



Using Shape Based Technology to Increase Engineering Efficiency and Combat Part Proliferation

A Case Study of Mitsubishi Caterpillar Forklift America Inc. (MCFA)

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Company Profile:

Mitsubishi Caterpillar Forklift America Inc. (MCFA) is a leading manufacturer and distributor of forklifts in North, Central and South America and the Caribbean. Based in Houston, Texas, MCFA distributes three distinct brands of forklifts and narrow aisle warehouse products – Mitsubishi forklift trucks, Cat® lift trucks and Jungheinrich®. Featuring the industry's most extensive dealer network, the company provides customers with quality products ranging from internal combustion forklifts to electric warehouse products.

Business Situation:

For years, MCFA has been creating and receiving electronic product data in multiple formats from suppliers, partners, and the parent company. Comparing incoming data to the current inventory and managing the total number of objects was becoming more of a challenge. Maintaining the CAD inventory diverted the engineering team from their core activities. MCFA decided to take a pro-active approach to address this challenge head-on.

According to Kevin Krakora, MCFA's Director Product Services, "MCFA must have an engineering department that is organized and easy to work with. We needed to have an efficient product data management system in place".

MCFA planned to have all of its' legacy product data migrated into the new PLM system but, at the same time, wanted to ensure that the new PLM database was not bogged down with too many duplicate files.

Technical Situation:

MCFA had approximately 1,500,000 CAD objects stored in network drives, but lacked a high level view of those objects and any decision support capability to efficiently enable data organization, migrating or re-using these objects. While MCFA knew this had to be addressed, the time required and risks associated with carrying out such a task manually, and the non-availability of dedicated internal manpower, necessitated MCFA's search to find a sophisticated vendor to assist in carrying out the project.

Solution:

A leading PLM Services company, SCONCE Solutions, was assigned with the task of implementing the new PLM solution and migrating legacy data for MCFA. After careful evaluation of the situation, SCONCE recommended using the powerful new shape-based technology from Enfinio, Inc. named Bingo! for identifying and archiving duplicated CAD data. The remaining CAD data, stripped of proliferated objects, would then be migrated into the new PLM solution.

Bingo!, an innovative tool with powerful functionalities and automation tools, dramatically shortened the time and man-power required to achieve the results. According to Wayne Mabry, MCFA's Current Products Engineering Manager, "The goal of using Bingo! was not only to organize MCFA's data but also to provide a solution that offered both CAD and non-CAD users the capability to efficiently search and re-use existing models. In addition, we desired to have a permanent solution to help prevent future part proliferation."

With the scalable architecture of Bingo!, SCONCE indexed the data set, supported MCFA in analyzing the existing data, and identified duplicates for archival.

The following process was utilized:

Prepare Data & Index	<ul style="list-style-type: none"> Identifying the folders that need to be indexed The data was indexed and lightweight viewable created
Report Duplicates & Where-used	<ul style="list-style-type: none"> Duplicates analytics showing meta data and geometry similarity Analyze where-used reports showing usage of duplicate models
Visual Navigation of Data & Model Comparison	<ul style="list-style-type: none"> Users analyze the reports, visually confirm items identified as duplicates Navigate to each folders and visually compare the models for similarity
Shape-based Classification of Models	<ul style="list-style-type: none"> Geometry based classification that organized the data Visually inspect classified data and identify library parts for standardization
Archival of Duplicates	<ul style="list-style-type: none"> Duplicate, where-used reports & visual comparison to archive duplicates Rule-based automated reporting for quicker archival

Impressed with the integration capabilities of Bingo! with the CAD and PLM environment, MCFA decided to implement Bingo! with the new PLM system. This was done to establish a highly efficient search and re-use environment and to provide a permanent solution for controlling data proliferation.

Results:

The outcome of the data cleansing project is shown below:

Total models (all versions of Pro/E parts, assemblies)	1.5 Million	
Latest models selected for geometry analysis	175,000	100%
Total number of duplicates identified	58,972	34%
Efforts to archive duplicates using reporting and visual comparison tools	2 weeks	
Number of duplicate parts/assemblies archived using Bingo! automation tools	23,000	13%

Benefits:

MCFA achieved a major improvement in efficiency and cost savings by utilizing the expert consultants from SCONCE and implementing the Bingo! shape-based search solution.

1. Cost Savings by Archiving Duplicated Data: The most important savings brought by Bingo! was the efficient identification and archival of 23,000 objects. While calculating internal costs on a ‘per part basis’ is complicated, external industrial studies report that the average life cycle cost of a part in a manufacturing companies can range between \$2,000 and \$27,000 per part.

2. Design Model Knowledge Mapping: According to Wayne Mabry, “A key benefit was the advantage of being able to explore what data we actually have in our system. There has been a lot of turnover between the time we started piling stuff into those shared folders and now. Visually exploring the entire content in Bingo! gave a great understanding of our data and the duplicate

reports and the usage metrics from Bingo! gave the clarity of what is required and what is redundant. This understanding is important so that we do not waste time migrating unwanted data to our new PLM system.”

3. Direct Engineering Productivity Gain: Prior to this project, MCFA engineers were typically diverting productive time to search for the right components to re-use when creating a new product. With the implementation of Bingo!, the search time is drastically reduced. An estimated 3-5% Design/Engineering cost savings has been achieved.

4. Automatic Classification: As part of the duplication data archival project, all of the indexed objects were automatically arranged under various classification groups based on the shape. Bingo! also helped to identify the most relevant attributes that can be used as selection criteria for a particular classification group and associate those attributes for future filtering and selection. The classification hierarchy created will serve as an in-house part catalog for MCFA.

5. Downstream Benefits: Bingo! not only helped to reduce the load on the migration process and the new PLM system, it will continue to help MCFA in the following aspects:

- Search and re-use existing designs and associated design knowledge
- Faster implementation of the Forklift Value Initiatives (FVI). These highly visible and important cost savings initiatives are critical in producing value for MCFA’s customers and shareholders
- Allow MCFA’s engineers to focus on their “core” activities
- Leverage similarity knowledge to all downstream users of MCFA to make informed decisions. For example, the sourcing department will be able to make purchasing decisions and consolidate vendors who provide similar objects to gain cost advantages

Preventing Future Parts Proliferation:

The MCFA engineering process can now apply Bingo! shape-based technology in three scenarios:

- When models are electronically received by suppliers and partners, MCFA can use Bingo!’s folder/PLM comparison capability to identify duplicates before introducing such data into the PLM system, in spite of the fact that identified duplicated objects do not use MCFA’s naming convention
- Before beginning work on a new model, MCFA will use Bingo!’s powerful search tools to find existing similar models. This can be done using input such as 2D sketches, 3D models, photographs of the model, and overall dimensional or attribute parameters
- Bingo!’s automatic classification technology will be continuously used to maintain the in-house online part library. The availability of this catalog will encourage engineering re-use and allow purchasing personnel to identify commonly purchased requisitions, in order to consolidate and aggregate sourcing decisions

Product Information

Product: Bingo!



Bingo! is a shape-based search technology which provides a unique and highly productive solution to the part and vendor proliferation problems found among major manufacturers’ today.

Using a powerful shape similarity algorithm, Bingo! enables manufacturers to reduce and maintain the duplication of designs and parts, thereby, effectively controlling the size of the part master, a central source of product cost. This goal is achieved by locating and archiving unnecessary proliferated parts, aggregating part data to make easy vendor and sourcing decisions, and encouraging engineering data re-use.

Bingo! capabilities include:

- Identifying duplicate and similar parts, providing systematic duplicate reports, where-used information, easy visual comparison, and automated tools to archive unused duplicate parts
- Organizing and classifying standard product data in useful part catalogs
- Providing intuitive 2D and 3D shape search capabilities
- Reporting of duplicated parts and their usage to enable effective decision making for engineers, part managers and sourcing departments
- Integration of external attribute based systems for additional filtering and consolidation of data in a single, similarity based system