

Improving Perforating Gun Reliability and Field Performance Begins with the Manufacturing Process



Well-designed and executed manufacturing processes can have a high impact on the quality and performance of end products. A philosophy of excellence and a commitment to quality produces parts and assemblies that are more reliable and perform better. This drives customer satisfaction and loyalty and increases product adoption rate and profitability for the manufacturer. These statements have been proven to be true repeatedly by companies that have developed a customer-centric culture and have built internal manufacturing processes designed around reliability and performance.

W. E. Deming is considered by many to be the master of continual quality improvement in manufacturing. In his book *Out of the Crisis*, Deming states that "No one can guess the future loss of business from a dissatisfied customer. The cost to replace a defective item on the production line is fairly easy to estimate, but the cost of a defective item that goes out to a customer defies measure."

It is with this mindset that DynaEnergetics manufactures, assembles, and tests all DynaStage perforating guns and associated products at its world-class advanced manufacturing facilities throughout the world. Perforating guns and component assemblies must adhere to exacting specifications. Advanced manufacturing, inspection, assembly, and testing procedures are designed to produce superior perforating products with shorter lead times, improved shipping and logistics, better cost control, and the absolute best in reliability and field performance.

STREAMLINING THE SUPPLY CHAIN

For wireline companies that provide perforating services, implementing a self-built, self-managed perforating gun supply chain can be a complex and costly endeavor. It can pull focus away from maximizing performance in the field. DynaEnergetics helps reduce, if not eliminate, these logistical headaches by providing a fully factory-assembled perforating system.

At our facilities, 100% of all ignition components are manufactured in-house, including detonators, charges, and detonator cord, giving DynaEnergetics complete control over this critical part of the perforating gun manufacturing and assembly process. Because we have an onsite explosive storage facility, wireline operators can mitigate safety risks by eliminating this need, along with associated ATF licenses and gun assembly personnel.

ADVANCING THE MANUFACTURING PROCESS

In-house machining is executed with advanced, multi-function CNC machines. First articles are dimensionally inspected through computerized measuring machines (CMM) to assure dimensions are in tolerance. The CNC operator routinely performs in-process dimensional checks to ensure continued compliance. After machining is complete, finished parts undergo further dimensional inspections by quality personnel. If any discrepancies are noted, the entire lot is subjected to 100% inspection. As the last step of the inspection process, each item is engraved for traceability purposes.



DynaEnergetics has developed a seven-step, full-system function test for a final quality check. While most wireline clients can assemble a full system in their shop, many lack the capability to perform a complete function test. They count on DynaEnergetics to provide this critical step that leads to robust downhole reliability for their oil and gas clients.

Dedicated personnel perform continuous improvement functions while cloud-based software constantly collects information on machine performance and scheduled maintenance intervals. On the very rare occasion when a failure does occur, DynaEnergetics uses proven root-cause analysis methodology to isolate problems and ensure performance improvement.

SIMPLIFYING WELLSITE OPERATIONS

Perforating products that are manufactured at our facilities are designed to be shipped directly to the wellsite or to a wireline provider's manufacturing plant or distribution facilities. This unique approach helps our clients avoid the logistical difficulty associated with transporting perforating guns and explosives. We employ dedicated third-party shippers (not common carriers) who have been thoroughly vetted and are certified to transport explosives.

Because DynaStage guns are factory assembled, there is little work to be done on location—just insert the simple plug-and-go detonator, test the system, and run downhole. The modular design allows each component, including the detonation system, to be tested on surface, ensuring the utmost in downhole performance.

A CULTURE BUILT ON PRIDE AND EXCELLENCE

The philosophy employed by DynaEnergetics at our facilities has changed the approach to producing perforating guns. Our commitment to manufacturing and testing excellence delivers a perforating gun that is superior in every way. We take pride in our facility, our manufacturing personnel, and our processes. Superior perforating technology extends well completion design capabilities, is easier to test, safer to use, and more efficient to operate. We welcome you to come and see for yourself.