



An Arena Solutions whitepaper

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3 Essential Tips for Effective Change Management

whitepaper

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While rapid business expansion is often the goal, it can be a stressful process for any manufacturer. But it can be particularly stressful for small and mid-sized organizations that lack a dedicated process to maintain control of their product data. Without controlled change of your product data, you leave yourself vulnerable to manufacturing disasters ranging from scrap and rework all the way up to and including product recalls.

This whitepaper tells the story of a small manufacturer who undermined its own success with an engineering and manufacturing change management process that relied on out-of-date tools and communication methods that could not scale to meet the complexity of a rapidly growing company. This paper also describes how a collaborative bill of materials (BOM) and change management system like Arena could have saved this company from an embarrassing and expensive manufacturing disaster.

3 SURE FIRE WAYS TO FAIL

Swim Beaus were the most successful product in Armbrister Entertainment's history. Thousands were sold. The singular success of the Swim Beaus had transformed Armbrister from a boutique toy manufacturer to a multimillion dollar enterprise competing against international heavyweights in the cut-throat world of kids' toys.

But at its core, Armbrister remained an old-fashioned Mom-and-Pop outfit that stayed true to the manual engineering and manufacturing processes that had served it so well before the Swim Beau changed the company's fortunes. Telephone, fax, email, and passing conversations in the hall formed the backbone of Armbrister's engineering and manufacturing change order process. On every flat surface in the place lay a tumbledown of bulging folders of engineering change orders (ECOs), test results, Excel spreadsheet printouts of BOMs, and sticky notes that comprised the Swim Beau DNA.

A Swim Beau itself is an electronics and engineering marvel. Eighteen inches of radio-controlled, battery-powered micro-machine girl and boy dolls that can swim on their backs or bellies, raise their arms and legs independently, and turn their heads as if breathing. Its success was so great that animators wanted to make a kids show based on the adventures of Swim Beaus, and the accessories, endorsements, and fan club memberships returned Armbrister huge profits. A new line of Olympic Swim Beaus were even under development when the complaints started pouring in that the Swim Beaus were bursting into smoke and flames.

During the course of a crisis meeting of Armbrister's engineering, manufacturing, and operations managers, it was discovered that a small, but crucial ECO concerning the seal on the battery compartment had not been properly communicated to the manufacturing department. Similarly, a seemingly inconsequential manufacturing change order (MCO) had not been formally brought to engineering's attention. This failure to communicate set off a chain of events that led to the product bursting into flames and the eventual recall and replacement of 10,000 Swim Beaus.

The ECO itself involved a simple, cosmetic change from an ugly black Buna o-ring to a clear Silicone o-ring that blended in with the doll's color. Unknown to engineering, manufacturing's MCO instructed assemblers to smear silicone grease along the o-ring to make installing the cover easier. The combination of a silicone o-ring and silicone grease set off a chemical reaction that broke down the seal on the battery cover. Water then seeped into the electronics compartment, where eventually corrosion set in, forming an electrical bridge across two traces. The

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high resistance of the new, unwanted connection became so hot that it ignited the batteries.

An executive management team investigated what had gone wrong with the engineering and manufacturing processes at Armbrister. The team determined that the company lacked control over its product data. At all levels of its process, Armbrister relied on outmoded forms of communications and paper-based processes to communicate changes between departments, leaving the company vulnerable to a manufacturing disaster at any step along the way. The final report identified three key areas in need of repair:

- **Control** –Engineering and manufacturing could make changes to a product BOM independently
- **Review** – ECOs and MCOs were entered into the master BOM and implemented without review and sign-off by stakeholders
- **Notification** – Armbrister did not have a formal or a consistent change notification process

The basic problem boiled down to the fact that the heads of engineering and manufacturing had been informed of the other's changes verbally but had forgotten about them. Hard-copy ECOs and MCOs were inserted in the master file folder along with hundreds of other documents. The changes were also entered into the company's master BOM, which was kept on an Excel spreadsheet. Any changes in an Excel spreadsheet are not highlighted or evident in any other manner beyond an easily overlooked icon tucked into the corner of a cell.

Further, when each department manager reviewed the final BOM that was prepared for the contract manufacturer, they focused on their own changes because they had no idea what other departments might have changed. Because the change management and approval process at Armbrister relied on verbal communications or email, no formal audit trail of approvals existed. Consequently, both the ECO and MCO slipped past affected stakeholders and disaster resulted.

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HOW ARENA HELPS YOU CONTROL PRODUCT DATA

Companies like Armbrister can suffer manufacturing disasters because they lack central control over their product data. With every department having its own BOM with its own naming and numbering techniques, data becomes isolated from other teams. This, in turn, sets the stage for vital information being missed by affected stakeholders.

Arena helps solve this problem by providing a central repository where you can maintain control over your master BOM. All teams in your company make changes to the same BOM, eliminating the problems inherent with having different BOMs in every department. However, while all teams make changes to the same BOM, Arena also allows for completely tailorable BOMs so that each team sees only the data they need to without the distractions of data that doesn't pertain to their part or position.

Arena also provides revision control that captures and tracks the complete change history for parts, assemblies, and entire products in one location. What this means for you is that once all your product data is in the same place, then any changes to your data – quantities, specifications, and approved purchasing information in your AML, for example – are available to all departments. You can see who made the changes and track the entire history of your decision-making process. Multiple and conflicting versions of your BOM become a thing of the past. Everyone is always working with the latest revision of your product.

ECO
Change #ECO-000045

Release X27 Board to production

Submitted, Approval Deadline: November 12, 2009,

Summary | Files | Items | Requests | Alerts | Routings | **Decisions** | Implementation | Notifications | Status | Supplier Access

Current Decision | Decision History

Stage 1: Open

#	Name	Comments	Last Action	Requests	Last Request	Commands
Additional Reviewers Optional - ✓						
1	Maria Wilcox Anthill Industries		11/04/2009 05:15 PDT	0		Edit Remove
Engineering Unanimous - Not yet approved						
2	Rachel Borg			2	11/04/2009	
3	<input checked="" type="checkbox"/> Toshiro Makamuri	Ready to release	11/04/2009 01:10 PDT	1	11/04/2009	
Manufacturing Optional - ✓						
4	<input checked="" type="checkbox"/> Eleanor Canard	We are ready to go with the new tooling.	11/03/2009 04:40 PDT	0		

Request Review

Stage 2: Upcoming

#	Name	Comments	Last Action	Requests	Last Request
Executive Approval Unanimous - Not yet approved					
1	John Bollinger			0 (1 queued)	

Request Review | Request Review When Stage Opens

Change decision view in Arena - displays who has approved the change, when they approved it and what comments they had. You can add revisions on the fly or send reminders for people to review the change.

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HOW ARENA HELPS ENSURE CHANGES ARE REVIEWED

The review process at Armbrister was, at best, ad hoc. At worst, it was a disaster waiting to happen. Using complicated Excel spreadsheets to manage BOMs containing hundreds of parts from dozens of vendors can leave you with little visibility into and poor control over your data. And without a method to communicate, organize, and track engineering change requests (ECRs), valuable information that could have prevented the Swim Beau disaster slipped through the cracks.

Arena eliminates problems like these in two key ways. First, while Excel doesn't have functionality to highlight changes or send out ECOs and MCOs, Arena does. Arena's redlining capability makes changes visible and easy to review. When you combine redlining with automatic routing of ECOs and MCOs, it becomes nearly impossible to miss any changes.

Second, Arena's BOM and ECO/MCO management capabilities also offer ECR functionality. This provides you with a method for reviewing proposed changes before they have been designed in detail. Arena's change request functionality tracks your discussions around the issues of proposed product changes, and it manages recommended next actions as well as the final decision made on a proposed change before that change is elevated to an ECO/MCO.

ASSEMBLY > HOUSING PRODUCT/ACCESSORY
Item #802-0122 In Production

BlueFin Remote NTSC / PAL Monitor

Revision: Working Revision * | Modified, 0 Views Locked

1 additions, 1 removals, 1 edited line Item, 4 edited components in the Working Revision since Revision B - In Design

#	Item Number	Item Name	Phase	Quantity
1	2A0-0012-A1	Electrical Tape 3/4 x 66 Super 88	In Production	1 each
2	661-0336-A 661-0337-A	Minnow 2.5 Monitor Shade BlueFin Remote Bulkhead	In Production	1 each
3	680-0076-A 680-0077-A	BlueFin Remote Bulkhead Assy PCA	In Production	1 each
4	705-0077-A	Double Ball Arm Clamp	In Production	1 each
5	705-0091-A	Allen L Key 3/32 in	In Production	1 each
6	780-0048-A	Box Tube - 7 x 7 x 10 (single tube box)	In Production	± 2 each
7	823-0314-A 823-0315-A	Thurston Remote NTSC Monitor Assy	In Production	1 each
8	823-0352-A 823-0353-A	Remote Monitor Charger Assy	In Production	1 each
9	825-0080-A	QuikConnect Ball End Assy	In Production	2 each
10	905-0108-C	Compact and Remote Monitor Instructions	In Production	1 each
	680-0124-A	Double 3-pin-male-Micro-SubConn-25.5-long	In Production	1 each

Redlining BOM view in Arena - compares 2 revisions and displays components that have been added or subtracted, quantities, phases, part names and part numbers which have been modified. Changes in files can also be shown.

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HOW ARENA HELPS GUARANTEE STAKEHOLDERS ARE NOTIFIED

The ad hoc communications between Armbrister’s engineering and manufacturing departments led directly to everyone missing the obvious error of mixing silicone grease with silicone gaskets.

Arena provides a formalized communication methodology that gives you full control over your change management process. Not only does Arena standardize your notification process by automatically routing ECOs and MCOs to stakeholders impacted by the changes, it automatically notifies people when a change is ready for review and when the change has been approved.

Notification of approved changes can be sent by Arena to change group participants and non-participants alike as well as key suppliers and contract manufacturers. You can even set up Arena’s notification system so that suppliers can notify you when and where they have implemented your changes. This means that data such as lot number, serial number, or the specific day a change took place on the factory floor becomes a permanent part of your product record.

ECO
Change #ECO-000045

Save to Dashboard Browse Change
Email a Link

Release X27 Board to production

Effective as of **November 04, 2009** | Implementation Status: ✔ Done

Summary Files Items Requests Alerts Routings Decisions **Implementation** Notifications Status Supplier Access

Implementation Status Edit Status

Status ✔ Done
Last Edited By [Eleanor Canard](#)
Last Edited On **November 04, 2009**

1 Implementation File, 1 stored at Arena using 8 kB Download Stored Add New File(s) Add Existing File(s)

#	File	Title	Edition	Category	File Number	Size	File Format	Author	Modified On	Commands
01		MPI_070-0072-001	Latest (1)	-uncategorized-	FILE-000166	8 kB	PDF	Toshiro Makamuri	11/04/2009	Update Remove

2 Implementation Notes Add Note

#	Label	Note	Last Edited	Supplier Visibility	Commands
01	Batch/Lot Code	Lot 49	Eleanor Canard 11/04/2009	Public	Edit Make Private Delete
02	General	Make sure to follow the new MPI on the production run.	Eleanor Canard 11/04/2009	Public	Edit Make Private Delete

Let others know that a change is not started, in progress, or done

Add reports, procedures or other files

Record cut in information such as lot code or serial number

Implementation view in Arena - allows your manufacturing department or CMs to record information about the implementation of a change. Add reports, files and notes and set implementation status.

HOW ARENA HELPS YOU SIMPLIFY AND STANDARDIZE YOUR ECO PROCESS

Like all manufacturers, Armbrister’s goal was to build their product correctly the first go around, ship it on time, and stay within budget. Instead, Armbrister’s success turned into disaster because they relied on old, error-prone methods and tools to communicate ECOs and MCOs, track approvals, and manage their BOMs. With Arena, you can simplify and standardize your engineering change management processes and ensure that your product changes are communicated to the right people at the right time.

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A company like Armbrister may have thought that they didn't have the budget or the IT resources to set up and maintain a collaborative bill of materials and change management system like Arena. But Arena makes it easy and affordable for small to mid-size companies to get control over their data, BOMs, and engineering and manufacturing change processes. In fact, Armbrister would have probably spent a lot less on Arena compared to the expense of the Swim Beau product recall and the amount of damage to their brand.

Arena's flexible user-based pricing and on-demand delivery make the time and money hurdle a thing of the past. Arena provides the software without requiring additional IT infrastructure and allows you and your team to focus on what you do best... designing and building good products.

If your success depends on staying within budget and getting to market before your competitor, you cannot afford to let your data get out of your control. Arena reduces scrap, rework, missed deadlines, and cost overruns. Arena makes it easy to avoid disaster, stay on top of engineering and manufacturing changes, and control your bill of materials.

Learn more about how Arena can help you get your data under control by visiting www.arenasolutions.com/controlchanges

This whitepaper is brought to you by Arena Solutions, which enables small to mid-sized global manufacturers to deliver their products to market on time, within budget and at high quality. Arena provides a collaborative environment for centralizing, controlling and analyzing complex and constantly changing product information, including bills of materials (BOMs), part specifications and engineering change orders (ECOs).

The repository for the product record, Arena sits at the epicenter of the broader product lifecycle management (PLM) landscape, connecting with systems like CAD, EDA, PDM and ERP and linking organizations with their supply chains. With its on-demand, software-as-a-service (SaaS) approach, Arena is a low-risk, rapid-return proposition that makes enterprise-class functionality available to companies that would otherwise have to contend with manual, time-consuming and error-prone product data management processes.

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