

Easing the headache of first article inspections with technology

“We have always noted the value of the FAIR to be a valuable tool to manufacturing.”
Roy Mawhinney

Within the manufacturing industry the role of quality control has become increasingly complex in terms of technology employed, standards adhered to and time constraints met. The role of first article inspection (FAI) as a means of communication between supplier and customer has come to the forefront of quality control.

In recent times, quality control has been refined such that customer specifications are more strictly identified. Agreed specifications are defined to conform to these requirements. Within this FAIs have become an administrative headache, taking up a vast amount of engineers' time in both their preparation and checking. The use of consistent data logging and assessment ensures that the final product reflects the original specification.

Technical concerns

Within current quality assurance procedures technical issues are becoming increasingly complex. The [capability and flexibility of many day-to-day manufacturing processes](#) has increased, adding to system complexity. Along with this is the [growing need for documentation](#) - the FAI report system plays a critical role in ensuring that products are built to the desired specification and standards. This process is often [long and drawn out](#), full of paper-based forms with a variety of attachments and procedures depending on the variety of component the FAI is considering. Multiple industry sectors and a lack of standardisation adds to the complexity of the process. The very nature of FAI is that it is a time consuming process to set up and to carry out and as such is often interrupted. This [stop-start nature](#) can lead to a considerably extended process, with re-familiarisation required each time the procedure is recommenced.

The process of FAI is critical to ensure that products are built correctly to the desired specification and standards.

Competitiveness concerns

Business concerns can never be left out of the equation. The activities involved in carrying out quality control exercises such as first article inspection (FAI) are not simple or straight forward. Businesses are required to tackle the high degree of variability in component manufacture, quality requirements, industry stream, and numerous relevant safety [standards and regulations](#). Above and beyond the requirement to meet these standards is the requirement to prove to the relevant bodies that the standards have been met. This need for [auditability](#) has led to the production of a complex paper trail - this is both time consuming to produce and complicated to track.

The element of time management is an issue within itself. With tight timescales for delivery on the cutting edge of design and manufacture, any additional requirements threaten profitability on project delivery. Complex quality assurance procedures are necessary but non-profit-generating. Each added layer of paperwork eats into already slim profit margins.

Within the aerospace industry, for example, the importance of compliance is highlighted through the need to adhere to AS9102 as a matter of aircraft security for all component parts. This provides a standardised proof that the part has met quality control standards.

This is in addition to the quality assurance forms such as FAI regulations particular to an individual company.

Past, present and future

In the past the use of engineering drawings to define both a product specification and manufacture have been the standard industry tool. However there is an increasing trend to move away from this two dimensional system through the use of technology. Although the future of much of design development is computer aided design (CAD) packages, there is a danger in presuming that the submission of a three dimensional model will be sufficient for the manufacturer. Standardised engineering drawings give valuable information about the priority of dimensions, tolerancing and fit. 'Stage', 'complete' and 'assembly' drawings are often necessary to fully understand and manufacture a component to the required standards. Clear reference dimensions for both holes and corners are essential for an accurate product development. To imagine the fully automatic production of components from models is to take a rather simplistic view. Three dimensional models do not have the same standardised procedure as engineering drawings - this opens up the possibility for error in the choice of key or reference dimensions. The need is not to ignore technology and its advancements but to use them to our best advantage. The use of technology to link drawings with quality assurance checking in a flexible but comprehensive way seems to be a clear and logical step.

"Every batch of components we produce is accompanied by a Component drawing, throughout manufacture. The drawing is after all the information on the part to be produced. On many occasions we have determined that cad models do not always produce the same part as the drawing. Therefore a drawing becomes essential.. to ensure the end product matches specification"

Roy Mawhinney

Solutions

So, how does the industry start addressing this issue of quality assurance without further complicating it? The issues are many but all seem to be based around the need to simplify and streamline an intricate system of events.

The [amount of engineers' time in both preparation and checking leads to a long and drawn-out process](#). The ability to set up standardised FAI reports with automated document flags would help to ensure an easier process all round. Streamlining the process with automated prompts would help the user to recommence an already-initiated control process at the precise point at which it was halted. This would also enable a job to be passed on to a colleague for completion, increasing the flexibility of the work force.

The need for [auditability, along with the standards and regulations](#) of a variety of industry sectors, has led to an increased level of complexity and duplication within the FAI process. Compliance with standards and regulations is vital in order to maintain the safety of a product. However, automatic template generation and cross-pollination for parallel completion of a series of documents could considerably ease this complex issue.

The quality control of a quality control document should not become the key issue surrounding the FAIR

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“The VisualFair software has sped up the whole FAIR process for our company, although we now do more FAIRs than ever before.”
Roy Mawhinney

Added value

The abilities to create bespoke templates and retrieve standard forms are vital for ensuring the flexibility of an automated FAI reporting tool for any company or industry sector. Central storage of standard control documentation as well as previously generated forms vastly improves the flexibility of the process. It can also reduce duplication of effort for relatively minor design changes.

Being able to complete documentation at the most appropriate time will also ensure the quality of the control process itself. It will allow the task of checking for adherence to standards to fit around the design process, rather than the other way around.

Final word

An automated process would reduce a great deal of the inbuilt complexity of this procedure. It would allow checks to be carried out in the most time- and cost-efficient manner, whilst still maintaining the highest degree of auditability. In this way technology compliments the process rather than trying to replace a robust system of engineering drawing documentation. To lose standard engineering drawings from the process would be a step in the wrong direction, as these documents provide valuable information about the priority of dimensions, tolerancing and fit for the manufacture of a product.

Key to success within design and manufacture is clear and concise communication between all parts of the supply chain. As such there is a clear need for an integrated control process tool which allows for the speedy, accurate and auditable processing of FAI control documentation.

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