Strasbaugh Nonconforming Report Optimization

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by

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Executive Summary

This paper strives to convey the problems and proposed solutions for Strasbaugh's Nonconforming Report (NCR) Optimization. Strasbaugh is a world leader in silicon wafer polisher and grinder technologies. After a significant down size to the company parts they used to manufacture now have to be purchased, and many of these incoming parts do not conform to Strasbaugh's high standards. This has led to an increase in NCRs that need to be processed, which takes up time, resources and money.

The objective therefore became to update the multi-sheet carbon copy paper system to better optimize the use of these reports and get to the root cause of the issue. This was done using Microsoft Access (per clients request) as a low cost solution with a quick implementation period. Higher cost web-based server solutions were also proposed for future use. The design of the database is simple, sleek and user friendly. The main menu gives options to view the percentage breakdown report, search for potential trends in NCR's, export NCR entries to an excel file, as well as track trends to find faulty suppliers or other major issues.

In addition to the database, three flowcharts were created to document the process for current employee use and aid in training future employees. Lastly, a cost breakdown was done to show Strasbaugh that by using the new procedure they would be able to save money in the long term. Ideally, Strasbaugh would be able to identify root causes by using the database and completely eliminating all NCRs. Realistically, they will be able to reduce somewhere between 25% and 50% of their NCRs. In reducing 25% Strasbaugh would save $11,250 in overtime caused by rework and $1,502.40 in time the Quality Engineer can spend doing someone else or even towards solving the root causes. With a 50% reduction, the savings would double.

As Strasbaugh has more money and resources they can dedicate to improving this process, they can begin using a web-based server. This will allow them to easily send data within the company, input NCRs from multiple locations, and generate more in depth reports for management. With a web-based server, an administrative account could also be created so not all information is accessible and only the administrator will have editing capabilities. The following report will give a detailed analysis of the processes used and the end deliverables to be given to the client.

Acknowledgements

Thank you to our parents for encouraging us to aspire for great things. Thank you to our Professors for giving us the necessary tools to get this far and thank you to Strasbaugh for giving us the opportunity to do our Senior Project with them.

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Introduction

Located in San Luis Obispo, Strasbaugh is a leader in design and manufacturing of advanced surfacing technology for the global Semiconductor, Silicon, Data Storage, MEMS, LED, Telecommunications and Precision Optics industries. Strasbaugh strives to maintain close relationships with manufacturers in the high technology market, and have developed technology standards for polishing and grinding today. While its headquarters is located in California, it has service offices all over the world including Japan, Israel, Germany, and China (Strasbaugh Design).

In the peak of their success, Strasbaugh employed over 500 talented workers to assemble the finals machines and manufacture most of their parts from raw materials. Since the products that Strasbaugh produce are large, detailed, and expensive machines that have a relatively long life cycle and only serve a small niche market, the company has been steadily declining and now is home to less than 50 employees. With fewer employees and resources, Strasbaugh has transitioned from producing necessary parts to purchasing them for suppliers all over the world. These incoming parts must conform to a strict tolerance level due to the delicate nature of the application of the finals machines. A Strasbaugh employee hand examines each and every incoming part to verify these standards are met and if the materials are usable or not.

With this process of ordering parts from third party suppliers, the company has seen a dramatic increase of parts that “do not conform” to the standards they strive to achieve and maintain. For every bad part that runs through this system, an NCR must be filled out for the proper disposition of said part.

NCR’s can also be filled out during production, such as in the case that something goes wrong on the manufacturing floor and the part is no longer up to standard. Additionally, because Strasbaugh has customers all over the US and various parts of the world, if something goes wrong after machines or parts are delivered, NCR’s would be filled out, and it would be noted that the NCR occurred ‘from the field.’

The current NCR process that Strasbaugh uses is completely manual, and relatively outdated. A multi sheet carbon copy paper form (Appendix A) is filled out by hand once a non-conforming part has been identified. It is then decided (upon discretion of the QA inspector) whether or not the product will be scrapped, reworked, used as is, or sent back to the supplier for repair/replacement. With this action in mind, each color-coded sheet is then torn apart and delivered to the correct departments. For example if a part needs to be sent back or scrapped, the purchasing department needs the correct carbon copy sheet to know about the issue and re-order

a new part. The overall process is messy and unorganized, leading to confusion, and the potential of misplacement of paperwork in route.

What this process lacks is proper identification, documentation, evaluation, segregation, and disposition of nonconforming material and for the notification of functions concerned. In order to add these capabilities to Strasbaugh's NCR process a database storage system must be implemented that can track and identify trends, search terms, state where the NCR originated, to ultimately help alleviate the need for NCR's.

Literature Review

The literature review can be broken down into a few main categories: the semiconductor industry, quality management, and the relationship between quality management and suppliers (internal as well as external). Since Strasbaugh is in the semiconductor industry, it begins by going over how semiconductors are made from both a manufacturing perspective and an industrial engineering perspective. Next it discusses the use of a quality management system within a company, specifically non-conformance reports. Lastly, it touches on the importance of how a company's quality management system relates back to its suppliers to maintain the desired level of quality.

Semiconductor Industry

In basic terms, the semiconductor industry is based around producing products that are at the heart of every piece of technology. Due to the diversity of products that use semiconductor chips, the industry is high volume and high variety. These chips are critical components for making electronic devices in application categories including computing/information, consumer electronics, telecommunications, automobiles, and aerospace/defense (TSI). The process of semiconductor manufacturing begins with growing silicon ingots, the raw material for making wafers, followed by a range of activities, including integrated circuit (IC) design, wafer fabrication, IC test, and IC packaging. The end of the process is marked by placing the finished chips on a printed circuit board. As (TSI-2) mentions, the semiconductor manufacturing industry is characterized by long lead times, increasingly short product life cycles, complicated manufacturing processes, and substantial capital investments. Due to the industry being very knowledge-intensive, high-tech, and fiercely competitive, companies that want to survive need to optimally allocate manufacturing resources in order to gain competitive advantages such as speed, cost, flexibility, and quality (TSI).

Semiconductor Manufacturing

Semiconductors can act as insulators and conductors systematically, like a switch, in order to control the flow of current and perform calculations. A pure semiconductor is made primarily of silicon, germanium, and gallium arsenide. Strasbaugh sells silicon wafer grinders and polishers that are used in the first stages of semiconductor manufacturing. Once the silicon is grinded down and polished, a company then begins the doping process where impurities are added to change the conductivity of the material. After the doping process, the material can be used to produce diodes and transistors. A diode is the simplest version of a semiconductor device which allows the current to only flow in one direction. It is composed of only two layers of N and P type doping. On the other hand, a transistor is composed of three layers, in which one can create either a NPN or PNP transistor. A transistor can act as either an amplifier or a switch. A

single silicon chip can hold thousands of transistors. The overall process goes from silicon, to doped silicon, to transistors, to silicon chips, and finally to microprocessors. This information provides a better understanding of the market and industry that Strasbaugh is in.

Build to Order

Due to the cycle time and customization needs of customers, Strasbaugh uses a Build-to-Order workplace where machines are only made as needed and are customizable for a customers demands. An article in Assembly Magazine expresses some of the advantages to this type of manufacturing, "[...] differentiates a company from competition, because customers can choose what they want (within limits)" as well as "[...]eliminates finished goods inventory. Finished orders ship directly to the customer usually upon completion" and "[...]makes it easier to plan and forecast material requirements" (Weber, 2006). With the products that Strasbaugh manufactures being shipped across the globe, a build-to-order manufacturing plan is ideal for the specifications based on country. For each country, the plug/outlet structure is different, required wattage levels vary, and wafer testing requirements and standards may be altered. Instead of having large quantities of the final machines on stock and ready to be shipped out, having common sub assemblies ready to be picked and assembled saves the company space and ultimately money. The book "Introduction to Materials Management" discusses this concept with an example about car colors "Suppose there are 10 tints and a final color is made by mixing any three of them with the base. There are 720 possible colors (10x9x8 = 720). Forecasting and planning production for 720 items is a difficult task. It is much easier if the production is planned at the level of the base color and the 10 tints. There are only 10 items with which to deal: the base color and each of the 10 tints. Once a customer's order is received, the base color and the required tints can be combined (assembled) according to the order" (Arnold, 2012). The real life application of this example is all the on hand common assemblies and parts that Strasbaugh stores, then gathers and assembles after an order has been received.

Quality and Non-Conformance Reports

Because items at Strasbaugh are Build-to-Order, many bigger items are not kept on hand in mass quantities. While nuts and bolts are easily stored, the big machines parts take up room that the company does not necessarily have. Since these large parts are typically used soon after Strasbaugh receives them, it is important the quality of these parts meets Strasbaugh's standards. If a part is not up to code or within the specified tolerances determined by the company, a Nonconforming Report or NCR is filed. This is a lengthy process involving multi-sheet carbon copy paper that are all to be routed to different departments. The head Manufacturing Engineer then manually inputs the information from this document into an Excel spreadsheet, which is difficult to organize and see trends. According to an article Design News, the Fort Worth division of Lockheed Martin had similar issues and is now using an automated control system for

the documentation of the nonconforming materials. “In the past, documenting non-conformances involved a lengthy, time-consuming manual procedure that starts with a five-copy Quality Assurance Report (QAR) form. Once a non-conformance is identified by a quality assurance inspector, a QAR is initiated. Completing the entire process took from 20 to 30 days” (Non-Conforming Material-Control Process Automated). The article then goes on to discuss how the automated system cuts up to 10 days off the cycle, eliminated the five ply papers and requires less personnel to work on the issue.

Importance of an Accurate and Efficient NCR Process

By creating an in depth database system to organize the NCR information, trends in suppliers, order dates and other categories can be monitored to potentially reduce the number of nonconforming parts that come through the doors at Strasbaugh. Supplychain-Mechanic.com describes the issue of getting nonconfoming parts from a supplier by saying “Poor performing suppliers can wreak havoc in a business from halting assembly lines through to impacting customer satisfaction with common challenges such as poor delivery schedule adherence, poor quality” (Dealing with Poor Performing Suppliers). The ability to quickly identify any poor performing suppliers, and communicate a plan to obtain better and conforming parts can be critical in the overall completion time for a part at Strasbaugh.

Transition from Paper to Computer Systems

Douglas Aircraft Company, originally a part of the Mcdonnell Douglas Corporation, made a transition from a paper nonconformance report to one that was stored on a computer system (Coleman, 1989). While the article may seem dated since it was written over 25 years ago, it details out the previously cumbersome paper form process and what benefits they gained from switching to an automated process. While more data will need to be taken at Strasbaugh to see if their capacity warrants using an automated system, this article is still extremely helpful to see how a well-established company recognized the importance of maintaining nonconformance records and exhibited it in both their former and latter processes.

Quality Management Systems

This article goes through and Roth and Miller [57] found quality programs to be a strong predictor of manufacturing strength. It is often found that manufacturing plans with an integrated set of quality management practices will have the best quality performance when compared with plants that focus their efforts on only a few popular quality management practices. Quality must be ingrained into each step of the manufacturing process and each management level. With this strong emphasis on integrated quality management, a company will be able to achieve and maintain competitive advantage.

The proposed framework for quality management and its effect on performance is pictured below.

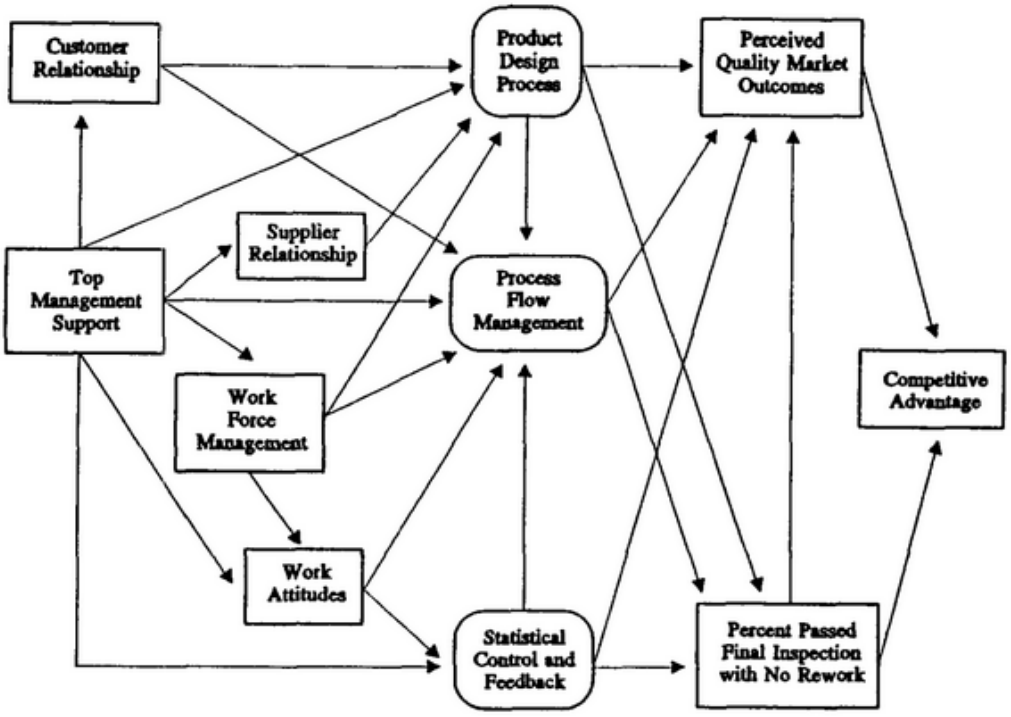

Figure 1: Quality Management Framework

With an effective and efficient process flow, there is often a lack of variance, which usually results in a lack of defective or reworked parts. In addition to this, there is an increased quality control with routine and scheduled equipment maintenance. Lastly, keeping things straightened, sorted, shined, standardized, and sustained will ensure that problems in the process can be identified much more easily.

Key Performance Indicators

Strasbaugh has a limited ability to control the quality of the products they receive from their suppliers. They currently send the supplier a copy of the NCR if they need to repair the part, but no further analysis is actually done to try and avoid nonconforming parts in the future, despite having an official Corrective and Preventative Policy and system. An article written by Queensland Government's Procurement Transformation Division titled "Procurement guidance: Managing and monitoring suppliers' performance" details the importance and method of maintaining communication with suppliers about the quality of their output. Strasbaugh needs to develop the proper Key Performance Indicators (KPIs) so a standard is in place that can be used to see whether or not a supplier is in compliance with their contract (Queesland, 2014). In addition to knowing when a supplier has breached their contract by producing a too many nonconforming parts (or different conditions depending on the details in the contract), it is important for Strasbaugh to have a set procedure for dealing with poor performance from a supplier. Some of the approaches this article lays out are "progress meetings and reviews, agreed problem-solving mechanisms and disputed resolution process, enforcing the terms of the contract, including through legal action, and as a last resort, terminating the contract and seeking damages from the supplier" (Queensland, 2014).

KPI's in the Collaborative Supply Chain

In addition to developing proper Key Performance Indicators, there is a need within the supply chain to collaborate and ensure that each company is on the same page. Today's business arena is much more competitive and must constantly be on their feet as there is an increased volatile demand, decreased customer loyalty, shorter product life cycle, and mass product customization (1). This creates a large need to improve on-time delivery, reduce inventory, and improve throughput. With this in mind, the main way that companies can achieve this is not by working individually and only working with their direct customers and suppliers, but by collaborating further upstream and downstream. As the Journal of Supply Chain Management mentions, "Firms have begun to realized that competition is no longer company to company, but supply chain to supply chain. (2)" Companies are now starting to change over to the mindset of not just a single company but a member in the whole supply chain. With this in mind, Strasbaugh needs to work with their supply chain to have similar KPI's and goals. Many of these should

create clear goals in regards to their quality assurance and affect their need and values as they create an efficient NCR process.

Design and Methodology

DMAIC

In the step of defining the problem and objectives, it was clear to see the problem was the inefficient use of current NCR process, which is outdated and unclear. With this in mind, the objective became to come up with a more effective method of improving the NCR process, as well as adding features of being able to track data trends to alleviate future NCR issues, and to map this entire process out with an easy to follow flowchart. The next step was to collect all data and relevant information from the client. This was done over several meeting with the client; where current detailed NCR process information, excel spreadsheets of recent NRC, and information as to what the client would find useful was collected. After looking at all the data, an analysis was done to identify root causes and potential solutions to the problem at hand. It was determined that the root cause seemed to be not knowing why the NCRs are happening so frequently (supplier problem, engineering drawing issue, manufacturing floor issue) and if there is a way to prevent them from happening.

The next step in the completion of the project is to create alternative solutions to solve the problem. Two solutions were examined, a low cost solution, which could be implemented right away, and a slightly higher cost solution that could potentially be a future investment. The low cost option is to create a database using Microsoft Access for the input and tracking of the NCR's. This would allow for a streamlined entry system and options to sort and search by categories. The downfall of this system is the lack of sharing ability and the insufficiency of an "administrator check" system before data points are entered. The higher cost system would be an internet based database system. This could allow for multiple users to input data, with the features of an administrator being able to monitor and check data before it is submitted.

After discussing options with the clients, the best solution was selected for implementation. In this case a low cost option was preferred, with the addition of a cost analysis of the higher cost solutions for use in the future. This begun the implementation stage of creating the database. The goals that were taken into account during its creation were to make aesthetically pleasing and ergonomic forms for ease of use for the operator. Once this was completed, a test run was performed with the client to verify that the database does everything he what he wants it to do. Once the database was complete and the new NCR system was semi finalized, the flowchart to map the process was created for a visual representation of the process. The final step was to make any further improvements using the notes from the client visit, and ensure that the system is functioning properly.

Database Design

After speaking with Strasbaugh about how they would like to track the trends of their NCR's they quickly suggested using Microsoft Access since they already had the software. The team initially questioned why they would not prefer to have a system that could be accessed online instead of a system that was accessible only from a single point. When this idea was presented, Strasbaugh said they would love to have a cost analysis on the various programs but were not currently ready to make the investment. The team researched various online programs that could do operations similar to or better than Microsoft Access. The programs researched, their capabilities, and the benefits of properly utilizing them will be explained in more depth in the economic analysis section.

When designing the database a number of factors were kept in mind as everything was laid out. There was an emphasis on having a logical flow to ensure that any user in the future could easily walk through the process and know how to use the program. Going along those same lines, error proofing for the user was included to prevent incorrect information from being submitted into the database. In order to ensure that any user that may not be familiar with Microsoft Access could easily use it properly, errors emitted from Access to help guide the user were replaced by encoded pop up alerts to correct the problem from occurring in the first place. If the user did not fill in a necessary field needed for the program to run correctly, a pop up would tell the user this before running the program. Some additional error proofing was not allowing the user to type answers in certain areas, by only allowing them to choose from a drop down menu. Lastly, only the appropriate fields will be visible when needed based on the choices of the user.

By utilizing the Microsoft Access program that the team will present to Strasbaugh, they will eliminate the time wasted by having to enter the NCR information twice. This was previously done by having to fill out the NCR carbon copy forms and then having to input it into the computer. The Access database eliminated this double entry by having the option to either email or print an NCR copy.

The actual design of the database is broken up into 3 portions, the NCR form, the data search form, and the report form. This can all be accessed from the main menu, which can be seen in Figure 2. The NCR form is similar to the carbon copy NCR form in order to assist in the user's transition. While the user is filling out the NCR information and they find that it does not follow any of the current reason codes, they can easily add a new one by selecting "Other" and filling out the boxes that appear below it. When the user submits the whole form for entry, this new reason code will be appended to the "Reason Code" table. From then on, the new code will

be an option that will appear in the normal drop down menu. The form will notify the user if there is crucial information that was not filled out or not filled out correctly before allowing the user to continue to submitting the form, emailing it, or printing it. An example of this form can be seen in Figure 3.

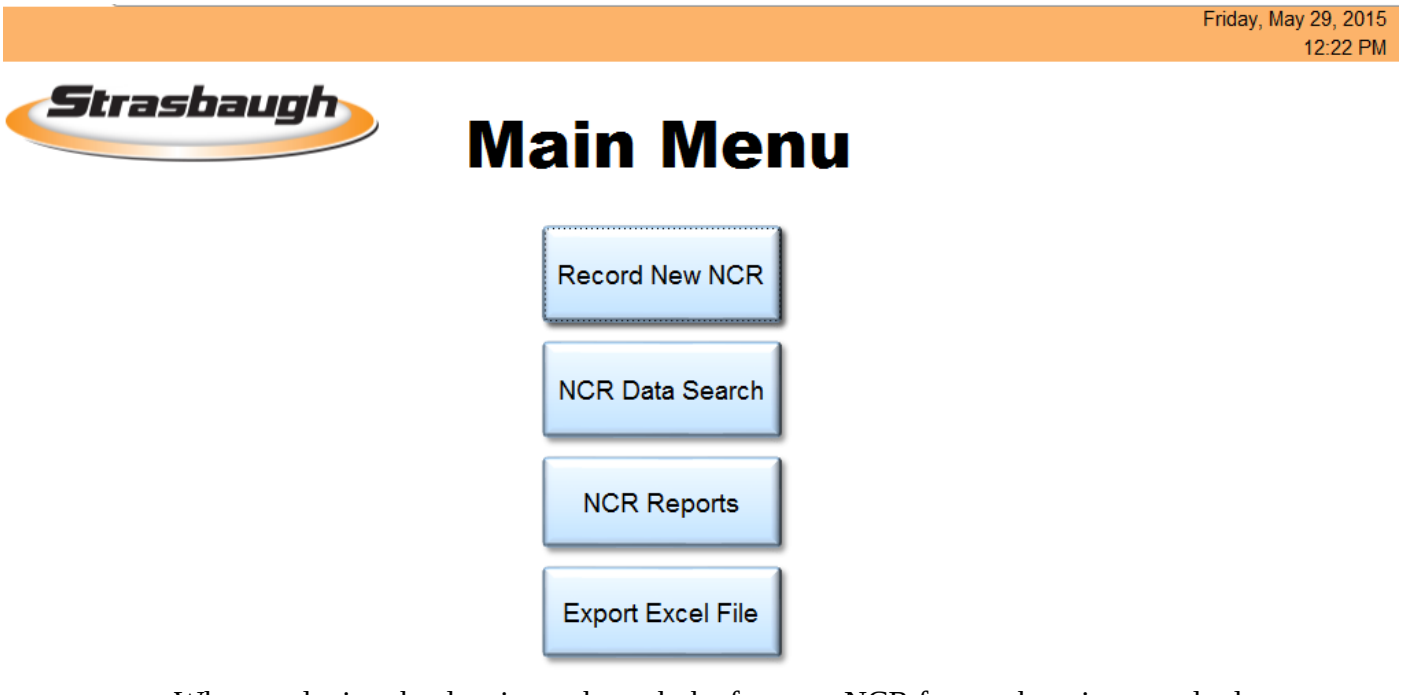

Figure 2: Main Menu

that shows various percentages and trends and a customizable search form that allows the user to view and sort data easily. The customizable search will allow the Quality Engineer to easily look into any area that they may be curious about that is not on the standard report. ‘The data search form is broken up into categories, reason code, key word, date, supplier, part, make vs buy, and location. The user also has the option of doing an advanced search in case they only remember a portion of the NCR’s they are curious about or if they are looking at NCR’s with common variable that may be confounding. The standardized data report form shows percentages of NCR’s by various suppliers, reason codes, part numbers, and sources. It is also capable of looking up the cost savings involved if Strasbaugh were to theoretically fix a portion of the NCR’s. Additional images of the database can be seen in Appendix B.

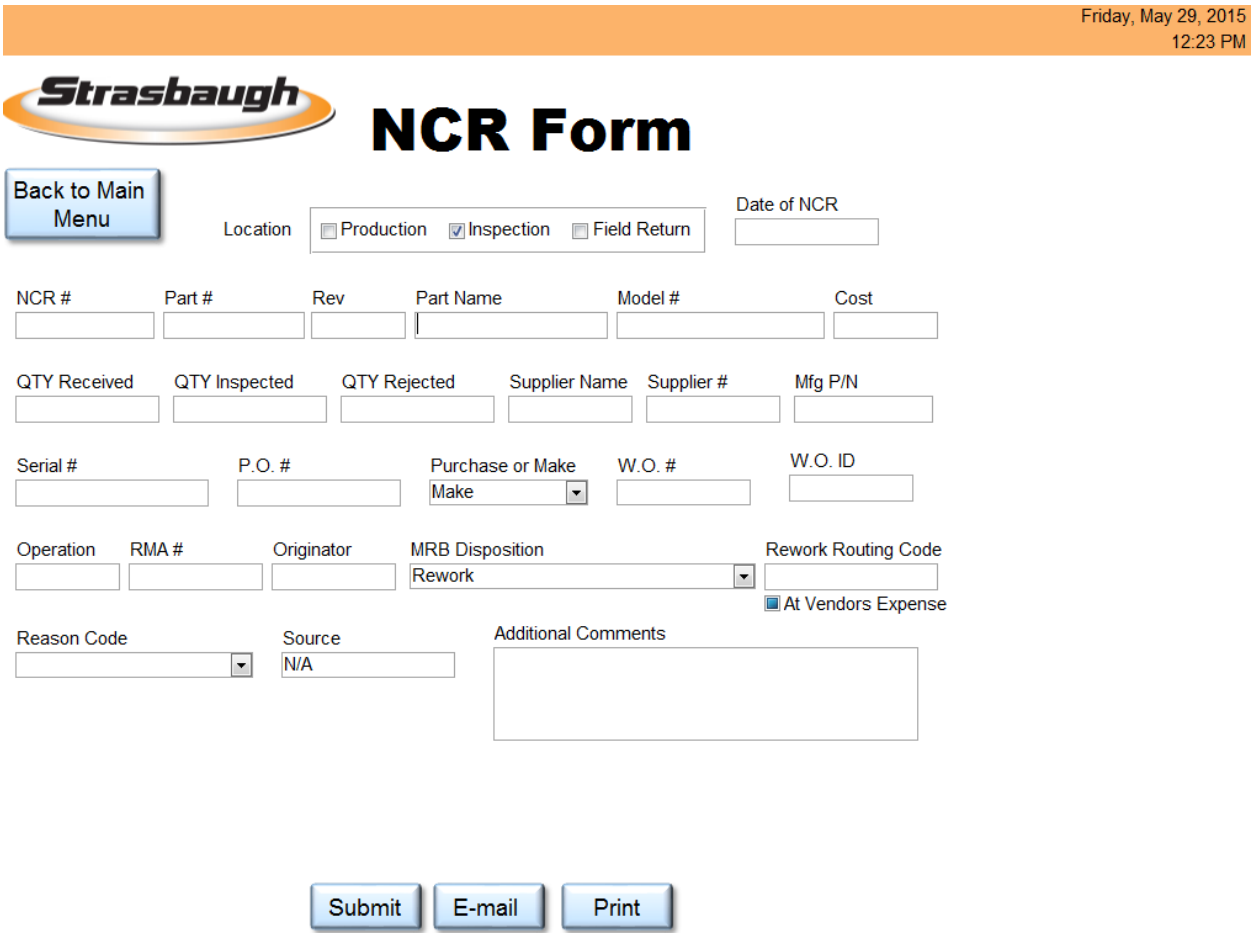

Figure 3: NCR Input Form

Flow Chart Design

Strasbaugh's current flow chart for their NCR process was created in 2004. With the recent downsize and the addition of the Microsoft Access Database, their process chart is very outdated. Strasbaugh needed a flow chart their employees could easily understand and had enough detail for them to perform their individual duties. With that in mind, three flow charts were made for Strasbaugh to use. Their current flow chart (Appendix C) was updated and compartmentalized by department so it was very clear who was performing each task and where the part and NCR needed to be transferred (Appendix D). Another copy was made specifically for Quality Engineering (Appendix E), which included slightly more detail than the original flow chart so, their current employees and as they hire new people, it's clear what needs to be done. Lastly, a flow chart was provided for Purchasing (Appendix F), which serves the same purpose for Purchasing as the Quality Engineering flow chart.

Results

In order to show Strasbaugh the cost benefits of using the Access Database and provide them with the proper next steps, an economic analysis was performed. The cost uses some basic assumptions. The number of NCRs per day, NCR cycle time, salary of the Quality Assurance employee, overtime cost per hour, and the overtime required per NCR were given by Strasbaugh. Working days, and hours worked per year were verified by multiple online sources as a common assumption when doing calculations. The economic analysis shows the cost of overwork and time spent writing and distributing NCRs for the current number of NCRs, a twenty-five percent reduction in NCRs, and a fifty percent reduction in NCRs. The savings are shown in yellow, which can be seen in Figure 4.

With Current Cycle Time

Overtime Calculations		Savings
OT (Rework) per NCR (hrs)	2	
OT Labor cost per hour	$90.00	
Rework per year (hrs)	500	
Rework Cost per year	$45,000.00	
Rework per year with 25% reduction (hrs)	375	125
Rework cost per year with 25% reduction	$33,750.00	$11,250.00
Rework per year with 50% reduction (hrs)	250	250
Rework cost per year with 50% reduction	$22,500.00	$22,500.00

Engineering Calculations		Savings
NCR Cycle Time (min)	30	
Quality Engineer Salary	$100,000.00	
Hours per year	2,080	
Hourly Salary	$48.08	
Time spent on NCRs per year (min)	7500	
Time spent on NCRs per year (hrs)	125	
NCR Cost per year	$6,009.62	
Time spent on NCRs per year with 25% reduction (min)	5625	1875
Time spent on NCRs per year with 25% reduction (hrs)	93.75	31.25
Cost with 25% Reduction	$4,507.21	$1,502.40
Time spent on NCRs per year with 50% reduction (hrs)	3750	3750
Time spent on NCRs per year with 50% reduction (hrs)	62.5	62.5
Cost with 50% Reduction	$3,004.81	$3,004.81

Basic Assumptions	
Qty of NCRs/day	1
Working Days	250
NCRs per year	250
NCRs per year with 25% Reduction	187.5
NCRs per year with 50% Reduction	125

Figure 4: Savings using Access Database

For next steps as the company continues to improve their NCR process, cost analysis was performed on using an online database. This online database would allow Strasbaugh to input the NCR directly into the database from an iPad or a computer. They could then email a copy to the required departments and it would be simple to print a copy if one was ever needed. This would save Strasbaugh a lot of manual work so the cycle time would be reduced to about ten minutes. The same cost analysis was performed with the new cycle time and the minimum Strasbaugh would save is around $4,000 and that is without a decrease in NCRs, Figure 5. The prices of various online databases can be seen in Figure 6. With the minimum savings, Strasbaugh could almost afford any of the online database options.

With Cyle Time Reduction Using Online Database

Overtime Calculations		Savings
OT (Rework) per NCR (hrs)	2	
OT Labor cost per hour	$90.00	
Rework per year (hrs)	500	
Rework Cost per year	$45,000.00	
Rework per year with 25% reduction (hrs)	375	125
Rework cost per year with 25% reduction	$33,750.00	$11,250.00
Rework per year with 50% reduction (hrs)	250	250
Rework cost per year with 50% reduction	$22,500.00	$22,500.00

Engineering Calculations		Savings
NCR Cycle Time (min)	10	
Quality Engineer's Salary	$100,000.00	
Hours per year	2,080	
Hourly Salary	$48.08	
Time spent on NCRs per year (min)	2500	
Time spent on NCRs per year (min)	41.67	
NCR Cost per year	$2,003.21	$4,006.41
Time spent on NCRs per year with 25% reduction (min)	1875	5625
Time spent on NCRs per year with 25% reduction (hrs)	31.25	93.75
Cost with 25% Reduction	$1,502.40	$4,507.21
Time spent on NCRs per year with 50% reduction (min)	1250	6250
Time spent on NCRs per year with 50% reduction (hrs)	20.83	104.17
Cost with 50% Reduction	$1,001.60	$5,008.01

Basic Assumptions	
Qty of NCRs/day	1
Working Days	250
NCRs per year	250
NCRs per year with 25% Reduction	187.5
NCRs per year with 50% Reduction	125

Total Yearly Savings	
No Reduction	$4,006.41
25% Reduction	$15,757.21
50% Reduction	$27,508.01

Figure 5: Savings using Web-based Server

Alternative Web-Based Servers			
Company	**Package Name**	**Cost per month**	**Annual Cost**
Caspio	Startup	$79.00	$948.00
	Business	$249.00	$2,988.00
Intuit QuickBase	(10+ users)	$150.00	$1,800.00
	(20+ users)	$500.00	$6,000.00
FileMaker	Server + 5	$69.00	$828.00

Figure 6: Costs for Web-based Servers

Conclusion

With Strasbaugh's outdated and inefficient process they lacked the ability to track trends and store NCR data. The objective became to create a low cost system that could be immediately implemented giving them the ability to eventually identify the root causes of why parts are not conforming, and ultimately save the company money. A secondary option for a web-based server with multiple access points would also be included as a deliverable along with the low cost database, detailed process flowcharts and a cost analysis.

In the long run it is hoped that Strasbaugh will continue to use the database provided, and potentially implement the web-based server to further improve the trend tracking abilities. This project included 25% and 50% savings, but with increased use this number may grow even more.

On a broader scope, this project has the ability to have an environmental impact of saving paper, and a social/cultural impact of adjusting the company culture to a younger demographic and getting Strasbaugh

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Appendix A

STRASBAUGH
NONCONFORMING REPORT (NCR)
OPTIONAL FIELDS

☐ CUSTOMER PROPERTY _____
☐ INSPECTION
☐ MANUFACTURING
☐ FIELD RETURN
☐ MATERIALS
☐ WIP
DATE _____

NCR: 34219

PART NO. | REV. | PART NAME | MODEL | COST | QTY REC'D | QTY INSP | QTY REJECTED
SUPPLIER NAME | SUPPLIER NO. | DEFECT ☐ SUPPLIER ☐ STB ☐ TBD | MFG P/N | SERIAL NO.
P.O NO. | BUY/PLN CODE | W/O NO. | W/O ID | OPERATION | RMA NO.

ITEM	QUANTITY	REQUIREMENT	DISCREPANCY

☐ URGENT REASON _____ ☐ PURGE STOCK QTY:

ORIGINATOR (PLEASE PRINT) DATE | SUPERVISOR (PLEASE PRINT) DATE

MRB DISPOSITION

☐ SCRAP _____ SCRAP CODE
☐ UAI
☐ RTV
☐ REPLACE WITH NEW
☐ REPAIR / REWORK TO AS NEW CONDITION
☐ REPAIR / REWORK TO FORM/FIT/FUNCTION COMPATIBLE
☐ FABRICATE NEW PARTS TO ADJUST QUANTITY
☐ REWORK/ REPAIR
REWORK ROUTING CODE: _____
☐ AT VENDORS EXPENSE

ITEM	QTY	DISPOSITION DETAIL	DEPARTMENT	SIGNATURE	DATE
			QA		
			MANUFACTURING ENGINEERING		
			MATERIALS		
			OTHER(S)		

☐ EVALUATE AT STRASBAUGH ☐ SUPPLIER FAILURE ANALYSIS REQUIRED ☐ CORRECTIVE ACTION REPORT REQUIRED ☐ CONTACT WITH REPAIR ESTIMATE PRIOR TO REPAIR

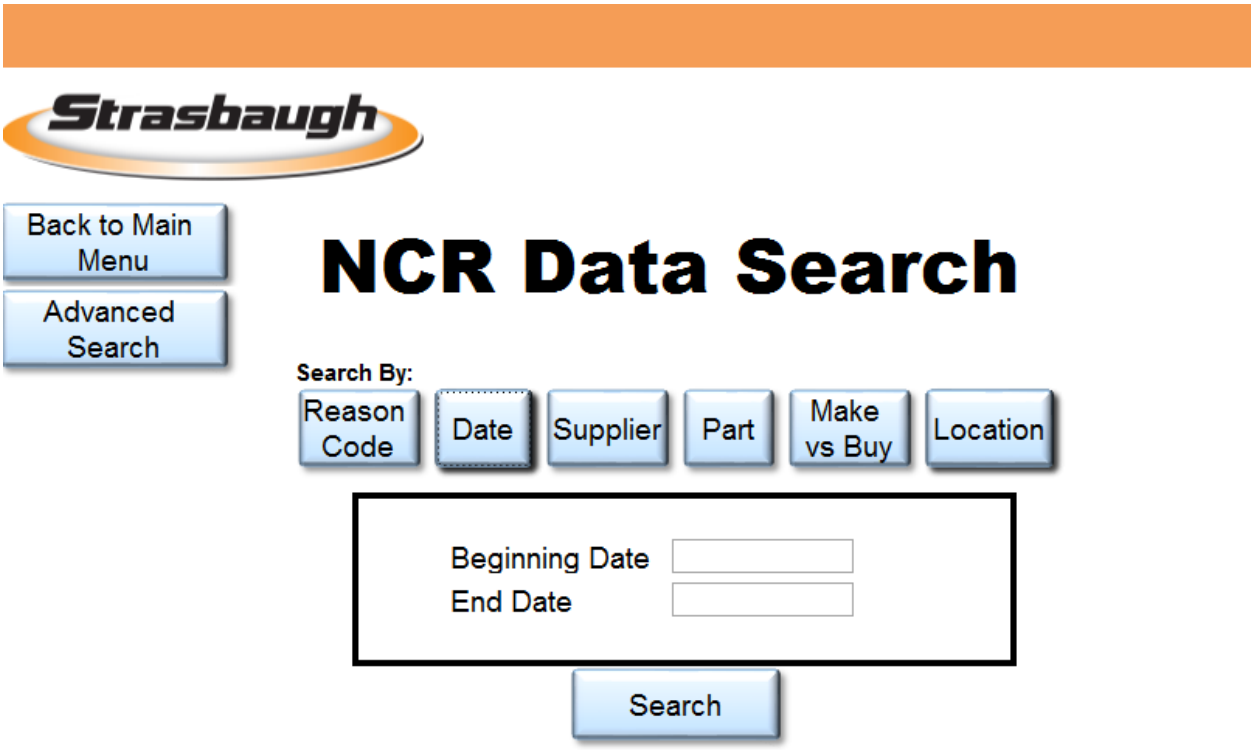
ERROR

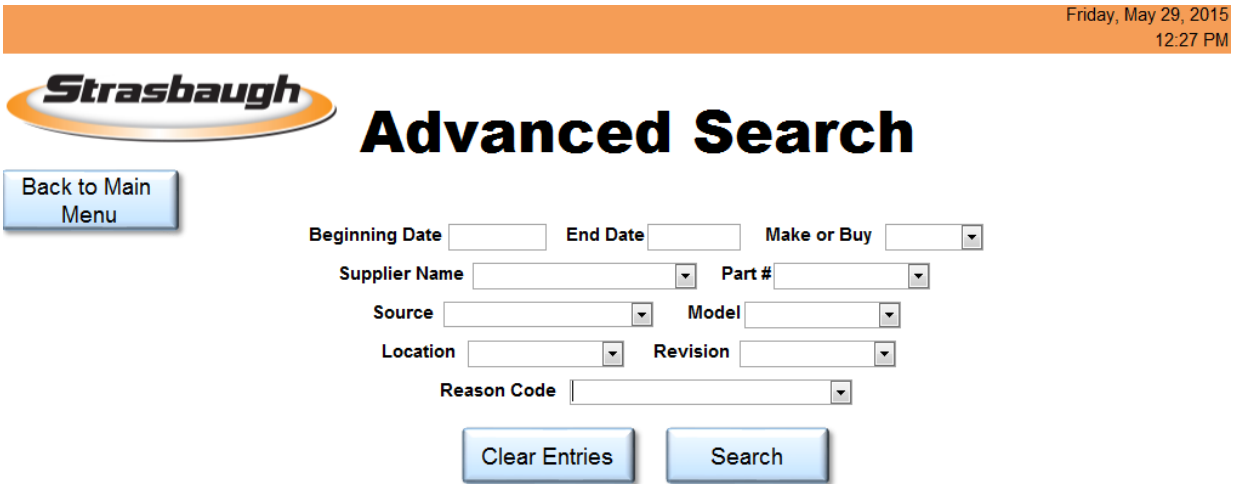
☐ STRASBAUGH
☐ SUPPLIER

DISTRIBUTION: WHITE – INSP LOG GREEN – MATERIALS CANARY – MFG ENG PINK – SUPPLIER

F13-01-01 REV C

Appendix B

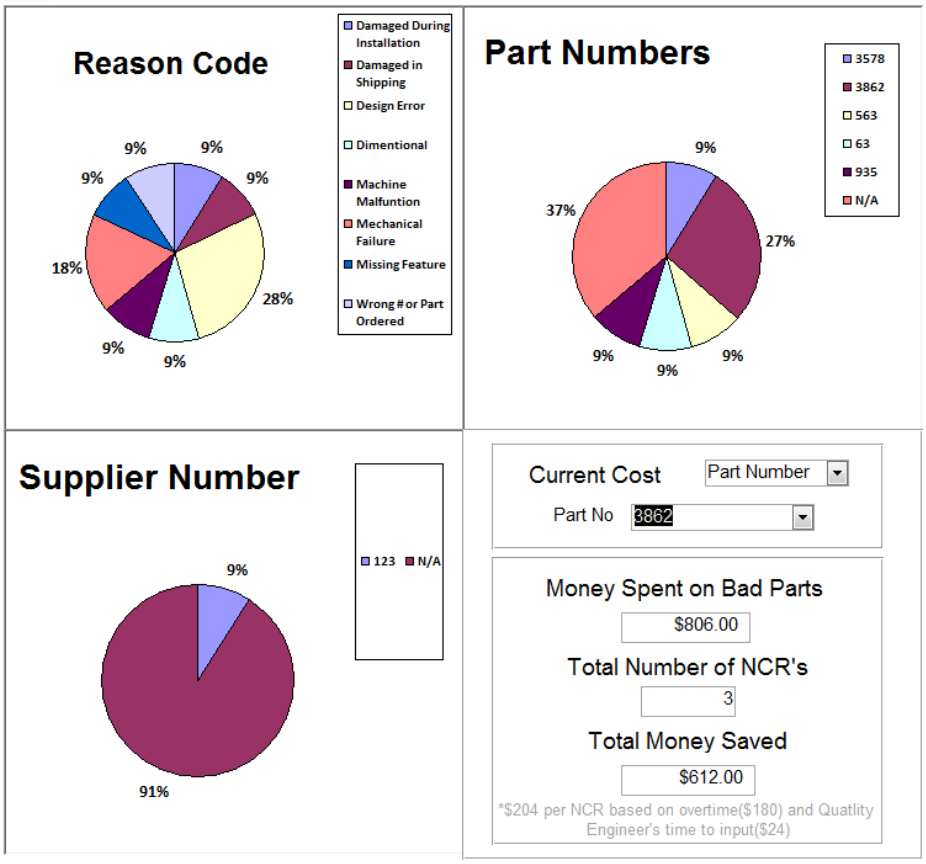

Strasbaugh
Back to Main Menu
Advanced Search
NCR Data Search
Search By:
Reason Code
Date
Supplier
Part
Make vs Buy
Location
Beginning Date
End Date
Search


Friday, May 29, 2015
12:27 PM
Strasbaugh
Advanced Search
Back to Main Menu
Beginning Date
End Date
Make or Buy
Supplier Name
Part #
Source
Model
Location
Revision
Reason Code
Clear Entries
Search

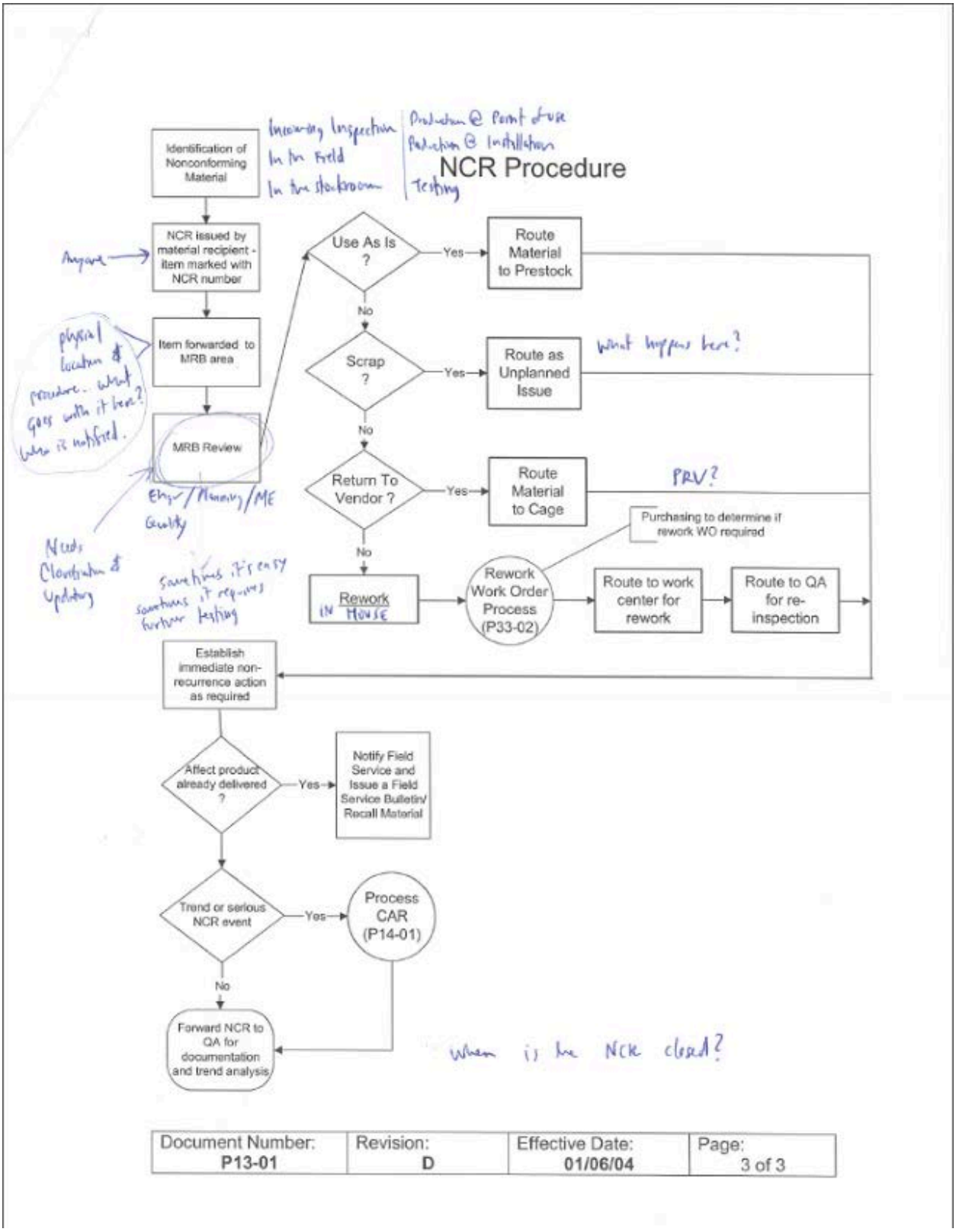
Friday, May 29, 2015
12:29 PM

Reports

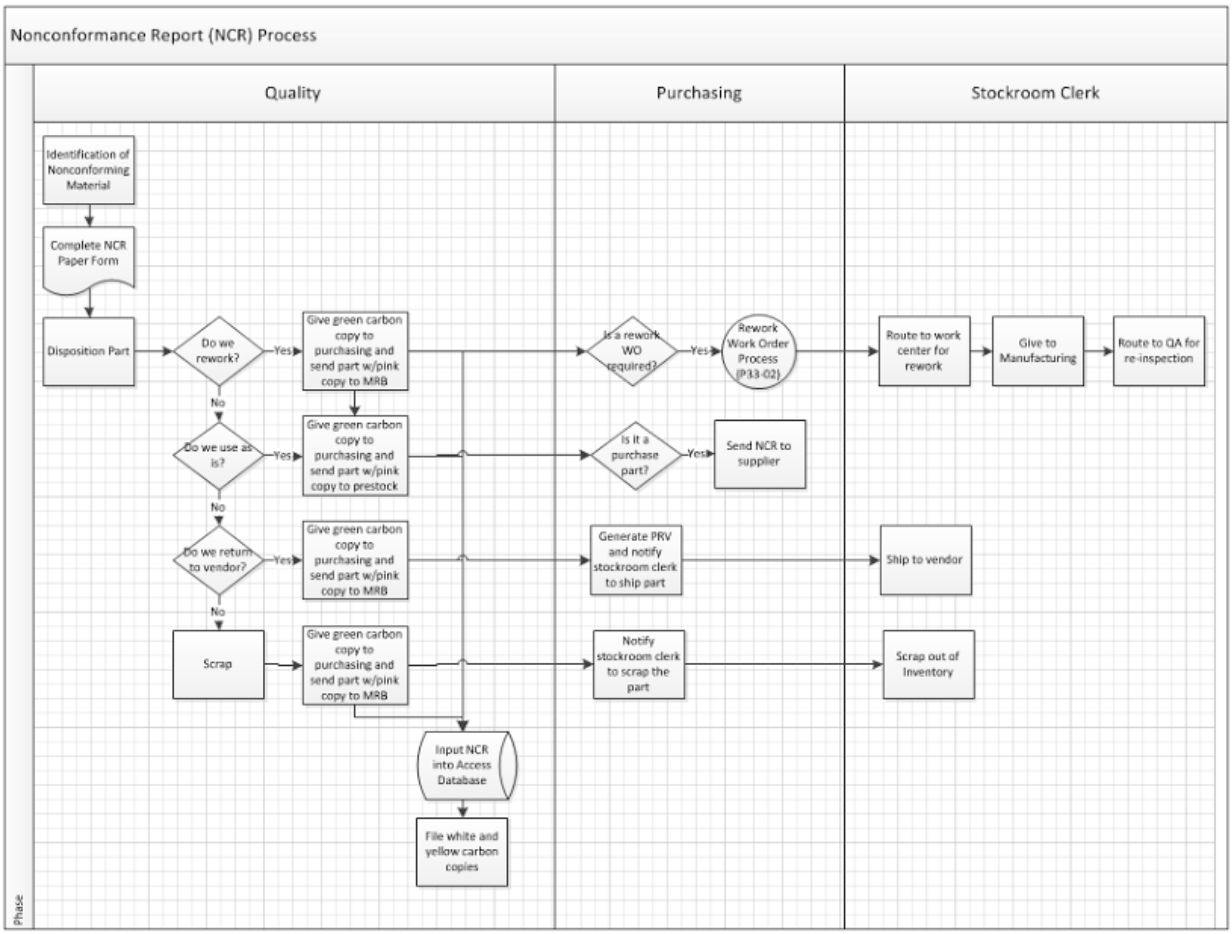
Back to Main Menu



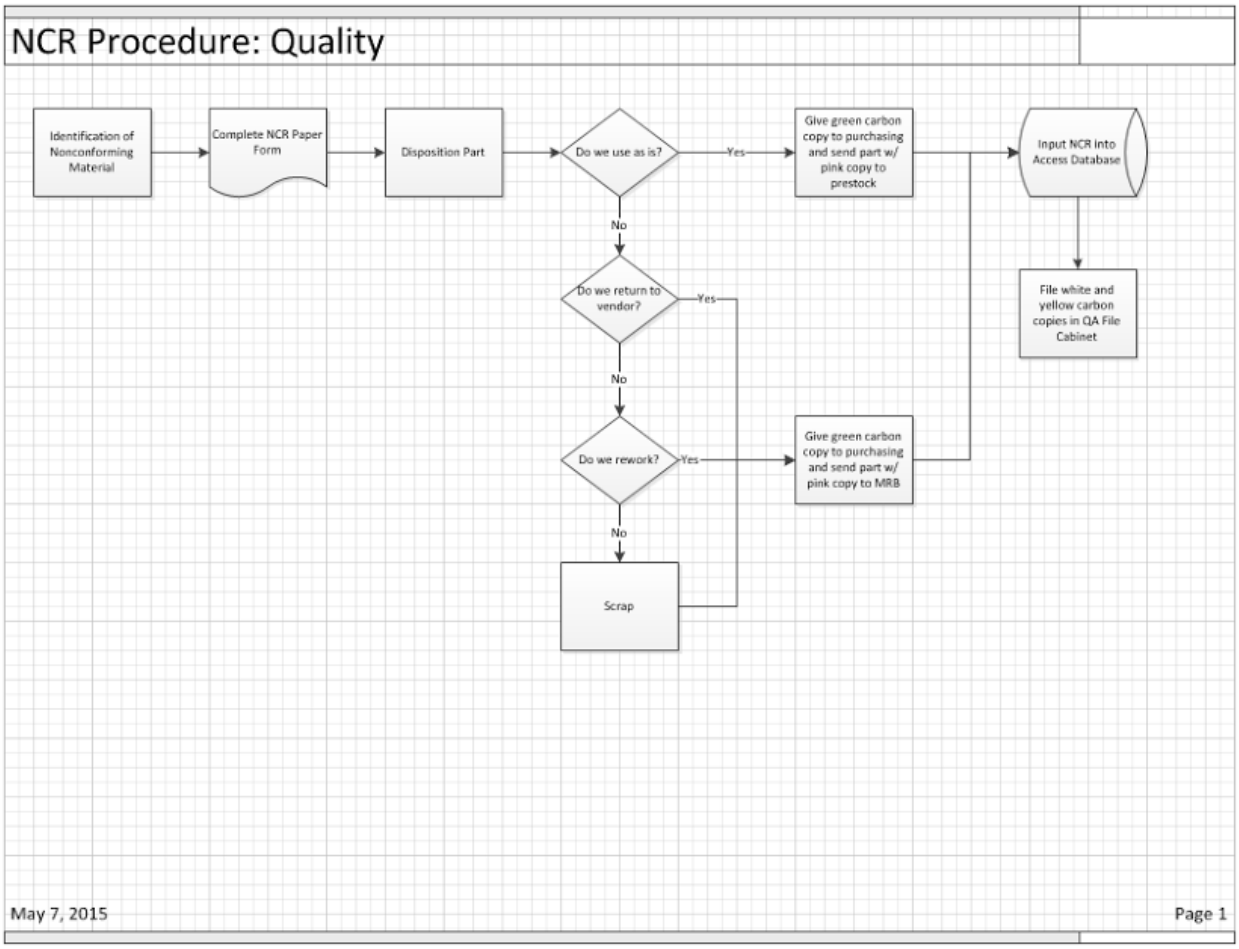
Appendix C


NCR Procedure
Identification of Nonconforming Material
NCR issued by material recipient - item marked with NCR number
Item forwarded to MRB area
MRB Review
Use As Is ?
Yes
Route Material to Prestock
No
Scrap ?
Yes
Route as Unplanned Issue
No
Return To Vendor ?
Yes
Route Material to Cage
No
Rework IN HOUSE
Rework Work Order Process (P33-02)
Purchasing to determine if rework WO required
Route to work center for rework
Route to QA for re-inspection
Establish immediate non-recurrence action as required
Affect product already delivered ?
Yes
Notify Field Service and Issue a Field Service Bulletin/ Recall Material
Trend or serious NCR event
Yes
Process CAR (P14-01)
No
Forward NCR to QA for documentation and trend analysis
Document Number: P13-01
Revision: D
Effective Date: 01/06/04
Page: 3 of 3

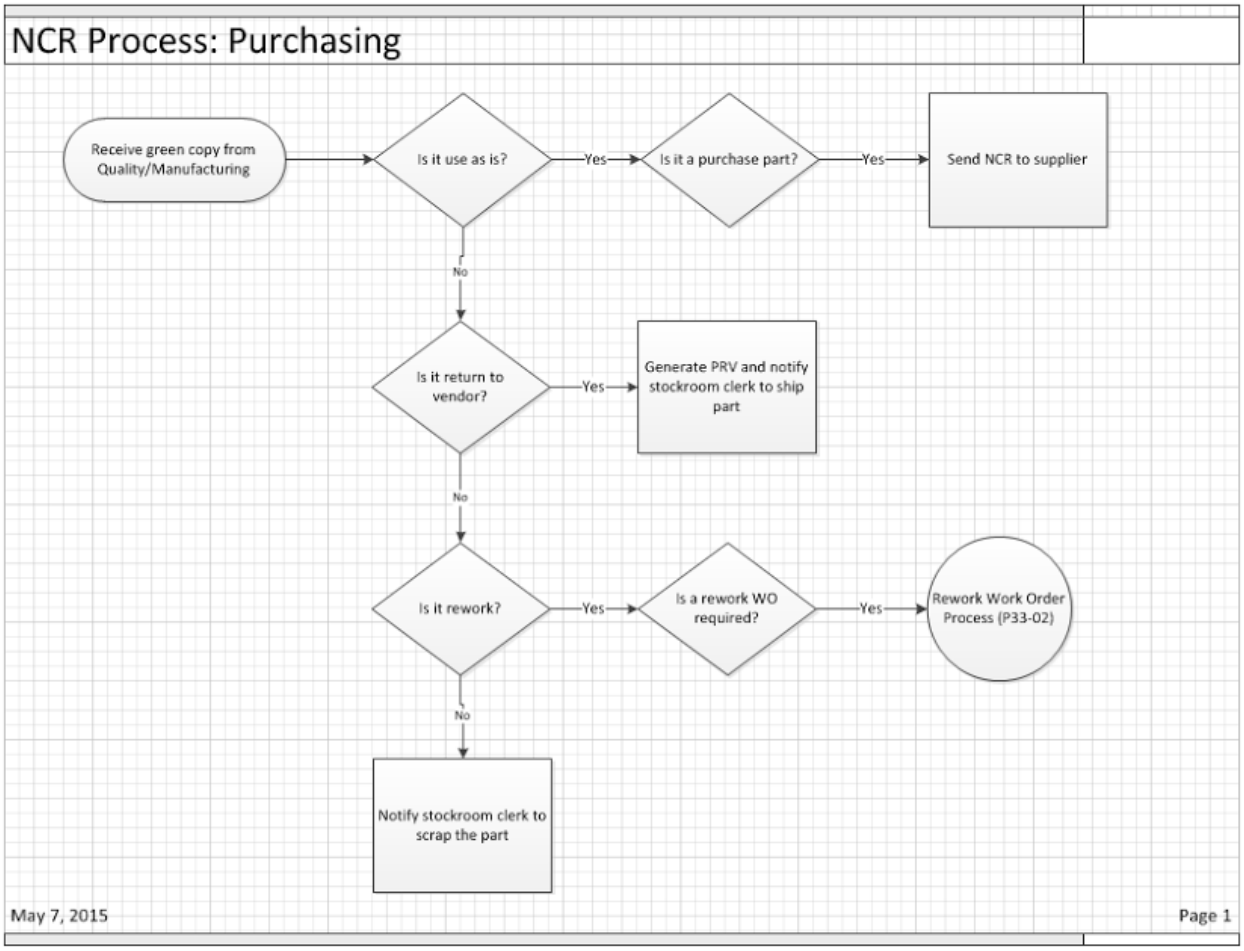
Appendix D


Nonconformance Report (NCR) Process
Quality
Purchasing
Stockroom Clerk
Identification of Nonconforming Material
Complete NCR Paper Form
Disposition Part
Do we rework?
Yes
No
Give green carbon copy to purchasing and send part w/pink copy to MRB
Is it a rework WO required?
Yes
Rework Work Order Process (P33-02)
Route to work center for rework
Give to Manufacturing
Route to QA for re-inspection
Do we use as is?
Yes
No
Give green carbon copy to purchasing and send part w/pink copy to prestock
Is it a purchase part?
Yes
Send NCR to supplier
Do we return to vendor?
Yes
No
Give green carbon copy to purchasing and send part w/pink copy to MRB
Generate PRV and notify stockroom clerk to ship part
Ship to vendor
Scrap
Give green carbon copy to purchasing and send part w/pink copy to MRB
Notify stockroom clerk to scrap the part
Scrap out of Inventory
Input NCR into Access Database
File white and yellow carbon copies
Phase

Appendix E


NCR Procedure: Quality
Identification of Nonconforming Material
Complete NCR Paper Form
Disposition Part
Do we use as is?
Yes
Give green carbon copy to purchasing and send part w/ pink copy to prestock
Input NCR into Access Database
File white and yellow carbon copies in QA File Cabinet
No
Do we return to vendor?
Yes
No
Do we rework?
Yes
Give green carbon copy to purchasing and send part w/ pink copy to MRB
No
Scrap
May 7, 2015
Page 1

Appendix F


NCR Process: Purchasing
Receive green copy from Quality/Manufacturing
Is it use as is?
Yes
Is it a purchase part?
Yes
Send NCR to supplier
No
Is it return to vendor?
Yes
Generate PRV and notify stockroom clerk to ship part
No
Is it rework?
Yes
Is a rework WO required?
Yes
Rework Work Order Process (P33-02)
No
Notify stockroom clerk to scrap the part
May 7, 2015
Page 1