a mars international whitepaper

Intellectual Property Protection and Document Control

introduction

The classic concern about outsourcing is that you will wake up one morning to find out that counterfeit versions of your products are being sold by a shady offshore firm. The reality is that this scenario is extremely rare. Most off-shore manufacturers are focused on contract manufacturing and have no interest in destroying their reputation by engaging in this type of activity.

However there is a larger danger in protecting your intellectual assets that is much more commonplace, and while it is primarily an issue with overseas manufacturing it can affect domestic design and production as well. We see many companies that come to us wanting to shift production from their existing supplier for a variety of reasons, including quality, delivery, and cost. *But they cannot give us a complete manufacturing-ready documentation package that allows for a rapid production shift*. The documentation is controlled by the manufacturer or engineering firm that helped design the product. So they end up having to reverse engineer their own products, or just end up living with the deficiencies of their current supplier.

The documentation package for your products is the key intellectual asset of your company. It should be treated like the crown jewels of your organization. All too often key pieces of documentation are only held by outside designers or manufacturers, and companies get held hostage to price increases or delivery issues. And once in this position many are afraid to push their vendors to get copies of the documentation for fear that it will trigger the very situations they are trying to avoid.

guidelines

Mechanical Components

Solid models of all parts: These should preferably be in the native format that they were designed in (Solidworks, Pro-Engineer, etc). You don't necessarily need to have the software required to read these files, although most have free viewers available. Neutral file formats like STEP and IGES are acceptable, but not as good, since it is much more difficult to make design changes if required down the road.

2D Drawings: 2D drawings are important supplementary documents to the 3D CAD data. They contain tolerance and material information, assembly directions, and more. It is important that all of this be captured.

guidelines

Material Information: Be sure that you have the manufacturer and grade number for resins, metals, etc. You should also have information about any colorants or fillers that are blended by the manufacturer.

Tool Drawings: While not as important as the other items it is a good idea to have copies of all tool drawings. There are subtleties in manufacturing that may have to be relearned if you redesign the tool from scratch with another supplier.

Electronics

Schematic: A schematic shows all components and interconnections. It is very difficult and error prone to reconstruct by reverse engineering the product, so it is important that this be maintained. As with 3D CAD data you should keep this in the original native format as well as PDF documentation that anyone can read.

Gerber Files: The Gerber files define the bare printed circuit board, including traces, holes, and physical dimensions. It is best to have these in the Gerber format as well as PDF files.

Bill of Materials: It is vital that you have a detailed BOM for at a minimum the electronic components. An overall BOM is also important, but it is much easier to reconstruct a mechanical BOM if necessary. Electronic components on the PCB are often indistinguishable. A BOM should have a description of the functional characteristics of the part (e.g. Capacitor, 0.1 uf X7R 10% ceramic 16V 0603), as well as specific approved vendors and their part numbers, and a circuit designator reference that matches the schematic (e.g C3, R5).

BOM Component Data Sheets: While not as critical, it is good to have copies of supplier data sheets for critical components defining the characteristics.

Bill of Materials: As noted in the electronics section you should have a complete BOM for the entire product including fasteners, packaging, and any accessories.

guidelines

Test Procedures and Fixtures: If the manufacturer developed the testing protocols, make sure that they have copies of the documentation. In addition you should try to get engineering drawings of test fixtures. If this is not possible you should at least have photographs of the fixtures. Certainly if you have paid for test fixtures you are entitled to some form of documentation.

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Software

Hex Code: The Hex Code is the software that actually gets programmed into the microprocessor. If you have this file you can duplicate your product, but without the source code it will be very difficult to make changes.

Source Code: The Source Code is the human-readable version of the code. If you hire an outside programmer it is critical that part of your contract is that you get a copy of the source code. Without the source code it is very difficult to make changes in the future, or use the software as a basis for other products in your line. In addition, the source code should be well commented so other programmers can understand the function and intent. It is a good idea to ask for source samples of other code the programmer has written to make sure it is adequately commented.

Programming Instructions: This document explains how the hex code should be programmed into the chip. Often there are special bit settings or serialization that needs to be configured that may not be specified in the source code. You need to know what these are.

Other Items:

Artwork: If you have an outside firm do logos, instruction sheets, packaging, or other artwork you should have a copy of the native files (usually Adobe Illustrator 'AI' files) as well as PDF versions. If you only have PDFs make sure you get color information if matching is important.

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Assembly Instructions and Fixtures: If possible, maintain copies of the step-by-step assembly instructions that your supplier prepares for the manufacturing line. In addition, you should have information about any assembly fixtures that are used in the manufacturing process. As with test fixtures, if you have paid for assembly fixtures you should get some type of documentation about their construction.

Engineering Changes: Even if you get all of these items it can be for naught if you do not keep up with changes. It is critically important that whenever a tool is modified, or a component substitution made that the relevant documentation be updated. We have been involved in many projects where subtle changes in a design were made after production had started, but were not reflected in the documentation. Only after tooling and costly product failures were these changes discovered.

summary

Maintaining all of this information about your product will enable you to have peace of mind knowing that you can quickly and effectively change suppliers if there are pricing or quality issues. A quality design firm, consultant, or manufacturing partner will have no problem turning any of this information over to you at the conclusion of development or at production start-up, but it should be discussed as part of the negotiations and included in a final contract. If a programmer refuses to supply source code, or a design firm refuses to give the native CAD data, it should set off some alarms.

Protecting this intellectual property is even more important today. Price pressures are forcing manufacturers to re-evaluate their supply strategies. It is imperative to the health of your business that you not be locked in with a particular supplier and to have the capability to smoothly transition to a new source.