

Dispelling the CAD Selection Misconception: Company Size Doesn't Matter, but Product Complexity Does

Key Facts

Is company size a good measure of its CAD and data management needs? According to Aberdeen research, the answer is “no.” In fact, a more accurate measure is the manufacturer’s product complexity. Comparing companies that produce products of the highest complexity to those producing products of the lowest complexity – regardless of company size – shows distinct differences in CAD capabilities needed.

- Manufacturers of high-complexity products are three and a half times as likely to use large assembly management capabilities for products with over 500 parts (62% versus 18%).
- Manufacturers of high-complexity products are twice as likely to use the configuration capabilities of data management solutions (56% versus 28%).

Decision Framework

Bifurcation. That’s the word many use to describe the product design market today. The idea is that SMEs have lesser CAD and data management needs. An assumption underlying this idea is that small and mid-size businesses produce simpler products.

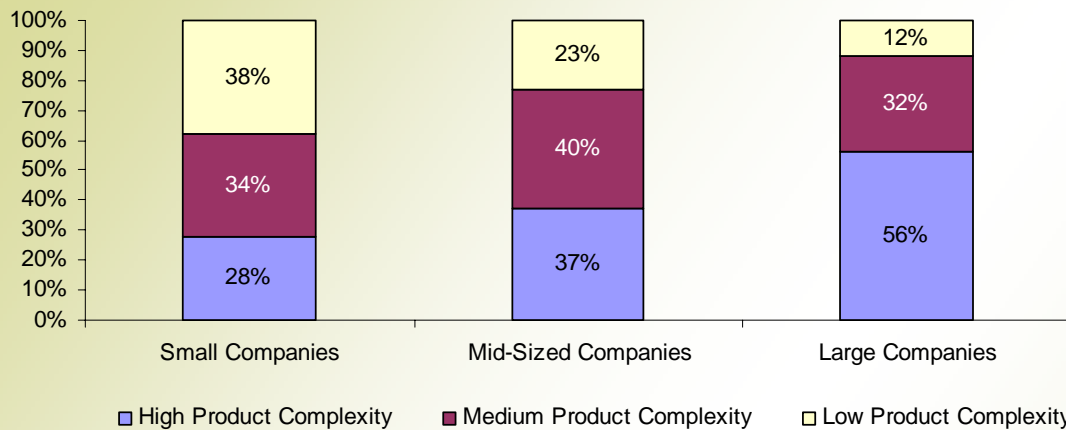
To clearly understand how product complexity correlates to company size, Aberdeen categorized respondents from [The Transition from 2D Drafting to 3D Modeling Benchmark Report](#) by measuring three key indicators: *number of parts*, *product development lifecycle*, and *number of engineering disciplines* (Table 1)

Table 1: General Characteristics of Product Complexity Categories

Product Complexity	Number of Parts	Length of Development
Low	Less than 50	Between a week and a year
Moderate	Between 50 and 1,000	Between a month and 5 years
High	Between 50 and 10,000	Between 1 and 5 years

Source: AberdeenGroup, December 2006

By comparing the complexity of the products developed by companies of different sizes, one can see that the previously mentioned assumption correlating product complexity with company size is not valid (Figure 1).

Figure 1: Product Complexity Produced by Company Size

Source: [AberdeenGroup](#), December 2006

While the results do show that larger companies are more likely to produce products of the highest complexity (56% versus 28%), it's not valid to say small and medium size companies make simple products. In fact, 42% of small manufacturers and 77% of mid-sized manufacturers make products of medium or high complexity.

Overall the conclusion here is clear: a substantial number of the small and medium sized companies make complex products. But does this fact affect their CAD and data management needs? Comparing the use of CAD and data management capabilities against product complexity provides some answers.

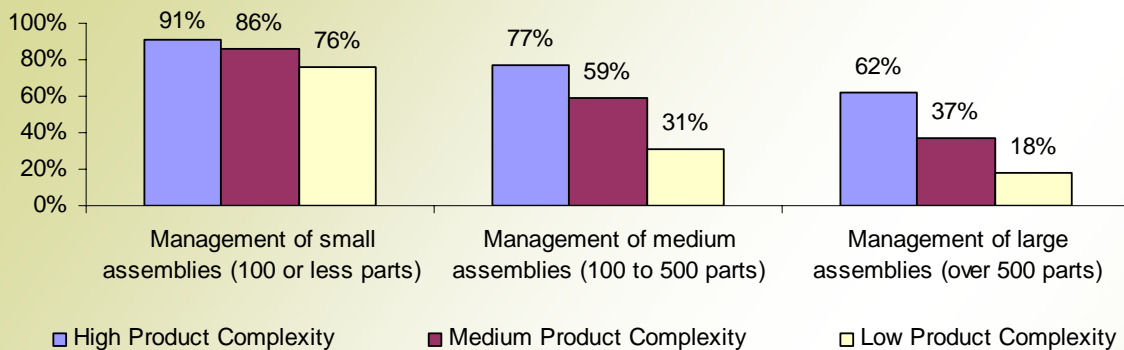
Large Assembly Management Capabilities

One set of the critical capabilities related to product complexity is large assembly management. These allow users to improve the graphical and computational responsiveness of the application when dealing with assemblies with complex parts or a large number of parts. These capabilities focus on lessening the load on core and graphics processors.

- **Level of Detail** – Fundamentally, the further something is away, the less detail can be seen. By leveraging this premise, some CAD software understands that the further something is away; it can simplify and abstract the geometry dynamically on the fly.
- **Separation of Graphics and Feature Information** – Another breakthrough technology lies in how the geometric and feature information is stored in the models. By separating this geometric and feature information, some CAD software only loads the geometric or graphic information and only retrieves the feature information into memory as required.
- **Localized Context** – While it can be advantageous to have all of the assembly information and geometry accessible, sometimes it just isn't necessary for the job at hand. Some CAD software allows users to include, exclude or determine what type of representation should be shown.

While a variety of companies use these capabilities, the manufacturers of the higher complexity products leverage them at a higher rate (Figure 2).

Figure 2: Large Assembly Management Capability Use by Product Complexity



Source: AberdeenGroup, December 2006

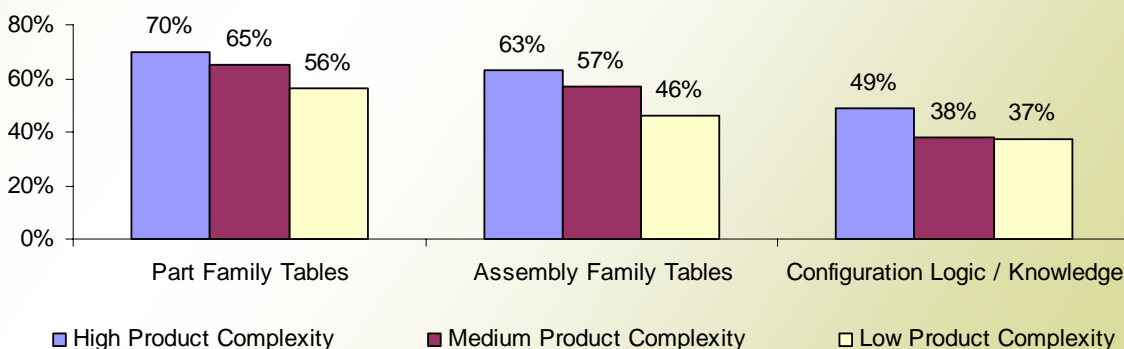
Capabilities specifically for managing assemblies of less than 100 parts are used by manufacturers that develop products of every level of complexity. The differences start to show in the next two levels of capabilities:

- Manufacturers of medium-complexity products are twice as likely as producers of low-complexity products to use assembly management tools for products with 100-to-500 parts (31% versus 59%).
- Manufacturers of the highest-complexity products are roughly 68% more likely than the producers of medium-complexity products to use assembly management capabilities for managing over 500 parts (37% versus 62%). Furthermore, they are three and a half times as likely as producers of low-complexity products to use these same capabilities (18% versus 62%).

Design Automation Capabilities

Three key design automation capabilities are also address product complexity (Figure 3). The first two are the automated creation and management of part and assembly configurations through parametric table inputs. The third is the capture of programmatic design logic that is then embedded within the design models, enabling them to dynamically update the model for parametric changes.

Figure 3: Design Automation Capability Use by Product Complexity



Source: AberdeenGroup, December 2006

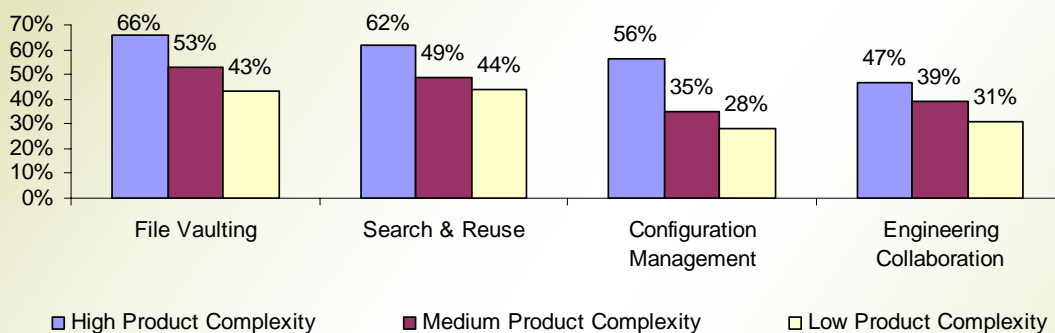
In general, manufacturers of high- and medium-complexity products are 10% to 15% more likely to use part and assembly family tables. They use these capabilities to automate the creation of new designs that are similar or different to designs created in the past.

Additionally, the producers of the highest-complexity products are more than 10% more likely than manufacturers of medium- and low-complexity products to capture and embed configuration logic in their design models. They use this capability to morph existing products into new ones, shortening their design times as a result.

Data Management Capabilities

A final key category of capabilities that works hand in glove with CAD design applications is CAD data management. Just like the other capabilities examined; the higher the product complexity, the more these capabilities are used (Figure 4).

Figure 4: Data Management Capability Use by Product Complexity



Source: AberdeenGroup, December 2006

In particular, manufacturers of the high- and medium-complexity products are more likely to employ key data management capabilities to support CAD use. Specifically, they are:

- 53% more likely to use file vaulting (66% versus 43%).
- 41% more like to use search and reuse (62% versus 44%).
- Twice as likely to use configuration management (56% versus 28%).
- 52% more likely to use engineering collaboration (47% versus 31%)

File vaulting and search and reuse are two key capabilities that serve as the necessary foundation if a product of any complexity is being developed. Engineering collaboration is used to coordinate the effort of larger and, increasingly, outsourced or off-shored engineering teams developing complex products.

In addition, manufacturers of the most complex products are twice as likely as manufacturers of the simplest products to use the configuration management capabilities of data management applications. With a complex design represented by hundreds if not thousands of files that each represents individual parts, the number of interrelationships between these files skyrockets. Without the configuration management capabilities of data management tools, users would quickly become overwhelmed by the number of interrelationships.

Solution Landscape

There are solutions from many software vendors that can provide some or all of these capabilities but are more often oriented into enterprise and SMB offerings (Table 2). Make sure to understand the capabilities relevant to the complexity of your product.

Table 2: 3D Modeling CAD Solution Landscape

	Large Assembly Mgt.	Part and Assembly Family Tables	Embedded Configuration Logic	File Vaulting, Search & Reuse and Engineering Collab.	Configuration Management
Alibre Design (Alibre)	●	○	○	●	○
Catia (Dassault Systemes)	●	●	●	●	●
CoCreate Designer (CoCreate)	●	○	○	●	●
KeyCreator (Kubotek)	●	○	○	○	○
Inventor (Autodesk)	●	●	●	●	●
IronCAD (IronCAD)	●	○	○	○	○
NX (UGS)	●	●	●	●	●
Pro/ENGINEER (PTC)	●	●	●	●	●
Solid Edge (UGS)	●	●	●	●	●
Solidworks (Dassault Systemes)	●	●	●	●	●
ThinkDesign (Think3)	●	●	●	●	●

Source: AberdeenGroup, November 2006

○ Capability Unavailable ● Capability Available

Recommendations

Based on these findings, Aberdeen makes the following recommendations for selecting CAD software based on product complexity.

Manufacturers of Medium-Complexity Products

These manufacturers should deploy:

- CAD software that includes large assembly management capabilities for assemblies that include 100-to-500 parts as well as part and assembly family tables
- Data management software that includes file vaulting, search and reuse, and engineering collaboration capabilities.

Manufacturers of High-Complexity Products

These manufacturers should deploy applications with the capabilities described for medium product complexity manufacturers as well as the following:

- CAD software that includes large assembly management capabilities for assemblies that include more than 500 parts as well as model-embedded configuration logic.
- Data management software that includes configuration management capabilities.

Related Research

[*The Transition from 2D Drafting to 3D Modeling Benchmark Report: Improving Engineering Efficiency*](#); September 2006

[*The Mechatronics Design Benchmark Report: Coordinating Engineering Disciplines*](#); August 2006

Author: Chad Jackson, Service Director, Product Innovation and Engineering
(chad.jackson@aberdeen.com)

Founded in 1988, **AberdeenGroup** is the technology- driven research destination of choice for the global business executive. **AberdeenGroup** has over 100,000 research members in over 36 countries around the world that both participate in and direct the most comprehensive technology-driven value chain research in the market. Through its continued fact-based research, benchmarking, and actionable analysis, **AberdeenGroup** offers global business and technology executives a unique mix of actionable research, KPIs, tools, and services.

This document is the result of research performed by **AberdeenGroup**. **AberdeenGroup** believes its findings are objective and represent the best analysis available at the time of publication. Unless otherwise noted, the entire contents of this publication are copyrighted by **AberdeenGroup**, Inc. and may not be reproduced, stored in a retrieval system, or transmitted in any form or by any means without prior written consent by **AberdeenGroup**, Inc.