

Abstract

This project consisted of the process automation of the documentation for the engine cooling assessment executed in a department of Company X. The objectives were to automate the cooling flow assessment documentation process within a period of 10 weeks, reduce execution time by 50%, execution cost by 80% and manpower by 75%. This process improvement was achieved within the proposed 10 weeks, with a reduction of the execution time of 81%, a reduction of the execution cost by 90% and a reduction of the manpower of 81%. These results confirmed that the objectives of the projects were accomplished.

Methodology

Aerospace Company X used the Achieving Competitive Excellence (ACE) system as the Quality Operational System. For this project, process improvement technics will be implemented following the steps described below:

Flow Assessment Process Diagram	Identify and provide a detailed understanding of the current process. Additionally is will provide an overview of the process execution time.
Process Improvement Ideas	Brain storming and selection of improvement ideas to achieve project objective.
Development and Implementation of Automation Tool	Provide detail information of development and implementation of the automation tool.
Flow Assessment Improved Process Diagram	Identify and provide a detailed understanding of the improved process and execution time.
Cost and Benefit analysis	Economic impact and benefit of the automation process.
Objective Verification	Validate if the process improvement achieve the proposed objective.

Conclusion

The utilization of the Company X Quality Operational System ACE and the implementation of the defined process improvement methodology, produced results that surpassed the defined objectives. The objectives defined at the beginning of the project were: automation of the cooling flow assessment documentation process within a period of 10 weeks, reduction of the execution time by 50%, execution cost by 80% and manpower by 75%. This process improvement was achieved within the proposed 10 weeks, with a reduction of the execution time of 81%, a reduction of the execution cost by 90% and a reduction of the manpower of 81%. These results confirmed that the objectives of the project were accomplished.

Introduction

As part of their daily work, a department of the Aerospace Company X executes an engine cooling flow assessment to validate their models predictions using an in-house software. These validations are performed using real data obtained in the field that involves lengthily and detailed documentation. The company's high management is requiring the automation of the process to reduce cost and allocate manpower resource.

Results

Current flow assessment documentation process consisted of four manually executed process that resulted in the utilization of 4 Full Time Employees (FTE's), a total process time of 32 hours per day and a total cost per day of \$1984.00.

Using a Company X proprietary Visual Basic for Applications (VBA) code, third party software Excel and PowerPoint were customize and used to enable the desire output and format of the assessment documentation.

Objectives

- Automate the cooling flow assessment documentation process within a period of 10 weeks.



- Once automation is completed:
- Reduce execution time by 50%.
 - Reduce execution cost by 80%.
 - Reduce manpower by 75%.

Current Flow Assessment Documentation Process

Process	Process time (hrs.)	Description
Flow template Initial Setup	2 Hours	Manually create engine cooling flow template.
Manual fill out of flow values (Prediction Values)	2 Hours	Insert the predicted flow values produced by in-house software.
Manual fill out of flow values (Engine Data)	2 Hours	Insert the engine data flow values obtained in the field.
Document Assessment	2 Hours	Put together a PowerPoint presentation documenting the flow assessment.

Note: Process times are for a single engine flow assessment. Four engine flow assessment are documented per day, utilizing a manpower of 4 Full Time Employees (FTE's), at a rate of \$62 per hour.

Automation Process Using Microsoft Excel and PowerPoint

Microsoft Excel initial setup	An Excel interactive window allow user to insert pressures and flows sensors readers for the desire engine locations on a Chart to compare Prediction vs. Engine Data values.
Prediction Values	Interactive window will allow user to browse the location of the files containing the Prediction Values. Excel will upload information into a formatted prediction data sheet.
Engine Data	Interactive window will allow user to specified the location of the files containing the Engine Data Values. Excel will upload information into a formatted Engine data sheet.
PowerPoint Documentation	The Excel spreadsheet, using a proprietary code, will export and generate a PowerPoint Presentation using the comparison charts documenting the flow assessment. PowerPoint will save document output in a user specified location.

The automation of the flow assessment documentation resulted in a process improvement with new execution times of 6 hours, utilizing a manpower of 0.75 FTE and total cost of \$372.00 per day.

The improved process achieved a reduction of the execution time of 81%, a reduction of the execution cost by 90% and a reduction of the manpower of 81%.

Background

The documentation automation is a common continuous process improvement technique used, not only on the engineering industry, but on other professions as well. This automation processes are considered very efficient, with superior accessibility and accuracy, with a reasonable implementation costs [1]-[2]. For these automation, third party software are commonly used for their efficiency, low cost implementation and for their versatility interacting with other software.

Specific information about document automation on the aerospace industry is very limited, as most of the information and /or documents are considered proprietary information.

Improved Flow Assessment Documentation Process

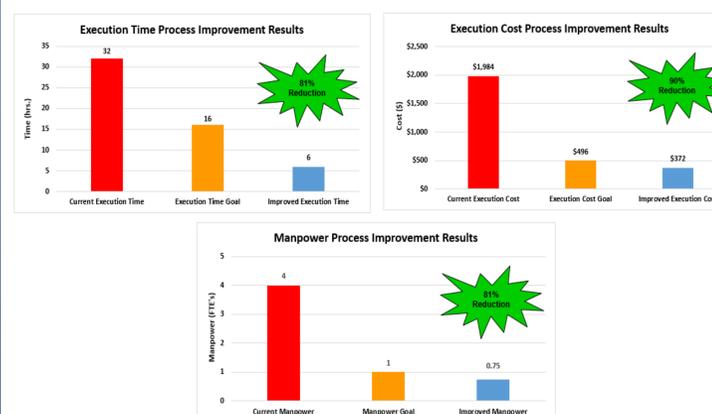
Process	Process time (hrs.)	Description
Flow template Initial Setup	1 Hour	Manually create engine cooling flow template with the help of an interactive window in Excel
Upload flow values (Prediction Values)	10 minutes	Upload the predicted flow values produced by in-house software into Excel.
Upload flow values (Engine Data)	10 minutes	Upload the engine data flow values obtained in the field into Excel.
Document Assessment	10 minutes	Automated creation of a PowerPoint presentation documenting the flow assessment.

Note: Process times are for a single engine flow assessment. Four engine flow assessment are documented per day, utilizing a manpower of 0.75 Full Time Employees (FTE), at a rate of \$62 per hour.

References

- Spencer, E., Swanson, T., Hueston, W. J., & Edberg, D. L. (1999). Tools to improve documentation of smoking status: Continuous quality improvement and electronic medical records. Archives of family medicine, 8(1), 18.
- Menke, J. A., Broner, C. W., Campbell, D. Y., McKissick, M. Y., & Edwards-Beckett, J. A. (2001). Computerized clinical documentation system in the pediatric intensive care unit. BMC Medical Informatics and Decision Making, 1(1), 3.

Process Improvement Results Comparison



Project Milestones and Schedule

Key Milestones	Start	Complete	Actual Dates	
			Start	Complete
Project Startup and Objective Definition	4/09/18	4/13/2018	4/09/18	4/13/2018
Proposal	4/16/18	4/20/2018	4/16/18	4/20/2018
Flow Assessment Process Diagram	4/23/18	4/27/2018	4/23/18	4/26/2018
Process Improvement Ideas	4/30/18	5/04/18	4/30/18	5/04/18
Development and Implementation of Automation Tool	5/07/18	5/11/2018	5/07/18	5/11/2018
Flow Assessment Improved Process Diagram	5/14/18	5/18/2018	5/14/18	5/18/2018
Cost and Benefit Analysis	5/21/18	5/25/2018	5/21/18	5/25/2018
Objective Verification	5/28/18	6/1/2018	5/28/18	6/1/2018
Final Report	6/04/18	6/8/2018	6/04/18	6/8/2018
Poster Creation and Delivery	6/11/18	6/15/2018	6/11/18	6/15/2018

The feedback from the users will be required to continue with the improvement of the engine cooling flow assessment documentation automation and for the final implementation of the new process within the department.