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From Experience

Smarter Testing, Better Outcomes: The Value of Virtual FATs

Incorporating performance verification testing criteria and protocols into equipment specifications offers a range of advantages that contribute to project success. By helping to ascertain that systems meet performance expectations before installation, these tests can save time, reduce costs, and improve quality. Traditionally, testing types to be incorporated into equipment specifications have included:

- **Performance Criteria.** Criteria should include rate, efficiency, yield, modes of operation, and changeover requirements.
- **Factory Acceptance Testing (FAT).** The objective of FAT is to validate the performance of individual systems, as well as the fully assembled system. Hixson's protocols require static testing to look at factors such as safety, sanitation, mechanical, electrical, and controls. Dry or wet runs are then conducted, followed by dynamic testing of sub-assemblies and components, to validate performance criteria over multiple short runs. When the fully assembled system is tested, protocols developed to validate performance criteria are executed to demonstrate fault recovery, control logic, and upstream and downstream interfaces.

- **Site Acceptance Testing (SAT).** During SAT, Hixson's goal is to confirm that the equipment is installed and integrated as specified, validate materials compatibility with the system, complete training, and confirm that operations and maintenance teams are capable of operating and maintaining the system. During SAT, static tests, dry/wet run tests, and dynamic testing qualifies performance criteria over an extended period of time.

In addition to these traditional elements, a new form of testing has emerged as part of our increasingly digital, post-COVID environment: the Virtual Factory Acceptance Test (FAT). The Virtual FAT acts as a Pre-FAT to verify the system operates as intended before investing in the travel required for an in-person FAT at a vendor's location.

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Two metrics used to validate equipment efficiency during Virtual FAT, FAT, and SAT are:

1. Machine Uptime Efficiency = (Actual Machine Runtime) / (Potential Machine Time) x 100
2. Machine Yield = (Total Acceptable Units Produced) / (Theoretical Units Produced) x 100

During a Virtual FAT, which is conducted via video conference, the equipment manufacturer is responsible for showcasing how the equipment operates and how it meets performance verification criteria. Remote observers can interrupt the test at any point to ask for more detail, to ask the operator to focus on a specific area, or to change a particular aspect of the tested system.

A Virtual FAT typically has less stringent requirements than a typical FAT. However, it should still validate key aspects such as performance, rate, and/or efficiency of individual components and fully assembled systems. More nuanced system tests are reserved for the in-person FAT and SAT. An added benefit of a Virtual FAT is to boost the preparedness of both the manufacturer and the customer. It can also help generate a punch list of tasks to be executed prior to in-person testing.

On a recent Hixson project, the value of conducting a Virtual FAT was clearly demonstrated. For this project, equipment/project specification documents required a system to pass a Virtual FAT, but the system failed the test. With the inclusion of Virtual FAT criteria in the equipment specification, the Owner realized savings via travel expenses and labor hours, the equipment manufacturer had the opportunity to implement design changes prior the FAT, and consequently, the system passed the in-person FAT.

As shown in this example, performing the Virtual FAT as a first step in the performance verification process can lead to more successful FATs and SATs, ensuring a smoother overall project execution.

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