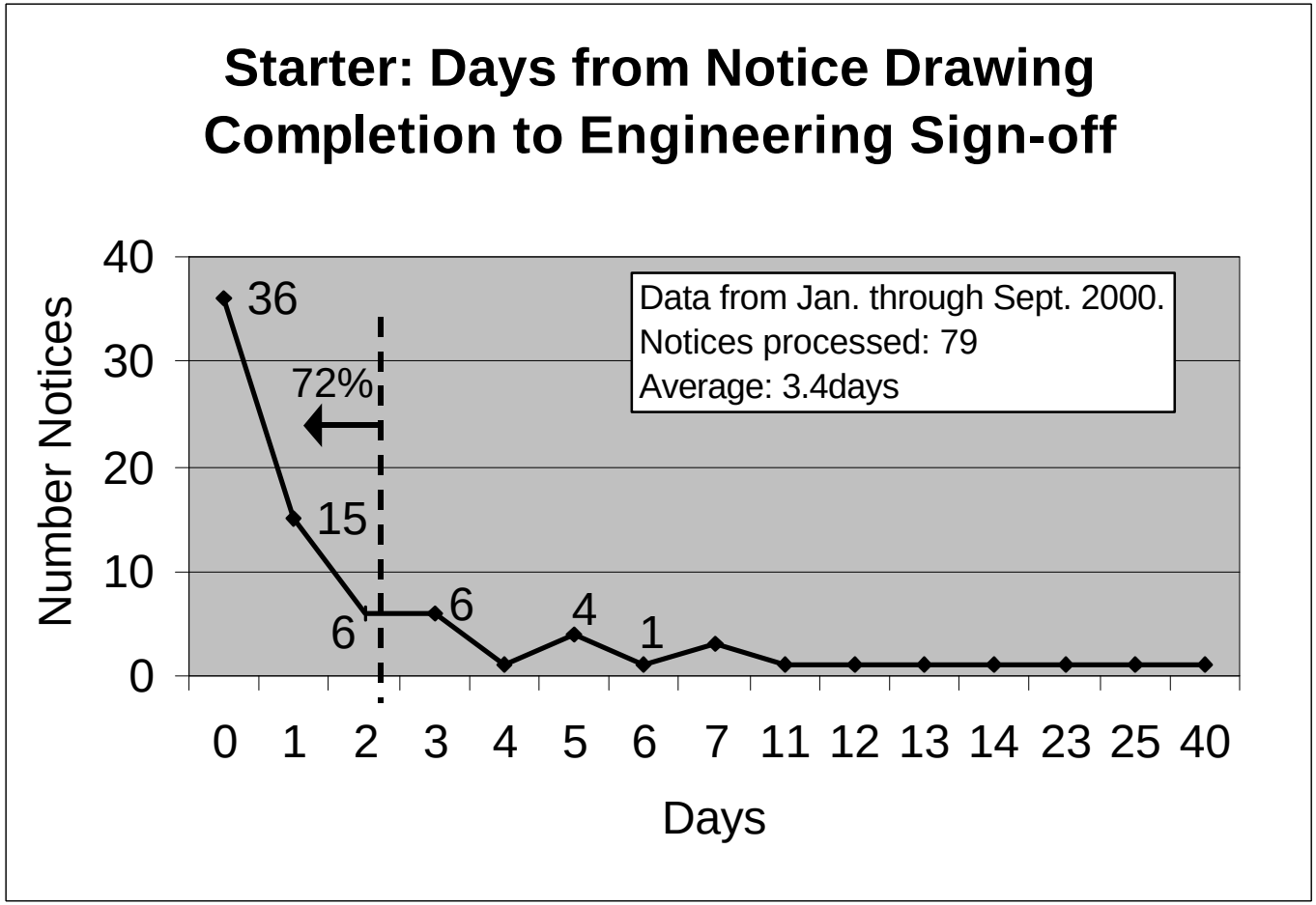

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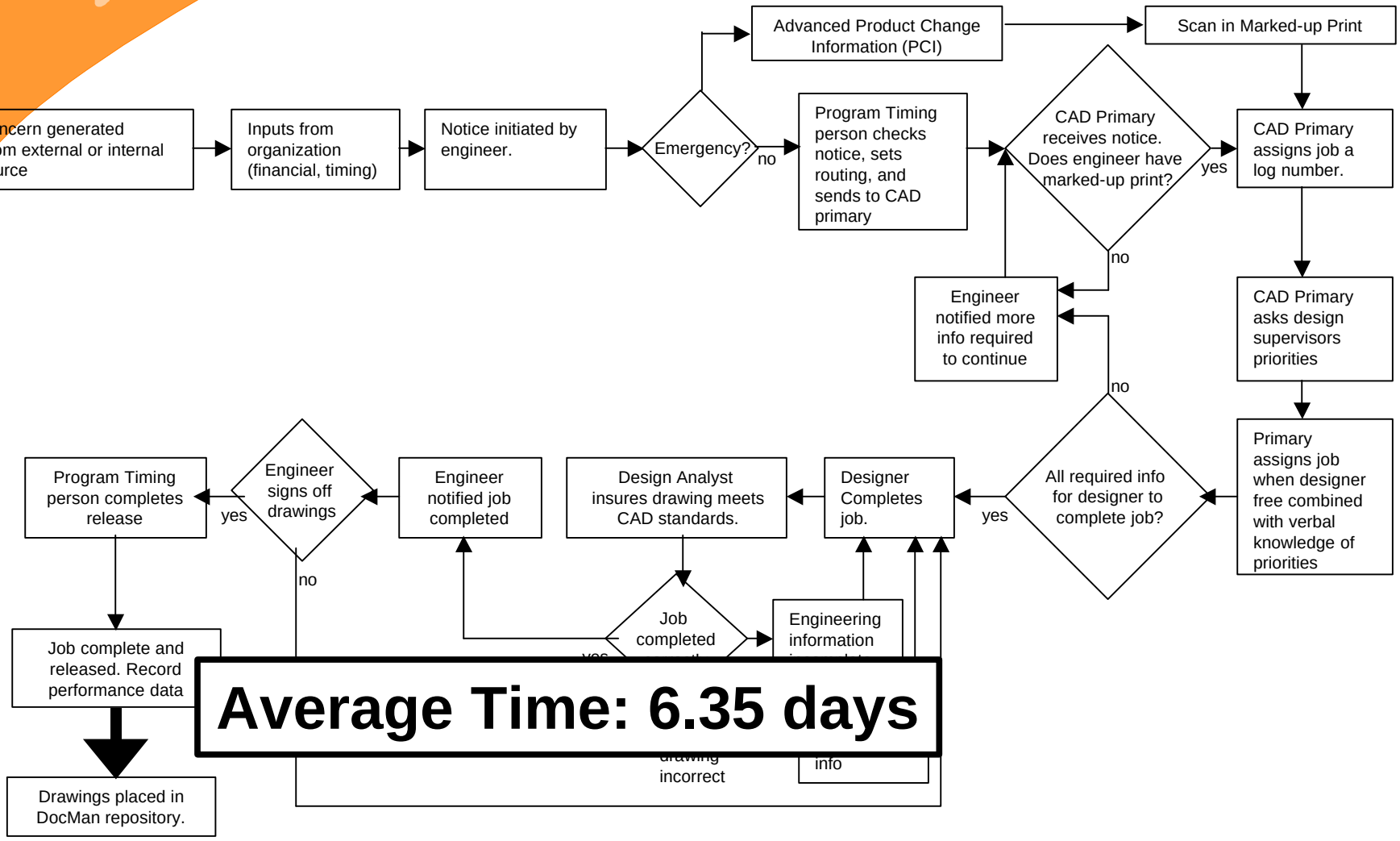
Current State Roadmap of Design Change Process 8/00



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The current state of the design department is a fire!

- •Everything is a priority from engineering
- •Dates are not hit
- •Correct information is not given before a job is started.

These factors result in little time to make lasting improvement and very poor efficiency.

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Engineering Change Process Cause and Effect Matrix

	Importance to customer	10	9	8	6	
Process Inputs		Timely Completion	Design Intent Verification (2nd set of eyes)	Dimensional Values	Standard Interpretation of Dimensions	**Total**
1	Designer Personal Work Habits	10	9	7	8	285
2	Designer Experience (dimensioning knowledge)	9	7	10	5	263
3	Involvement, Participation, Partnership	10	8	6	2	232
4	Designer Product Knowledge	8	7	8	3	225
5	Engineer Experience and Product Knowledge	9	7	7	2	221
6	Software app. Uptime and usefulness	10	5	7	1	207
7	Software expertise of designer	10	2	5	3	176

Note: Subjective data obtained from a cross-functional team of engineers, CAD designers and manufacturing engineers.

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LOG #	NOTICE # DF00-E or I	DESIGNER	ENGINEER	DATE RECEIVED	REQUIRED COMPLETION DATE	ACTUAL COMPLETION DATE	NO. DWGS	FTT	FTT CODE
1	L1047654-00(	TM	TAYLOR	4-Jan	20-Jan	20-Jan	8	N	1
2	L1036323-00(	TGB	KOPP	5-Jan	11-Feb	22-Feb	4	N	1,2
3	L1040216-00(	MM	TAYLOR	6-Jan	18-Feb	29-Feb	22	N	1,2,3
4	L0979418-01!	TGB	ROOF	7-Jan	19-Feb	19-Jan	2	N	2
5	L0979418-03:	KV	ROOF	7-Jan	16-Feb	14-Apr	7	N	1,3
6	L0979418-03(	TM	ROOF	7-Jan	21-Jan	21-Jan	8	N	3
7	L0979418-04:	TM	ROOF	10-Jan	26-Jan	26-Jan	2	Y	
8	L0979418-04(	TGB	MIKKELSON	10-Jan	2-Feb	12-Feb	2	N	1
9	L1046067-00(	TM	ROOF	13-Jan	2-Feb	2-Feb	3	Y	
10	L1047250-00(	KV	ROOF	13-Jan	16-Feb	14-Apr	8	N	1,3
11	L0948293-00:	TM	KOPP	19-Jan	27-Jan	27-Jan	1	Y	
12	L1024658-00(	JW	DARR	19-Jan	11-Feb	28-Feb	1	Y	
13	L0916257-01-	DH	FINE	19-Jan	21-Feb	18-Feb	23	N	1,2,3
14	L1046727-00(	TGB	KINN	27-Jan	18-Feb	17-Feb	1	N	5
15	L0916257-01!	MM	EVANS	28-Jan	9-Feb	9-Feb	1	Y	
16	L0844300-00(	TM	PRICE	28-Jan	7-Mar	8-Mar	5	N	1
17	L0979418-04:	TGB	MIKKELSON	28-Jan	11-Feb	8-Feb	2	N	2
18	L0980417-02:	TGB	JIM	28-Jan	28-Jan	28-Jan	2	N	5
19	L1049893-00:	TGB	PRICE	30-Jan	2-Feb	2-Feb	2	N	5
20	L0979418-04-	TGB	ROOF	9-Feb	16-Feb	11-Feb	1	Y	
21	L0916257-01'	MM	EVANS	10-Feb	28-Feb	14-Mar	10	N	2
22	L1065353-00(	TGB	JIM	16-Feb	22-Feb	22-Feb	4	N	1,3
23	L1007047-00(	TM	DARR	17-Feb	1-Mar	17-Feb	1	Y	
24	L0979418-04!	TGB	DARR	28-Feb	3-Mar	9-Mar	4	N	1
25	L0979418-04!	TGB	MIKKELSON	7-Mar	8-Mar	8-Mar	1	Y	
26	L0979418-05(	MM	MIKKELSON	7-Mar	17-Mar	27-Apr	1	N	1,3
27	L0979418-04'	MM	MIKKELSON	7-Mar	17-Mar	21-Mar	2	Y	
28	L0979418-05:	TGB	MIKKELSON	7-Mar	12-Mar	9-Mar	2	Y	
29	L0971070-00!	TGB	KINN	8-Mar	14-Mar	14-Mar	1	Y	
30	L0979418-04(	TGB	PRICE	9-Mar	22-Mar	22-Mar	1	Y	
31	L0979418-04:	DH	MIKKELSON	13-Mar	3-Apr	4-May	35	N	2
32	L1065372-00(	TGB	PILLOTE	13-Mar	5-Apr	8-Jun	16	N	1,2,5

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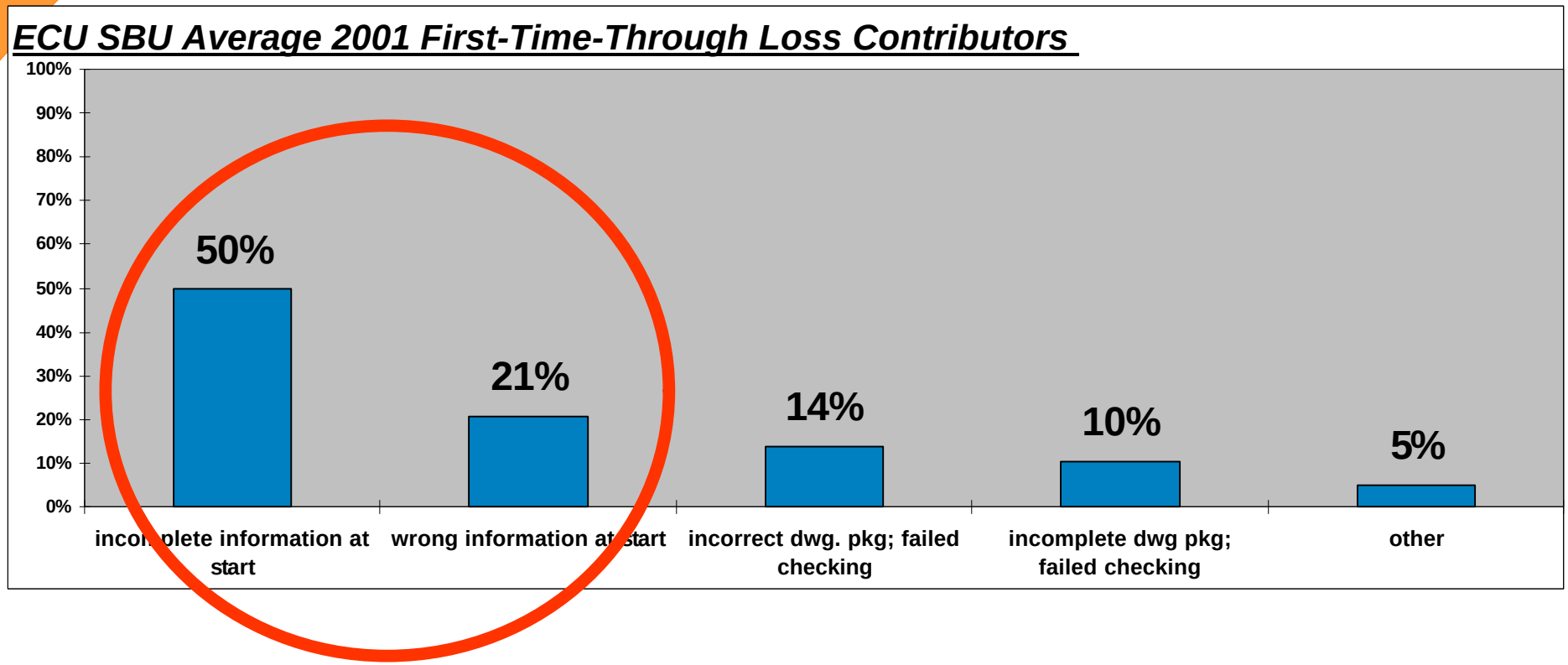
ECU SBU Average 2001 First-Time-Through Loss Contributors



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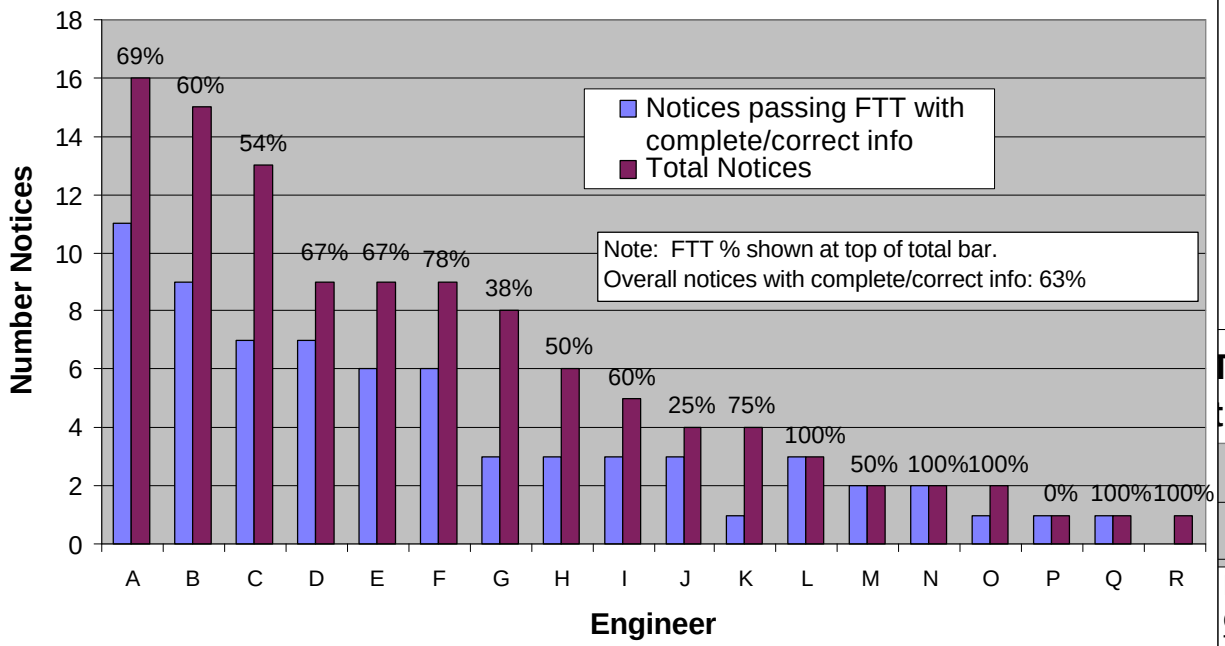
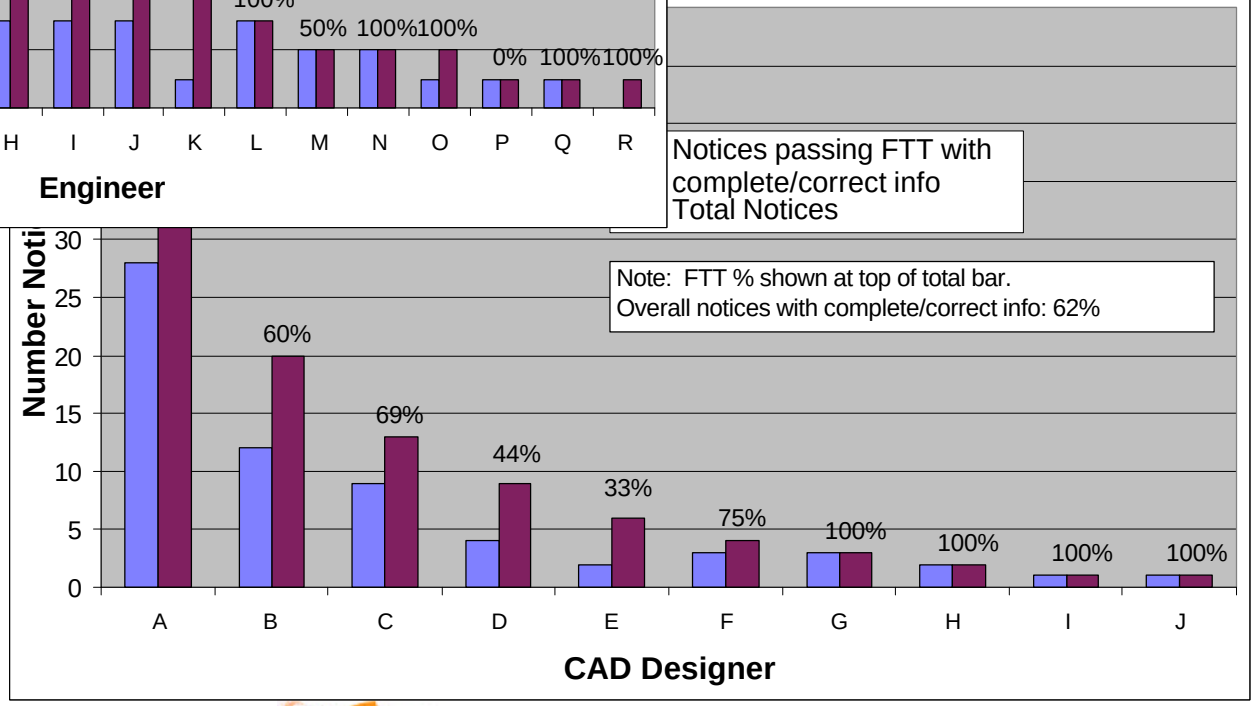
Alternator: Notice FTT by Engineer through Sept 2000



T by CAD Designer through : 2000



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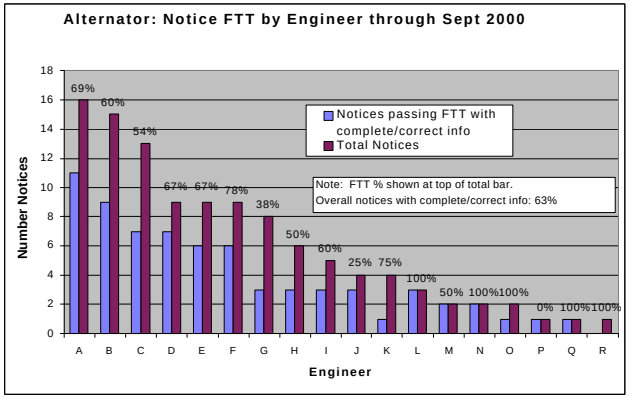
Analysis Conclusions

- No engineer that completed more than 4 notices had over 78% FTT
  (less than 4 notices was considered noise)
- No CAD designer that completed more than 4 notices had FTT over 69%



- All EC SBU product areas had similar FTT results
- No statistical correlation between Designers and Engineers
- This was a systematic issue, not certain individuals or certain functions.
- Although everyone attempted to do their job well, the FTT of engineering notices was still unacceptable.

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ELECTRICAL CONVERSION DESIGN TRACKING SHEET

NOTICE/ALERT NUMBER _____ LOG NUMBER _____

☐ ADVANCE NOTICE ACTION _____ DATE REQUIRED _____

☐ PRE-REVIEW COMPLETE ☐ No Marked Print ☐ No Material App. ☐ Missing Affected Parts

ENGINEER _____ DATE RECEIVED _____

DESIGNER _____ EST COMP DATE _____ DATE ASSIGNED _____

DESIGN ANALYST _____ DATE COMPLETED _____

PACKAGE HISTORY

DATE	EVENT	INTL	FTT

CUSTOMER SATISFACTION DATA

HOW WOULD YOU RATE YOUR OVERALL SERVICE EXPERIENCE?(Consider timing, accuracy and professionalism)

LOWEST [1] [2] [3] [4] [5] HIGHEST

DID THE COMPLETED DOCUMENT(S) FULLY MEET THE ENGINEERING NOTICE REQUIREMENTS?

[YES] [NO]

COMMENTS: _____

DESIGN HISTORY

1st TIME THRU	2nd TIME THRU	3rd TIME THRU

FTT CODES:

1 INCOMPLETE DATA FROM ENGINEER

2 INCORRECT DATA FROM ENGINEER

3 INCORRECT/ INCOMP. FROM DESIGNER

4 OTHER

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ELECTRICAL CONVERSION SBU
DESIGN PROCESS IMPROVEMENTS
OCTOBER 2000

D M A I C

PURPOSE

- There are opportunities to make the design process more efficient (please review both pages).
- This document describes initiatives that the Electrical Conversion SBU is implementing.

NOTICE PRE-REVIEW

- No notice will be released to the CAD design department until it is reviewed by the engineer who wrote the notice, a representative from CAD (primary, design analyst or designer), and the program timing coordinator.
- Engineers must meet with this group of people prior to work starting in the CAD department.
- The purpose of this is to insure the notice can be completed when required for the customer. For example, if it is detected early that a material change approval has not been obtained it can be obtained immediately, not held up at the end of the process after drawings are complete.

FEEDBACK TO CAD DESIGN SERVICES

- Every alert or notice is assigned a log number and tracked to completion.
- An improved tracking cover sheet has been implemented that will record engineering satisfaction with the execution of the notice/alert and any comments from engineering.
- Please encourage your teams to input into the design process, as these comments will also be used as a tool in the annual performance reviews.
- Fifteen to 25% of a CAD designer's performance review now depends directly upon engineering feedback.
- The purpose of this is to reward and reinforce positive support to engineering team.

SIGN-OFF MUST BE IN NOTICE IF REQUIRED

- The release process is moving to electronic process with no manual prints to sign. This will allow electronic prints to be in DocMan within hours instead of an average of 6.3 days.
- Within 48 hours of completion will be released automatically unless drawing is a sheet 1 drawing or engineering manager requests otherwise. Signatures should instead be on marked-up prints.

Customer Requirement Date

In order to satisfy Visteon's customers, deliverables must be completed in a timely manner with highest quality at the most efficient cost in our design process. Realistic dates are required to schedule work through the CAD department. If everything is considered a priority then CAD works overtime or must contract extra support at a higher expense. If some jobs are less critical than others, CAD is able to schedule the work more effectively, with a level schedule.

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Salaried Personnel Performance Review

INSTRUCTIONS: Refer to Salaried Perso
Supervisor's Manual,
Performance Review Section.

NAME	SOCIAL SECURITY - -	FORD SERVICE DATE	TIME ON PRESENT POSITION->	YEARS	MONTHS

STAFF/DIVISION/PLANT	DEPARTMENT	ORGANIZATION CODE NUMBER
Visteon/Energy Conversion	CAD (D485)	PH3010EE

CLASSIFICATION TITLE	SALARY GRADE	WORK PLAN DATE	INTERIM REVIEW DATE	ANNUAL REVIEW DATE
Designer				

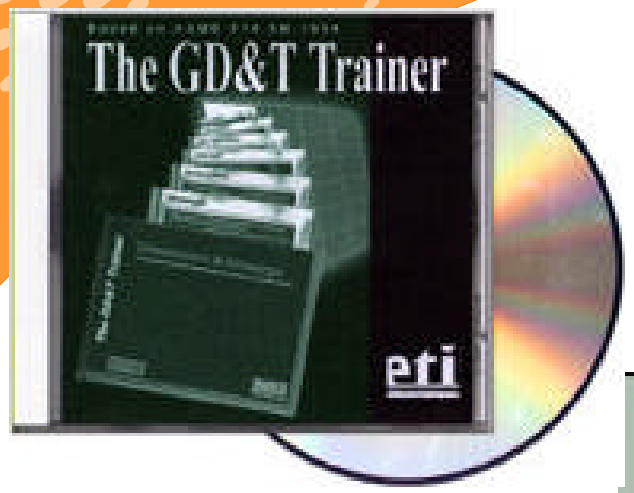
ACCOMPLISHMENT OF POSITION TASKS AND PROJECTS

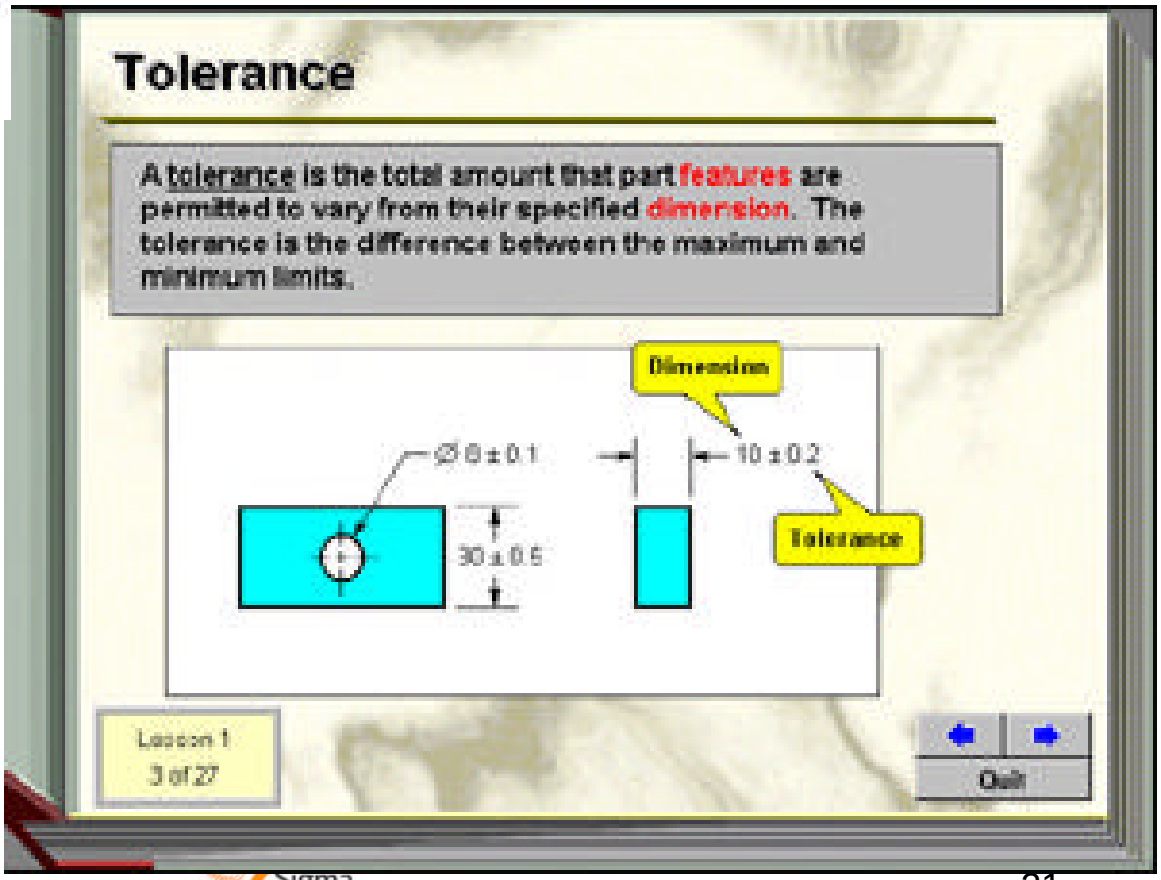
LIST MAJOR TASKS AND PROJECTS IN PRIORITY ORDER, DOCUMENT EVALUATIONS BY PROVIDING COMMENTS ON PERFORMANCE WHICH BRIEFLY DESCRIBE THE ACCOMPLISHMENT AND JUSTIFY THE LEVEL OF EVALUATION. IF MORE SPACE IS NEEDED TO LIST TASKS AND PROJECTS OR WRITE COMMENTS, ATTACH ADDITIONAL SHEETS OF PAPER.

TASKS AND PROJECTS	LEVEL OF PERFORMANCE	COMMENTS ON PERFORMANCE
This list should not be considered a complete description of all employee tasks and projects.	Indicate only one rating for each task and project: O, EP, E, SP, S, SM, U.	Should consist of a statement indicating results achieved; also may consist of comments indicating the employee's proficiency on job-related skills.
Design of Electrical Conversion Systems and Components: (25%) *Input supplied by the Primary Designer*		
Quality of Work: (15-25%) *Input supplied by the Design Analyst*		
Assistance to other Designers (Knowledge Sharing and Leadership): (15%) *Input supplied by peers*		
Customer Focus: (15-25%) *Input supplied by Engineering and External Customers*		
Training: (10%) One Technical Class taken in 2000 Registered for one Personal Skills Class GD&T Skills refresher completed by 12-10-00		
Department Goals: Notices, FTT for Department: 80% Notices, Dock to Dock for Department: 400 Hrs. Overtime for Department: 12%		
Individual Reference Information: Number of Notices: Number of Alerts: Number of Drawings: Programs worked on: Number of Patents applied for:		

OTHER CONTRIBUTIONS

List contributions made by the employee in addition to those described in the Accomplishment of Position Task and Projects Section. If more space is needed, attach additional sheets of paper.





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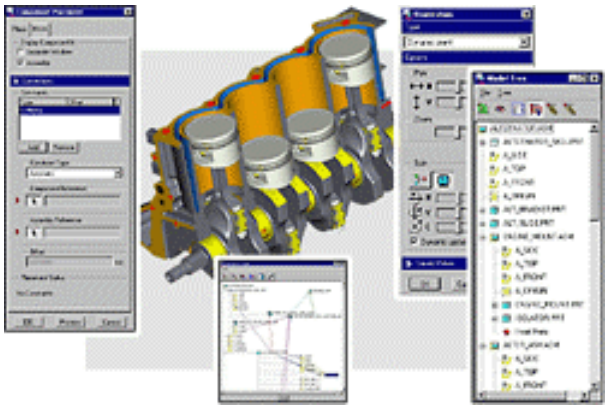
ProEngineer Tool of Choice on EC Products



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Paper Documents

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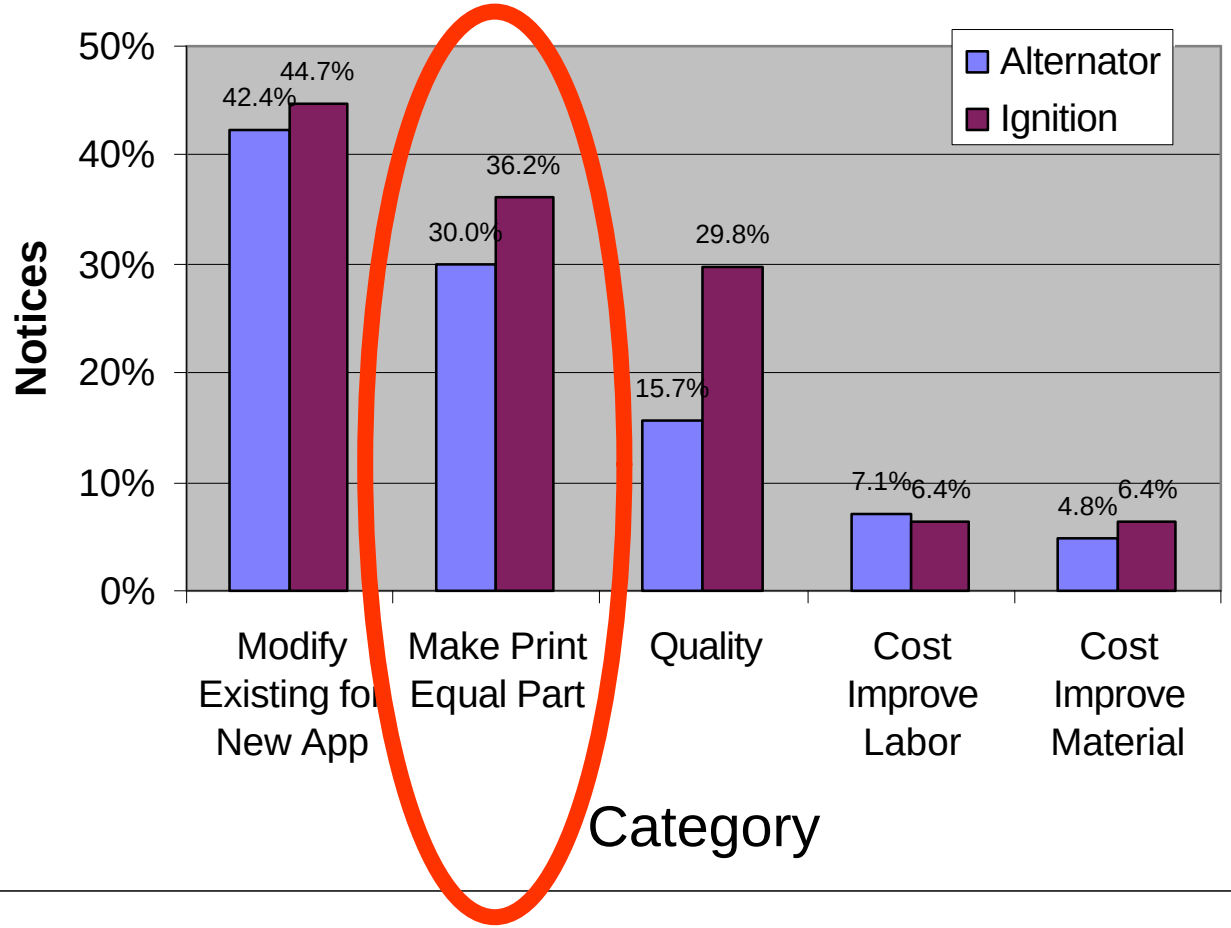
Year 2000 Notices Categorized



Print reviews initiated on developing designs prior to production (e.g. ISA)

Data from January through mid-September 2000.

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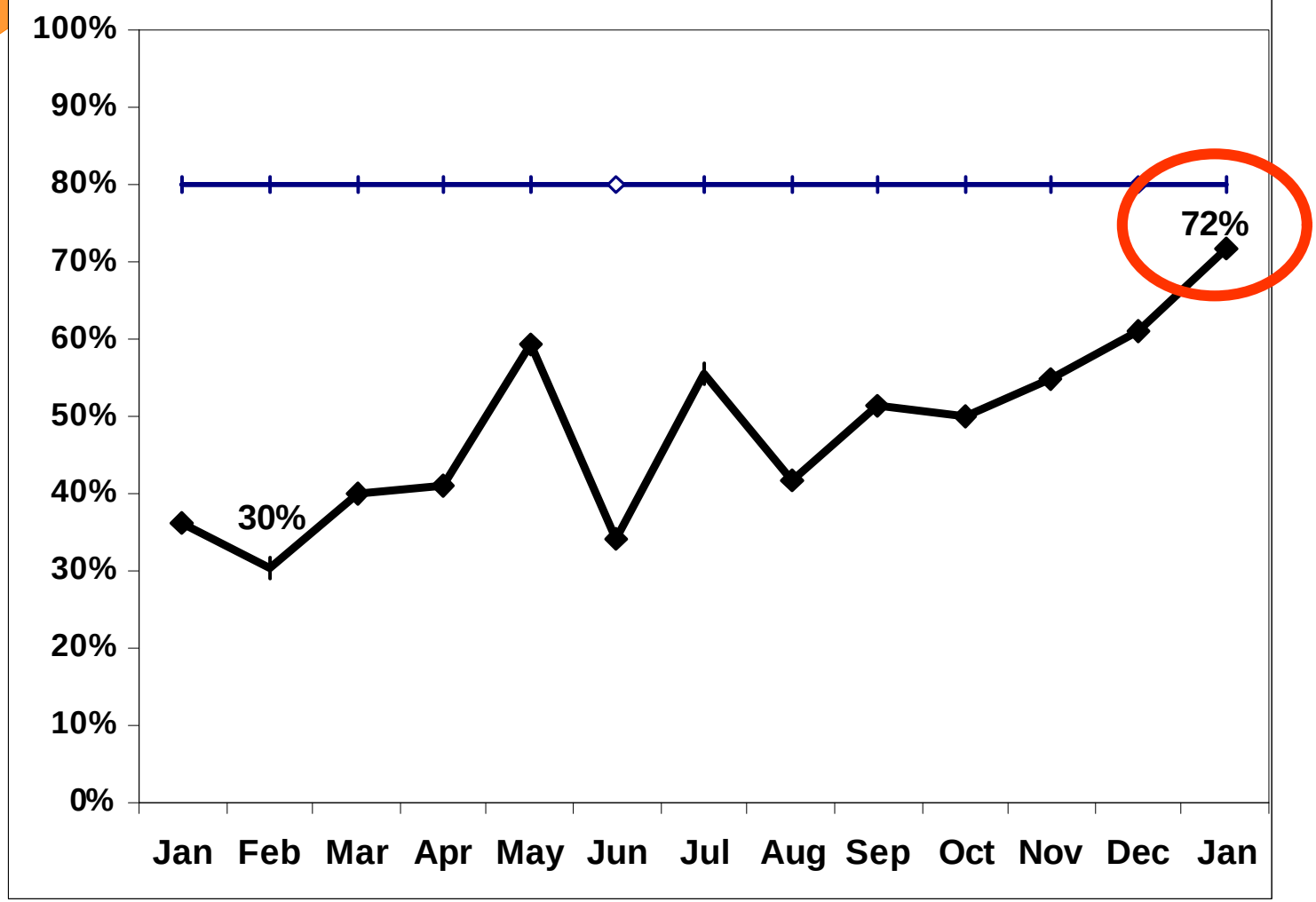
SBU Design First-Time-Through



Note: Data from year 2000 and Jan 2001

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Closure Date:
February 20,2001

Visteon

SIX SIGMA PROJECT CLOSURE FORM

Project Title: Engineering Change Notices: First Time Through

This project is: (circle one) **Transactional** Operational Design

Statement of the Problem: (include evidence or objective data of the problem)
Engineering change notice productivity is low, with frequent rework. The purpose of this project is to determine and eliminate waste in the flow of an engineering design change initiating from the reason for the change through to its completion in the Electrical Conversion Strategic Business Unit (EC SBU).

Focus for this Project: (define project level response variable Y & inputs X from Y / X diagram, limit scope to 4 months)
- Apply operational measurements to determine and improve effectiveness and efficiency.
- Reduce inefficiencies in process using Lean and Six Sigma principles.

Results of this Project: (customer satisfaction, cycle time, efficiency, cost, note target of 70% improvement and $250k, etc)
- Three CAD designer heads were eliminated, approximately $240,000 savings annually.
- One CAD designer was replaced with two less expensive agency co-op students.
- Productivity increase allowing more resources to focus on advanced work (EPAS, ISA).
- Potential multiplication of savings if replicated by other CAD Design areas.

Sigma Improvement: (previous sigma capability compared to closing sigma level)
- First Time Through in Early 2000: 30% (corresponds to .38 sigma)
- First Time Through in January 2001: 72% (corresponds to 1.10 sigma)
- Sigma Improvement: 0.72
- 240% improvement in First Time Through.

Investment Required to Obtain Improvement:
None.

Recommendations:
CONTINUE LEAN CONCEPTS AND "FUNNEL" THIS BACK TO BE REPLICATED IN OTHER AREAS!
NOTE: JAN-JULY AVERAGE MONTHLY OT WAS 977 HRS/MONTH. NOV-DEC AVERAGE WAS 697.5 HRS/MO.
THIS EQUATES TO ~$85,000 ANNUAL SAVINGS IN ADDITION TO HEADCOUNT REDUCTION(S)

Project Leaders

Six Sigma Black Belt: Jonathan R. Hobgood
Deployment Director: Todd A. Gross
Project Champion: Gary D. Clark
Process Owner: n/a

Closure Approval Signatures

Six Sigma Black Belt — Date: 2/21/01
Project Champion — Date: 2/20/01
Deployment Director — Date: 2/20/01
Process Owner: N/A — Date:

Project Champion: Gary D. Clark — System / Division: ETS

Send a copy of this form to the System Six Sigma Deployment Director.

Jon Hobgood / revised: Feb 19, 2001

Revision: Jan 2001

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Results: Improved Information Flow

"There has been a huge increase in marked prints, and I believe the communication between Designers and Engineers is better.

We still need to improve on our WERS info from a standpoint of Designers (including myself) and Engineers. Once we have cleared this hurdle, Notices will flow a lot easier."

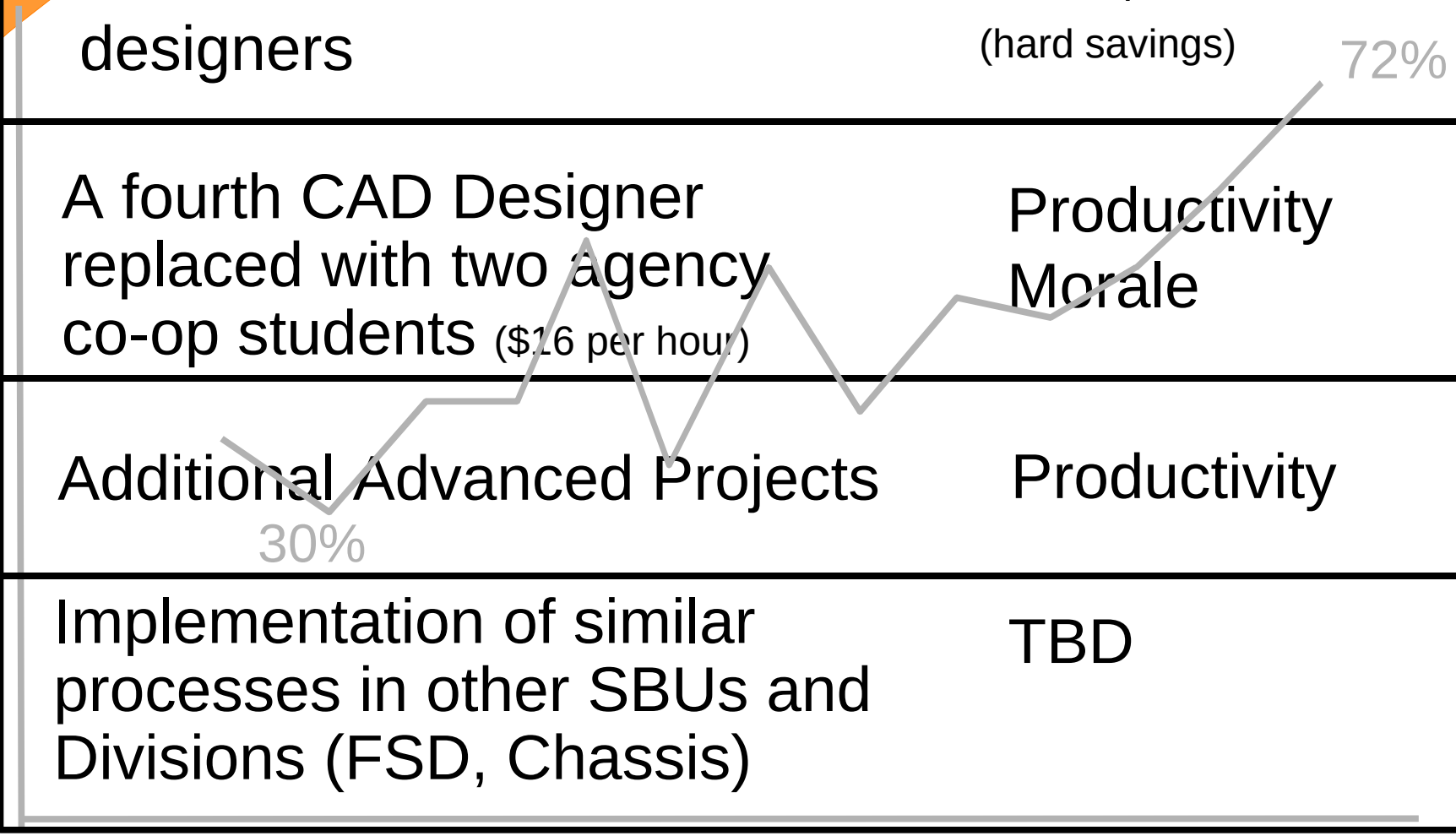
-Sherman Allen, Washer-Wiper-ISA Primary Designer
February 2001

Jon Hobgood jhobgood@visteon.com
Visteon Corporation

Results: Financial

D M A I C

Three less CAD designers	$240,000 (hard savings)
A fourth CAD Designer replaced with two agency co-op students ($16 per hour)	Productivity Morale
Additional Advanced Projects	Productivity
Implementation of similar processes in other SBUs and Divisions (FSD, Chassis)	TBD



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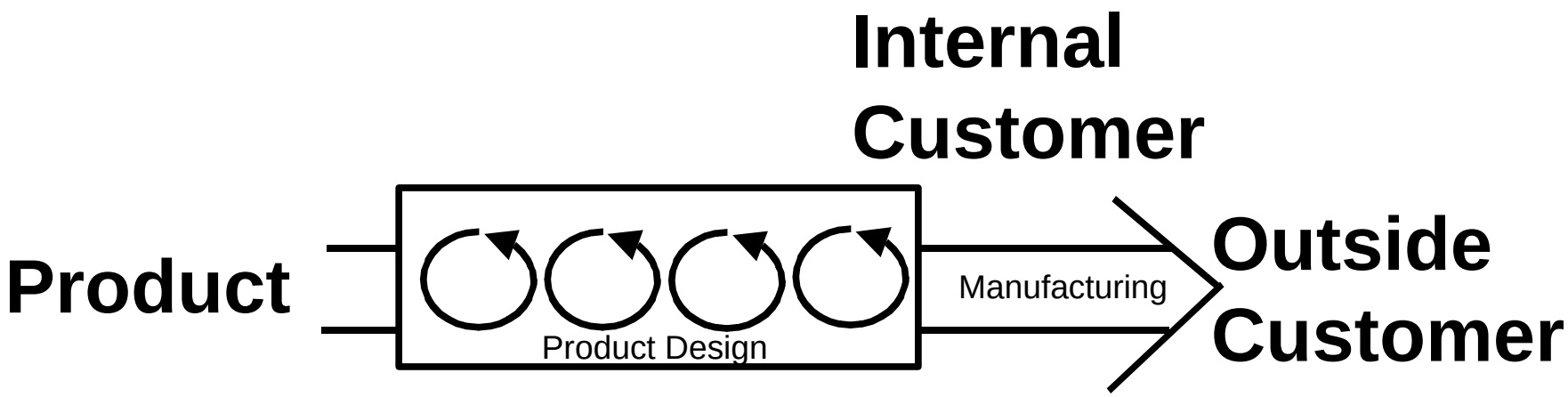
Results: Customer Satisfaction



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D M A I C

Actual Spending

Q1 2000	$862,671
Q1 2001	$746,393
	$116,278 Quarterly Savings

Spending on PD CAD for the following product areas:
Alternator/Starter/Ignition/Wiper/EPAS/Hybrid Motors

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D M A I C

Replicating this Method Across Visteon Divisions

- Implement a log to track vital statistics on all engineering changes.
- Implement a common tracking sheet that travels with each job to record all issues - any missing information or other obstacles to complete the job.
- Implement some way of measuring performance, whether it is tracking First Time Through, number of jobs that have required information, or number of jobs completed by required date.
- Require Product Engineering, CAD Designers, and Release Analysts to review the engineering change prior to directing CAD to make the change.
- Meet with individual engineering sections to insure they understand the new procedures and measurement system.
- Incorporate goals on Designers', Engineers', and Release Analyst' performance reviews to meet a specified department objective for the measurable you've chosen.
- GDT Lesson plan that was used: http://etinews.com/compsoft.htm#gdttrainer

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Proposed Visteon-wide Implementation

Action		Date
Review with John Kill, Product Development (PD) Vice President		April 30, 2001
Champion identified in each PD Division		May 11, 2001
Implementer for each champion identified in each PD Division *		May 14, 2001
Assessment and Implementation Complete (2 months in duration)		July 15, 2001
Savings Realized from extended project		September 1, 2001

*Note: Could be Blackbelt or Process Owner (e.g. Kris Born in Chassis).

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D M A I C

Lessons Learned on a Transactional Project

- **M** Often requires initiation of a measurement system
- **A** Analysis does not use statistics tools as extensively as manufacturing projects
- **I** Lots of opportunity in our transactional processes!
- **C** Not always easy to calculate benefit

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List of Jon's Next Projects

- Visteon-wide Prototype Process
- Visteon-wide Technical Design Reviews
- Visteon-wide FMEA process

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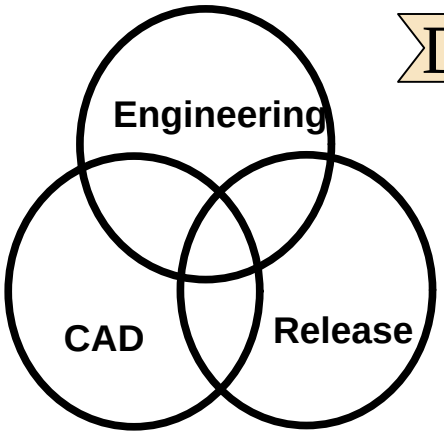
Other Possible Projects



D M A I C

- Roles and responsibilities
- Scheduling/prioritization Methods (whiteboard, software, etc.)
- Design Guidelines and Design Reviews, Bookshelf of designs
- Modify tolerances in one effort to eliminate wasteful “Make Print Match Part” engineering changes.
- Step-by-step instructions on how to create a notice. Checklist? Manufacturing Involvement? (release team is taking on this task, starting with an internal survey)
- Opportunity with suppliers not meeting print
- New product design stack-up and intent reviews (ISA) -> guide
- Co-location of CAD designers with engineering in select areas (in process with wiper and ignition product teams)

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For more information, please see:

http://hub.visteon.com/ets/energy_mgmt_sbu/ftt

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Following Slides are for Reference Only!

(not part of 15 minute presentation)

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Experiment in Prioritizing CAD Design Services

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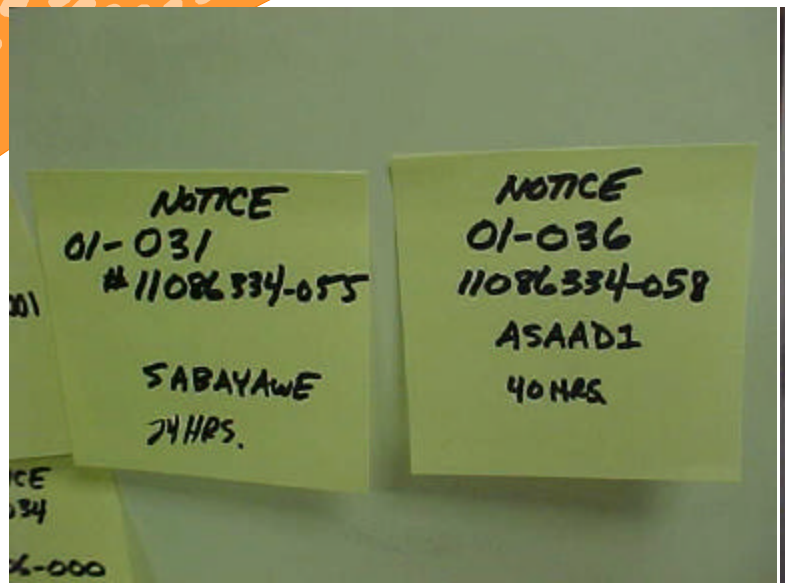
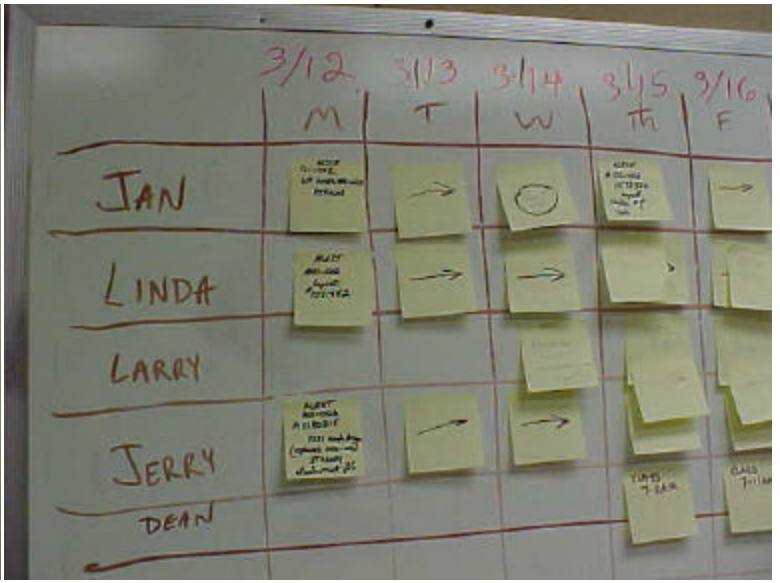
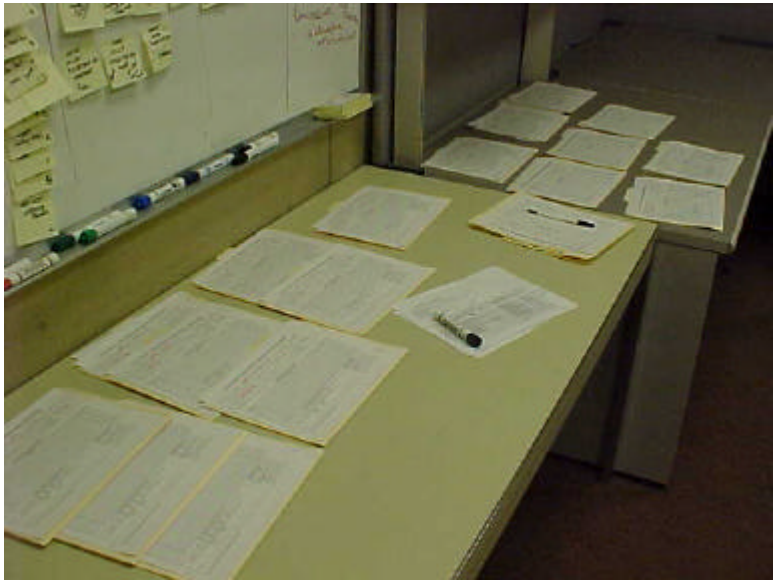
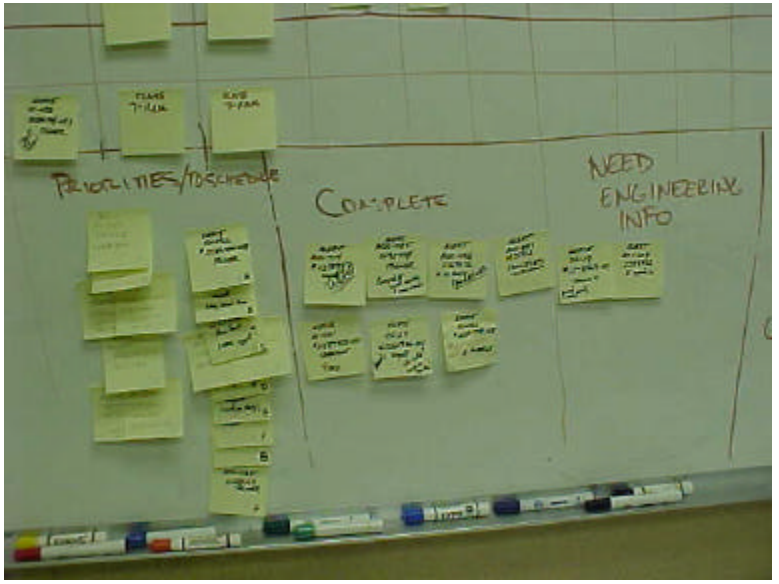
Experiment in Prioritizing CAD Design Services









Improve Engineering Change Notice Processing

Purpose

Many engineering change notices are not completed in a timely manner. Many must be "reworked" in CAD Design area because initial information was not accurate or completed. The purpose of this project is to determine and eliminate waste in the flow of a design change initiating from the reason for the change through to its completion in the Electrical Conversion Strategic Business Unit (EC SBU).

Method

•Apply operational measurements to determine and improve effectiveness and efficiency.
•Reduce inefficiencies in process using Lean and Six Sigma principles.

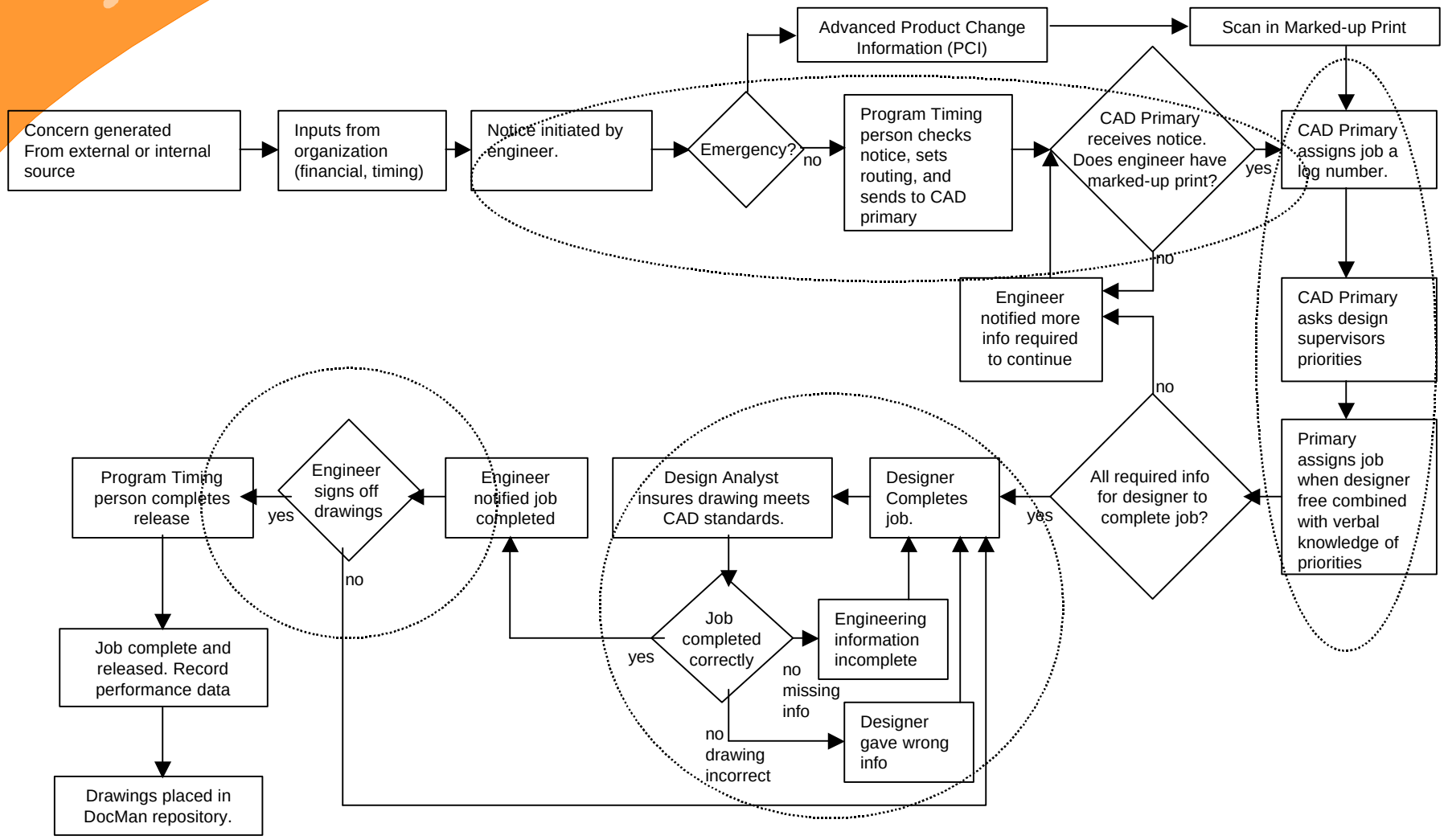
Project Objective

Efficiencies in design change process. Doing more with less engineers and less CAD designers. First Time Through over 80% resulting in decrease of two CAD designers for 2001 (~$160k) with an increased workload. This does not include intangible savings of lost time spent on "rework" in the design area that could be spent on new, value-add, profit-increasing business.
Over 80% FTT will bring the process from below 1 sigma to over 2.5 sigma capable.

Issues

•How can we effectively measure effectiveness in this design process?
•Culture change – design process hasn't been measured before. Many engineers and CAD designers feel that "every design is different" and common measurements cannot be applied.
•Are the design engineers and CAD designers working on the right things?
•Insure that scope does not creep on this project to delay implementation/benefits.

Current State Roadmap of Design Change Process 8/00



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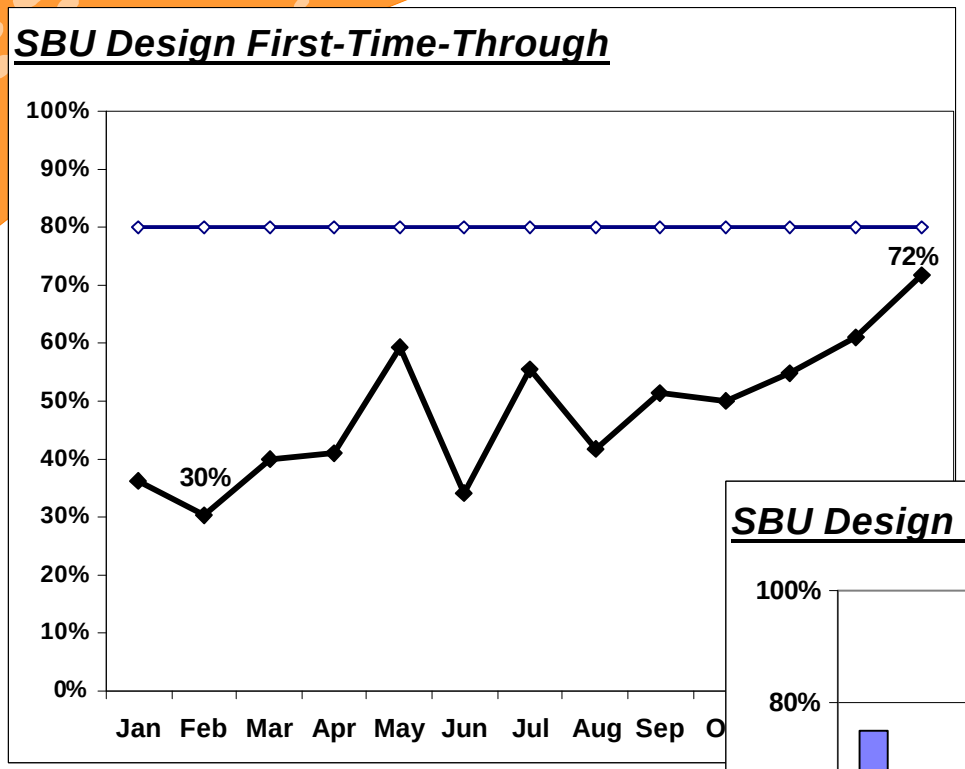
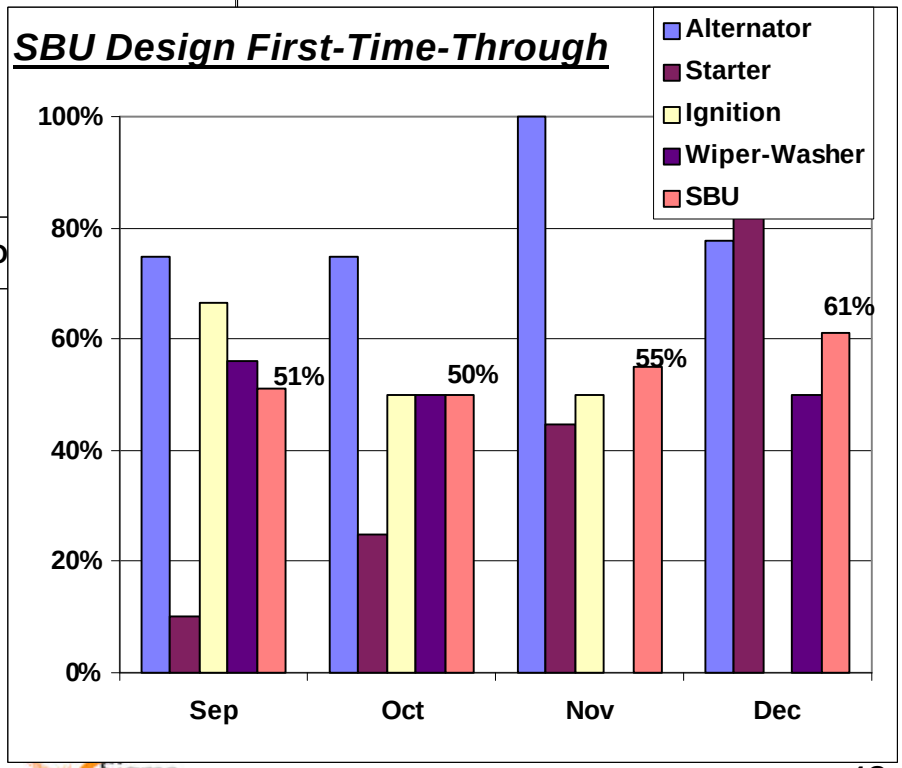


Note: Data from year 2000 and Jan 2001.



Note: FTT calculated for total number notices in SBU that month (not averaging product areas together, since areas have different numbers of engineering change notices).

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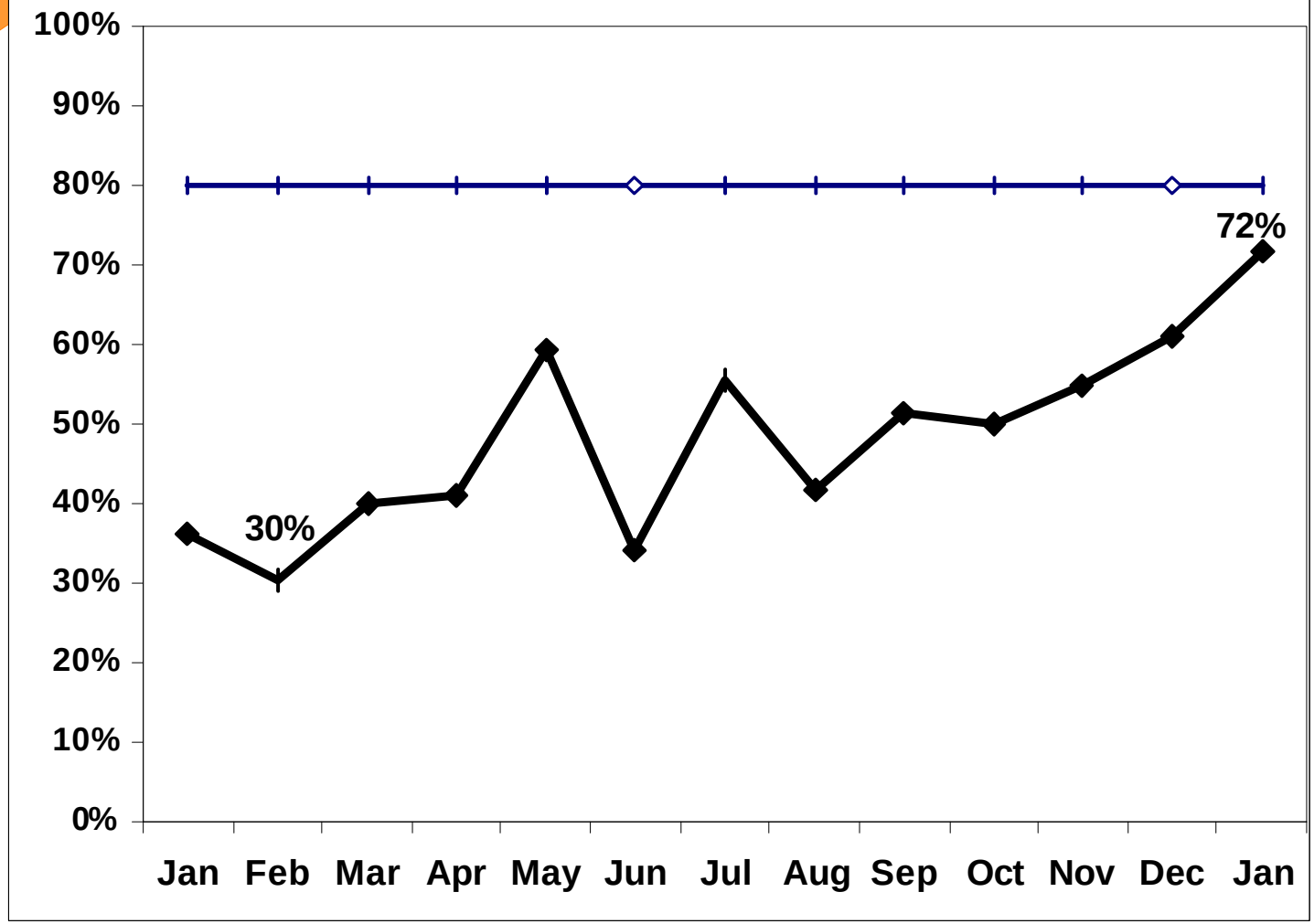
SBU Design First-Time-Through



Note: Data from year 2000 and Jan 2001

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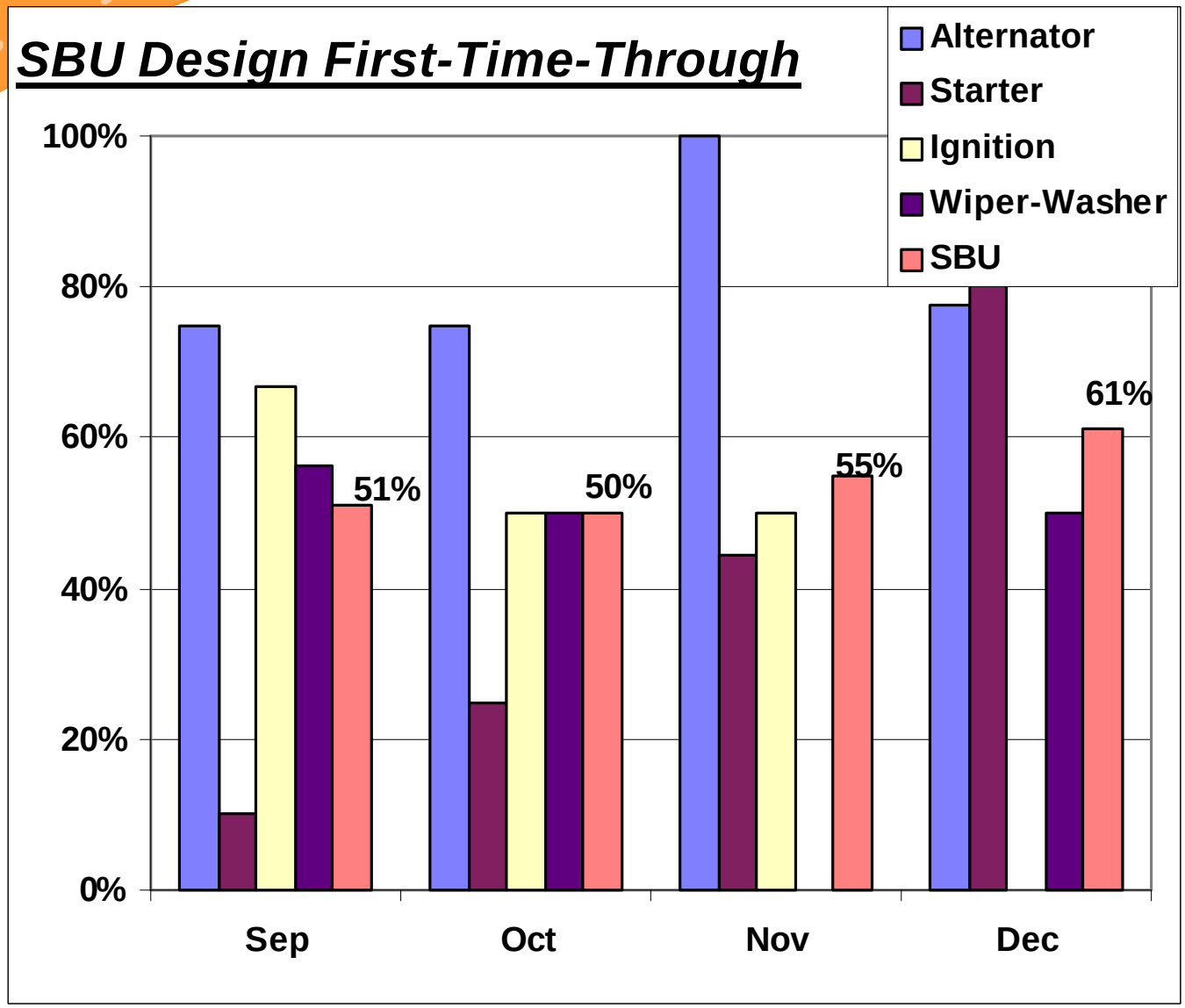

Note: Data from year 2000.

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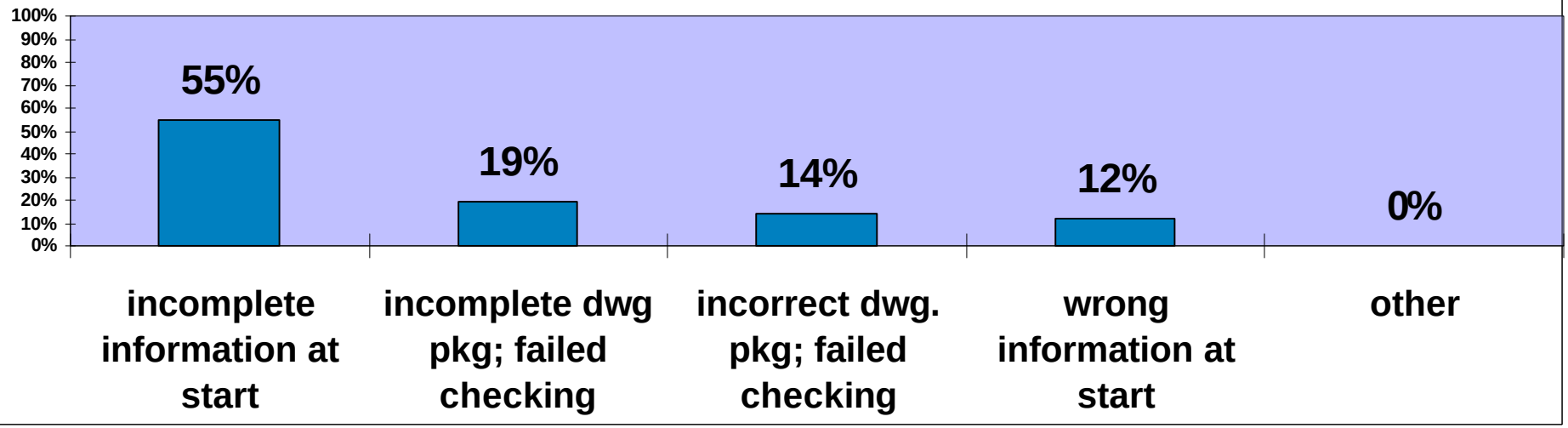
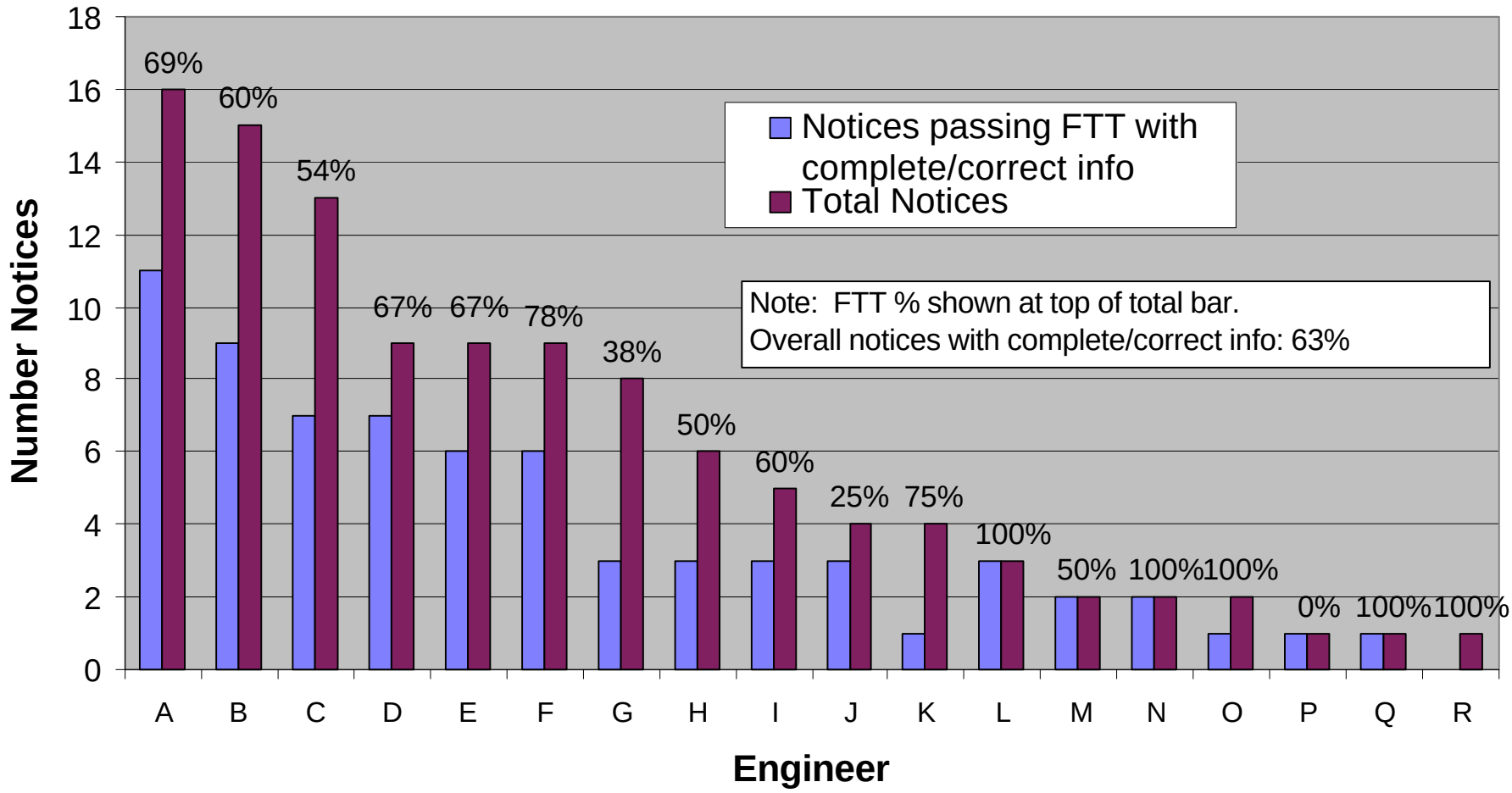
EC SBU First-Time-Through Pareto Oct. 2000



Alternator: Notice FTT by Engineer through Sept 2000



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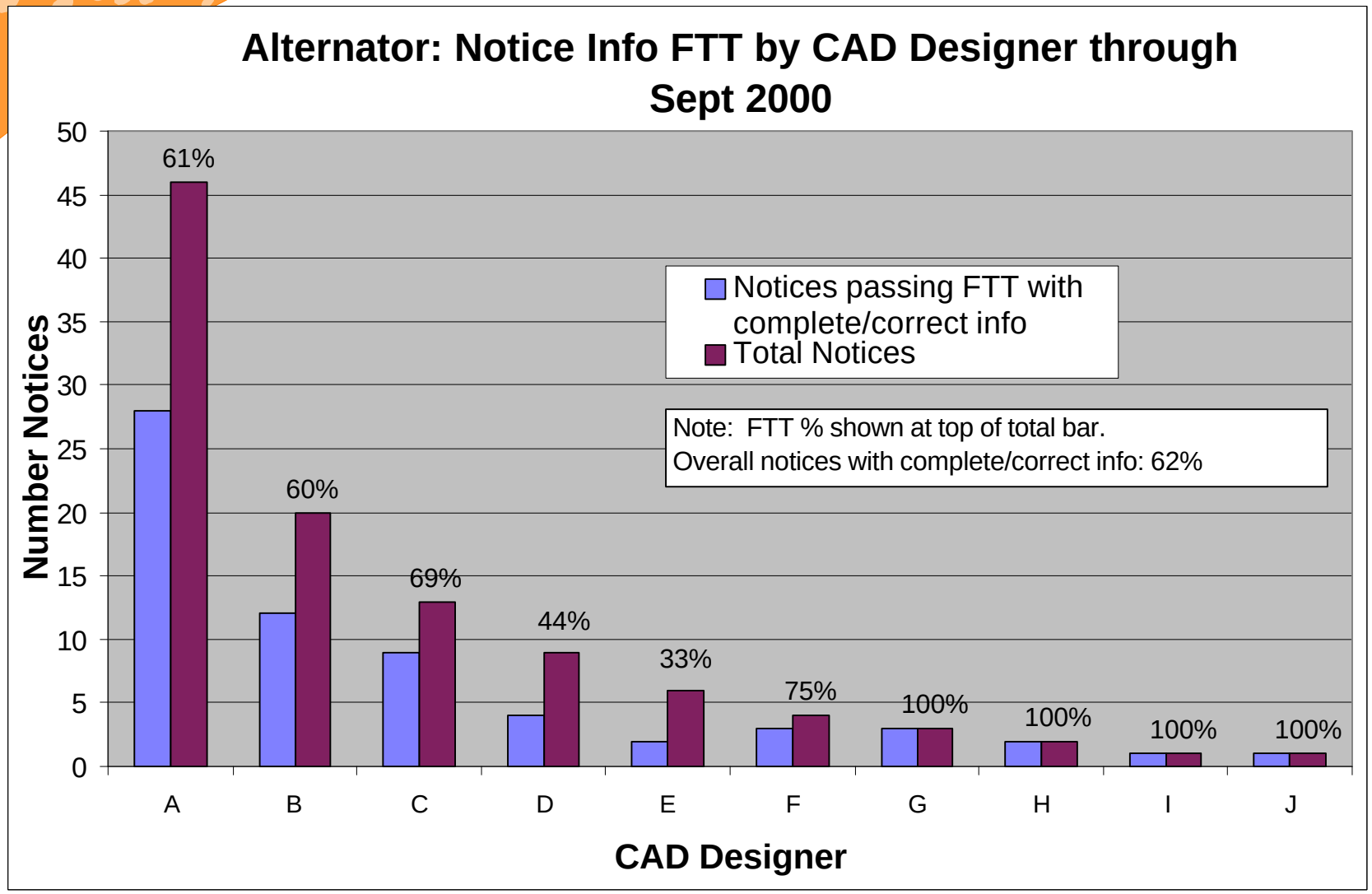

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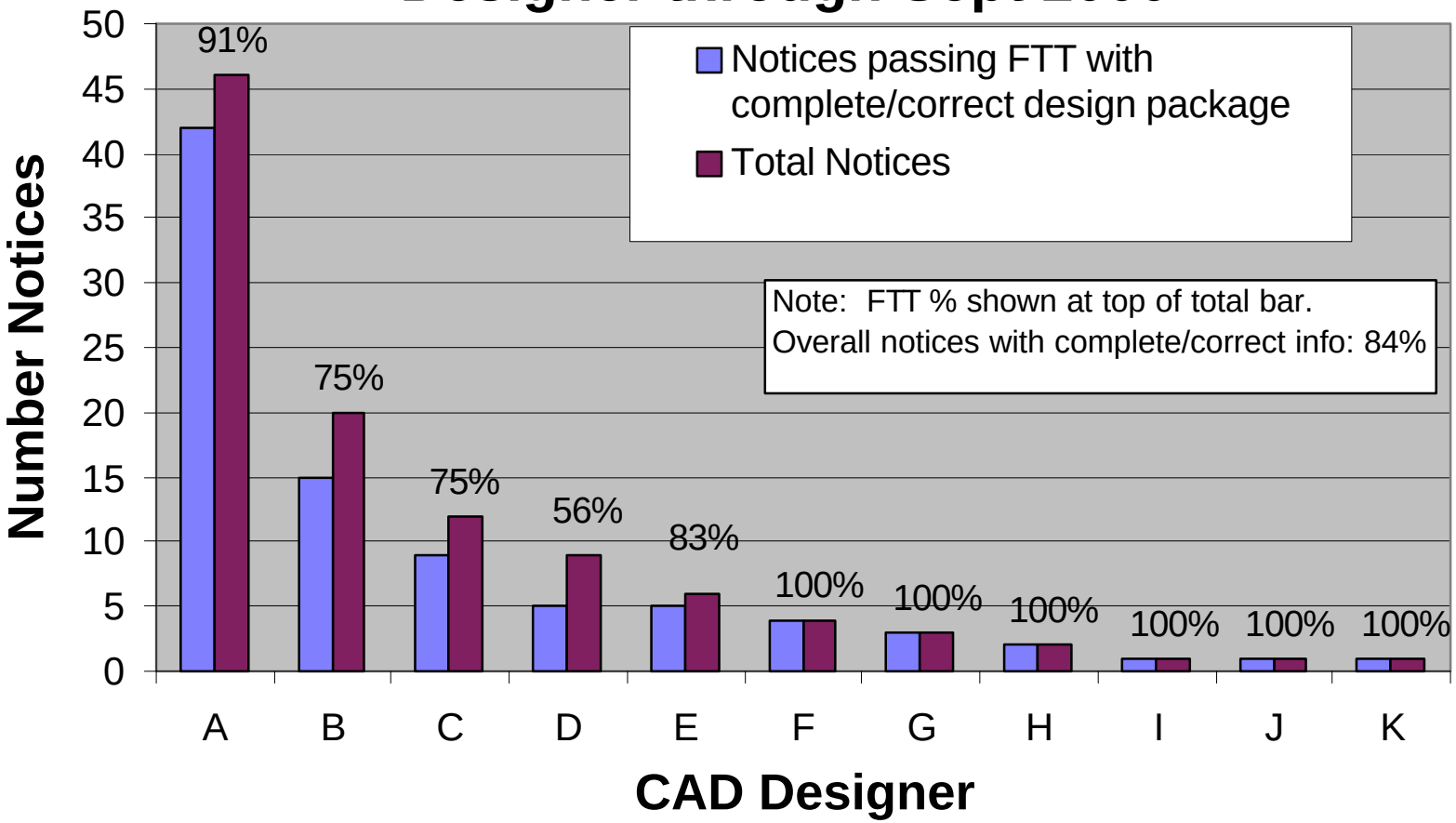
Alternator: Design Package FTT by CAD Designer through Sept 2000



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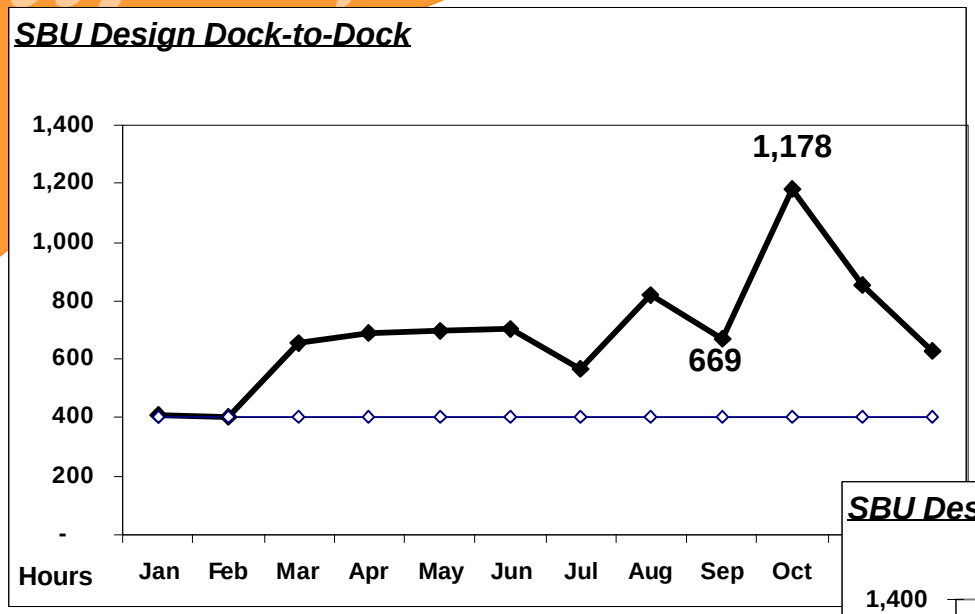

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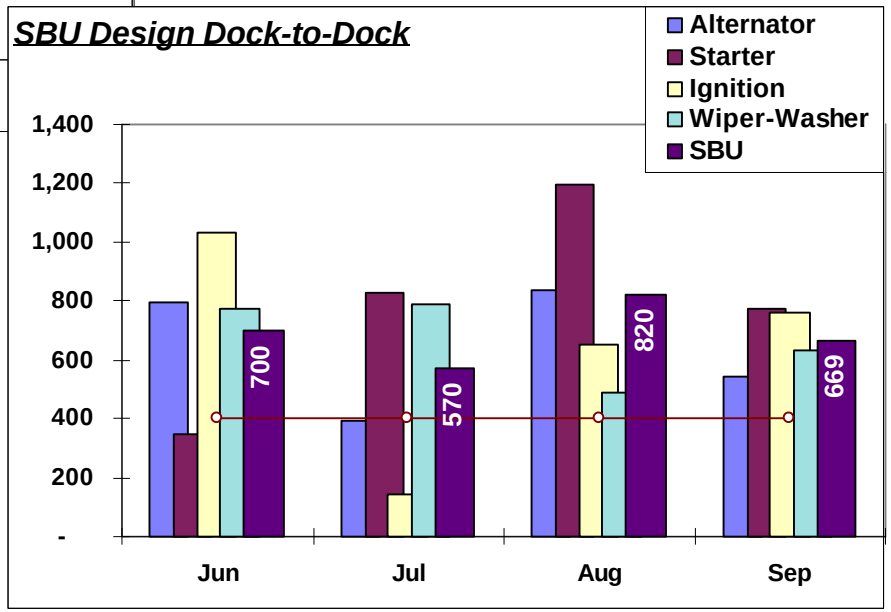

Note: DTD was determined to not be the most effective measure of efficient design change implementation. A better measure would not the time a notice is open, but the time the notice is required to be completed and the percent completed on time (or days late to requirement, etc.).

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Results: Improved Process

- Common template to track all jobs
- Counseling if design more than twice to analyst
- GDT course completion required for all designers
- Notice Pre-review engineer, primary designer, and release analyst (ongoing reinforcement)
- ProE tool for efficiency and IDEAS envelopes (proprietary)
- Electronic Release implemented (no paper – models released directly into archive).
- Low-level design changes contracted to India
- Objectives formally defined and related to process.
- New product design stack-up/intent reviews (ISA) -> guide

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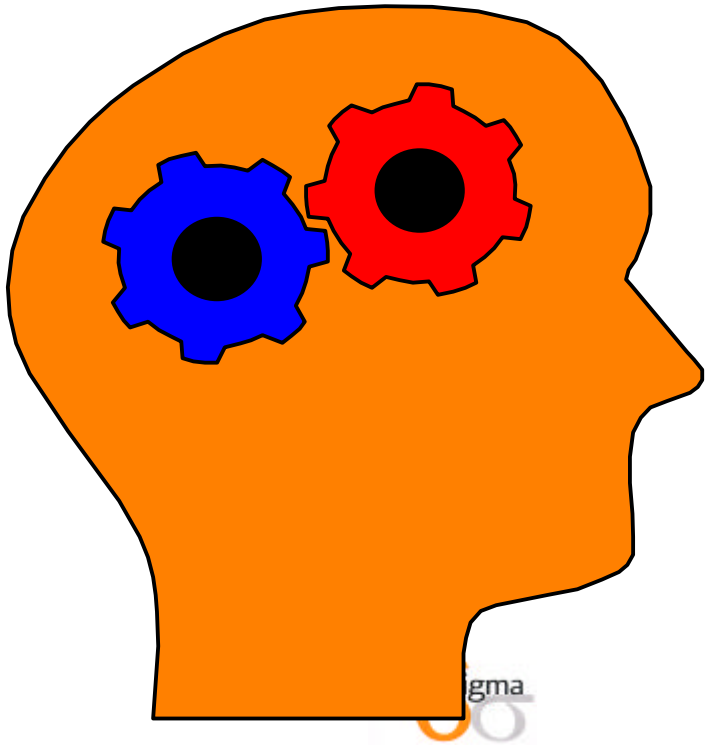
Six Sigma
A mindset that lets us see different values, and use statistics differently.



Remember when defects were measured as % instead of ppm?

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