

Engineering and Production Drawings

Engineering drawings and production drawings are different, and understanding the difference is important.

In larger electronics manufacturing companies with specialized departments and mature procedures there is typically a good understanding of the difference between engineering drawings and production drawings. In smaller companies, however, this distinction can be lost and the wrong sort of information can end up on the wrong drawings. Or worse, the distinction between the two sets of drawings can be lost as a company struggles to manage with only one set.

This article clarifies the difference between the two types of drawings, and shows how putting information in the proper place brings benefits.

ENGINEERING DRAWINGS

For an electronic product, the Engineering drawings define *what* the product should be.

The engineering drawing set is produced by the Engineering department, and is the final output of the research, design and development phase of a project. The engineering drawing set includes schematics, printed circuit board layouts, bills of material, drawings for mechanical parts and assembly drawings.

The engineering drawings set is a complete specification of what the finished product is. Every aspect of the product that is important to the form, fit and function of the product is specified. Any product, however manufactured, that is consistent with the engineering drawing set is acceptable.

PRODUCTION DRAWINGS

Production drawings show *how* to manufacture the product.



In a medium or large sized organisation there will typically be a production engineering department. Production engineers take the engineering drawings and decide how best to manufacture the product described by the drawings in their factory. They produce a set of production drawings that detail the task to be performed, the equipment to be used, the order tasks are to be performed in and the procedures to be followed.

These drawings are used by the shop-floor workers in their day-to-day activities. Machine operatives, production line workers and supervisors all use the production drawings as a reference for how to go about manufacturing the product.

For example, if the engineering drawings called for a screw to be tightened to a particular torque, the production drawings would typically detail which tool is to be used to tighten the screw, and how it should be calibrated. If the screw is in an awkward place the drawings might also specify that this tightening is to be done early in the assembly procedure, before access becomes restricted.

DIFFERENT FACTORIES, DIFFERENT DRAWINGS

As such, the production drawings typically include information that is specific to the particular factory. One factory will have different tools and machines than another and the production drawings will reflect this. More dramatically, a factory located in the first world will place a premium on labour and will avoid labour intensive processes. A factory in the developing world might choose very different assembly methods, preferring labour intensive

Engineering - *What* Production - *How*

methods that avoid the need to purchase expensive machines.

Products produced in either factory are acceptable as long as they meet the specifications of the engineering drawings.

WHICH DETAILS BELONG WHERE

It is easy to fall in to the trap of putting too much detail on engineering drawings, in an attempt to be helpful. For example, the designer of the component with the screw that needed to be tightened might realise that the screw is in an awkward place and specify on the engineering drawings that the tightening operation is to be done early in the assembly process. But suppose the factory where the product is made only had a particular type of right-angled torque driver. It might actually be more convenient for them to tighten the screw later on, when they can get at it from the side. By imposing the unnecessary restriction the engineer might have just made the product more expensive.

The key questions when considering if something belongs on an engineering drawing are *"Is the proposed specification something that can be observed in the finished product? Would a product be unacceptable if this specification were not followed?"*

In the example of the screw the answer is that the torque specification is important and measurable. You can look at a finished widget and measure the torque of the screw and say whether it is acceptable. The torque specification, if it is important to the correct operation of the widget, properly belongs on the engineering drawing.

On the other hand, you can say nothing from looking at the finished widget about which tool might have been used to tighten the screw or when the tightening might have been done. These things do not affect the finished widget and thus do not belong on the engineering drawings.

WHY TWO SETS

Separating production information from the engineering drawings brings advantages to the engineering department too. Every engineer is familiar with the Project That Will Not Die. The project he worked on five years ago but about which he is still compelled to make mundane decisions every other week. Decisions that have

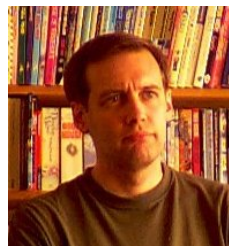
nothing to do with the engineering specifications of the product, but rather concern production details.

This problem is especially acute in smaller companies without a dedicated production engineering department, where all the information about both engineering and production details is on one set of drawings. Every mundane production problem requires the involvement of engineering staff to modify the drawings. Avoid this problem by maintaining separate engineering and production drawing sets. The engineering drawings will rarely change and the expensive engineers can work on developing new products. The production drawings, which typically change more frequently as problems arise or new equipment is introduced, can be maintained by the production staff.

CONCLUSION

Maintaining a clear distinction between engineering and production drawings, and ensuring that everyone understands which information belongs where brings benefits to both the engineering and production functions, both in time and cost.

ABOUT THE AUTHOR



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