



NAGA
INFO SOLUTIONS PVT. LTD.

CAD AUTOMATION

CASE STUDY: Quality Assurance

In an effort to automate the CAD processes in a government agency, Naga Info Solutions team interviewed personnel at the Quality Assurance Department. These interviews highlighted problems that we believe are typical of organizations which deal with verification of complicated CAD drawings as part of the quality assurance process. This report highlights the findings of these interviews, provides our analysis of the findings, suggests a solution to the problems found and evaluates the solution after implementation. Our observations are typical of the state of practice in similar areas and this report and the solutions found are applicable to other organizations doing manual verification of CAD drawings.

1.0 Introduction

During 2010, Naga Info Solutions performed a study, within a government organization, which examined the techniques that the Quality Assurance department made use of to verify complicated CAD drawings of mechanical components. The examination was carried out through interviews with the right personnel at the Quality Assurance department.

This report highlights the result of these interviews including our findings, analysis and suggested solution. We were mostly talking to the head of the department, senior engineers and technical personnel. The interviews were conducted over a period of 5 days. The people we interviewed were very enthusiastic and frank in expressing their views and difficulties with the existing system. They were really motivated by the hope that the efficiency of their existing system could be improved greatly.

The opinions we got from the various interviews were noticeably uniform. This report aims to study our findings from the various interviews and propose an appropriate solution to the problems found.

While this study was conducted for a specific government agency, our findings have general applicability to many other organizations which have to perform quality assurance tests for CAD drawings.

To protect confidentiality, neither the government agency involved in this study nor the department within it is named.

2.0 Interviews

A list of the staff selected for the interview was prepared before we began. We had to make sure that we selected the right people for interviewing, as our analysis and proposed solution would be based on their comments and opinions. The interviews conducted were informal and we discussed various aspects like tools used, techniques used, communication mechanisms, efficiency, ease of management and more. All of the candidates we interviewed were very candid and helped us collect important information.

The department used CATIA for CAD. The information we obtained from the candidates was focused on the activities that the technical staff carried out, like, parameterization of dimensions, preparing checklist, categorization of dimensions and more. The interviewees described the long and cumbersome process of manually checking each dimension in every single drawing as part of the quality assurance process. Our focus during all the interviews remained on how we could solve such the problems with the existing technique.

3.0 Findings

The interviews conducted helped us identify the following issues with the existing method:

- Manual identification of dimensions, notes, instructions and other objects from a CATDrawing file was a time consuming process.
- Identifying the dimensions manually in a highly detailed drawing was prone to errors.
- Lack of a method to easily categorize dimensions.
- Even a small modification in a CATDrawing file meant that the verification process had to be repeated.
- Important details relevant to a particular drawing, like, type of drawing, title, general, angular and fit tolerance values etc had to be manually extracted from the drawing.
- Lack of a method to manage drawings and revisions efficiently.

4.0 Solution

Our analysis of the findings suggests that even though CATIA is the right program to use, it would be a lot more efficient if it could be customized to assist the users in their job. CATIA is a very general purpose CAD application with a wide range of functionalities, all of which might not be useful to the users. Appropriately identifying the functionalities required and customizing the application for day to day tasks can be greatly productive. Customizations can range from merely tweaking the user interface for practicality to adding tailor made functionality to the software or creating a totally new application to interact with the CAD software.

Based on our analysis, we suggested creating a new application that interacted with CATIA software to achieve the following functionalities:

1. Drawing Extraction & Analysis

- Automatically assign unique parameter number/identifiable names for all types of dimensions, notes, instructions, etc. to be inspected in the input CATIA file (.catdrawing).
- Automatically assign parameter to be marked near the appropriate object in the 2D drawings.
- Automatically identify type of drawing like part, sub assembly, Main assembly or Next assembly from title block.
- Tolerance for general category and specific cases to be applied and minimum and maximum limits to be listed by the software.
- Numerals, angle, chamfers, geometrical tolerance, etc are to be identified and classified separately.
- Automatically highlight with bold, the last parameter number of different classification in the drawing.
- Automatically assign additional parameter during revision of a drawing and extraction of all parameters.

2. Parameter Archiving using database

- Automatically extract the parameter assigned with related values and save it into a database.
- Parameter Database to contain Drawing No., Title, Project Name, Raw material requirements like welding-HT-NDT-surface treatment, quantity, etc.
- Parameter Database to contain field for specifying revision no.
- Parameter number assignment for a repeated/ duplicated/ redundant dimension to be avoided.
- Access rights for editing of values in the database.

The recommendations were presented to the personnel in the organization and they all readily approved of the same. The different groups of people could see the benefits our plan would bring about and how much more efficient and easy the day to day tasks would become.

Once the approval was obtained, we developed appropriate design documents for the new solution. The personnel assisted us to ensure that the solution we suggested was complete and covered all the required aspects.

Subsequently, we selected appropriate tools for development and put the design to implementation. We chose to develop a Windows application with MySQL backend database. Once developed, necessary testing and evaluation was done and the software was ready for installation.

5.0 Usage & Feedback

The final product was installed in the Quality Assurance department and necessary training was provided to the users. Our team worked closely with the personnel in the department to make sure that the transition from the old method to the new one was smooth and easy.

The personnel could really appreciate the work our team had done. They were really surprised how easily the software could handle all the time consuming and tedious tasks to produce quick results. It did not take much time for them to see the boost in productivity the software system brought along. For instance, parameterization,

preparing a check list and manual verification of a complicated drawing could take over 120 minutes, whereas, with the use of the software it could be achieved in less than 4 minutes.

Clearly, the system had met and exceeded the expectations of the people at the Quality Control department. The system is now being used throughout the department and is the standard software used for the verification processes.

6.0 Conclusion

The interviews that our team conducted helped us identify problems with the existing technique of work. We analyzed our findings and suggested a very productive solution which helped them eliminate most, if not all, of their problems.

CAD automation has tremendous potential to aid in enhancing productivity of organizations that use CAD software. It has been adopted by organizations which are foresighted and desire to complete tasks in a highly optimized way.