

MSA Policy for Frozen Process

Introduction:

Lately, there has been a great deal of discussion concerning “Frozen Design” and “Frozen Process” requirements. The trouble is, these two terms can mean different things to different people, which can create a gap in understanding and may set the stage for disagreement.

There is a cost-to-benefit ratio related to defining and achieving the degree of “Frozen” that is desired. The following policies explain the extremes of the “Frozen” spectrum. As such, they establish MSA’s typical product offering, as well as what MSA is capable of providing if the customer desires a greater degree of control to be exercised.

Frozen Process (FP)

MSA views the Frozen Manufacturing Process as a full spectrum of possibilities, bracketed on each end by two distinctly different approaches:

1) MSA’s Non-Frozen Process:

MSA’s typical Manufacturing Process is considered to be **NON-Frozen** because it is governed by well established, cost-effective, real-world guide lines, where process changes are allowed because they do not alter the form, fit or function of the end product.

and,

2) A Totally Frozen Process:

A Strict Manufacturing Process, which is **Totally Frozen**, allows absolutely no manufacturing process changes.

1) MSA’s Policy regarding our Typical, NON-Frozen Manufacturing Process:

For the great majority of our customers, two key manufacturing realities exist within MSA to create our **NON-Frozen**, cost effective Manufacturing Process.

Together, these realities help MSA to ensure compliance with all customer specifications, without adding unnecessary additional cost.

A. MSA’s Typical, Internal Manufacturing Reality:

1. MSA’s Component Manufacturing Processes:

MSA will employ multiple pieces of precision CNC controlled turning equipment, and

multiple variants of additional manufacturing fixtures and processes to produce equivalent, individual components to be used in each final assembly.

2. **MSA's Final Assembly Manufacturing Processes:**

MSA utilizes multiple, equally capable and configurable Lean manufacturing cells, including relevant processes for measurement and testing within each cell, which, together, can confirm the function and quality of each final assembly.

3. **Continuous Process Improvement:**

Great companies are always focused on continuous improvement. MSA utilizes this practice where ever relevant, all the while assuring that each component's character and precision is maintained, and a consistent, reliable end product is achieved.

B. **MSA's External Sourcing Reality:**

MSA will employ multiple, certified and equally capable outside suppliers for services (such as plating, heat treating, etc.), and for raw materials (such as steel, plastics, etc.), always assuring that consistent, reliable components and end products are achieved.

2. **A More Strict Definition of Frozen Process, which is available upon request from MSA:**

If the customer both requires and is willing to pay the additional cost of same, MSA can offer the most strict definition of Frozen Process, one which demands that nothing can change relative to the sourcing, materials, and processes that are used to manufacture components, and nothing can change relative to the assembly and test procedures which are used to complete the end product.

In effect, within this strict scenario, **the entire manufacturing process is Frozen**. Such an approach is typical in the automotive and aerospace market places.

Examples:

1. **Components:** Sourcing, Manufacturing and Processing:

Sourcing of Materials and Outside Services:

If a particular external supplier (i.e. plating, heat treating) is used to add value to a component, and if a specific supplier is used for purchased components/commodities (i.e. O-rings, steel, etc.), then, the most strict interpretation of FP would demand that the same supplier be used for all subsequent customer purchase orders for the same end product.

Internal Manufacturing Processes:

Within the strict FP paradigm, MSA would employ specific CNC machining centers to

make turned components. Once these components become part of the customer qualified final assembly, the strict FP would demand that the same CNC equipment be used to make said components for all subsequent customer requirements.

2. Final Assembly Cell:

Within MSA's Lean, one-piece flow manufacturing environment, if a particular machine is used to produce a sub-assembly in a Lean assembly cell, and, if additional specific equipment within the cell is used for final assembly, testing and inspection of the customer qualified end product, then the most strict interpretation of FP would demand that this same Lean cell (comprised of the aforementioned equipment and test procedures) be used to produce all subsequent orders for the same end product.

Strict FP, Advantages:

a. Serialization:

If desired by the customer, a strict FP can enable serialization of the final assembly.

b. Traceability:

When deemed desirable for future reference and verification of the manufacturing process, the strict FP provides documented history of all parameters, including sources of raw materials, records of component dimensions and tolerances, and the quality data for final assemblies.

Strict FP, Primary Disadvantage:

Achieving everything required within strict FP guidelines comes at great cost, which increases the selling price.

The Path to Frozen Process Realization

Whether a customer wants to choose MSA's Typical, NON-Frozen Manufacturing Process, the Strict Frozen Process, or select a customized approach somewhere in between, such a decision must be made very early in the design phase of a project, and it must then be fulfilled by way of collaborative effort between the customer and MSA.

Only when design guidelines and goals are clearly established can the correct manufacturing processes be selected, thereby achieving the desired technical and commercial results.