

Reynolds Industries Systems Incorporated Explosive Products



Explosive loading is conducted in a "white-room" equipped with special weighing, loading and lot control equipment needed for "secondary" explosive initiator manufacturing.



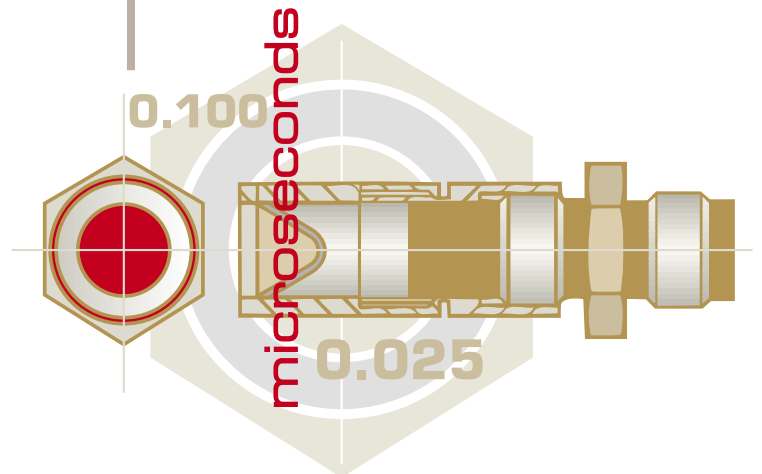
An operator is precision weighing explosive powder prior to its pneumatic pressing against a bridged EBW header.

Facilities

RISI, Reynolds Industries Systems Incorporated, is a subsidiary of Reynolds Industries, Inc. and is located in San Ramon, California, thirty miles east of San Francisco. This unique facility has all the capabilities necessary for the design, development, manufacture and testing of high quality secondary explosive initiators and related explosive components.

The San Ramon facility houses the following distinct operations:

- Administrative offices
- Model shop
- Mechanical and explosive engineering
- Explosive storage magazines
- Explosive processing laboratory
- Remote explosive drying and pelleting
- Loading and final assembly of explosive components
- Ordnance development and production test firing
- Hot, cold and pressure environmental testing
- Receiving and final inspection



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Technology

RISI specializes in the manufacture of secondary explosive initiators including detonators, squibs and ignitors utilizing the Exploding Bridgewire (EBW) or Exploding Foil (EFI) concept. RISI also utilizes these initiators in various explosive devices such as exploding bolts, shaped charges, self forging fragments and explosive welding assemblies.

RISI manufactured initiators contain no low energy primary explosives such as are commonly used in “blasting caps.” Both the EBW and EFI concepts rely on the rapid discharge of electrical energy to vaporize a wire or foil and subsequently initiate a secondary explosive directly.

In the EBW method, the exploding wire provides sufficient shock energy to initiate a secondary explosive such as PETN at about 50% of crystal density.

The EFI concept utilizes an exploding foil to shear a dielectric, and accelerate it across an air gap. The kinetic energy in the sheared disc is sufficient to initiate secondary explosives such as HNS at 90% crystal density.



Precision gold bridgewire welding to EBW header electrodes is critical to performance and high EBW system reliability.

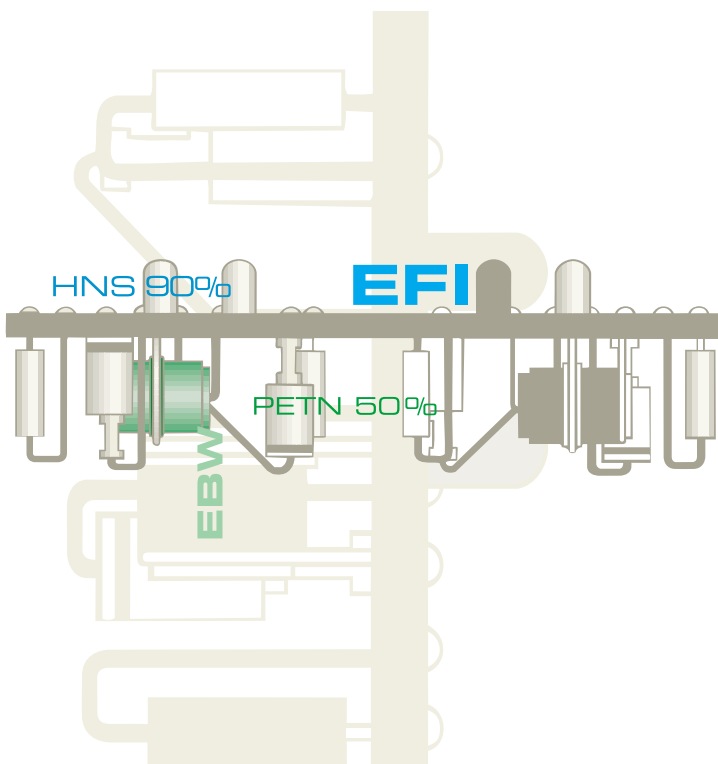
Explosive storage pelleting, drying and processing buildings are specifically designed to meet governmental safety regulations and the unique operational requirements of EBW and EFI Ordnance manufacture.

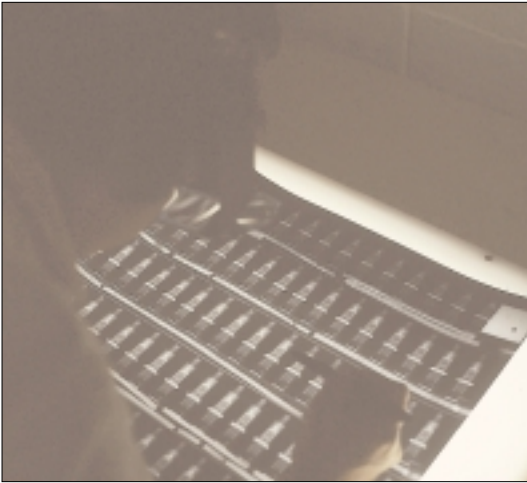


Our explosive processing laboratory is principally utilized for the development and production of re-crystallized “secondary” explosives to make them sensitive to the specific shock generated from exploding bridgewires and exploding foils.



Extensive ordnance testing is conducted to meet varied system applications and needs, including nano, micro and milli-second event timing, reliability calculations and safety parameter studies.





Neutron radiograph inspection of completed EBW and EFI ordnance components is a non-destructive test method to provide assurance of full-filled process and assembly steps of manufacture.



Portable EBW electronic firing systems have found a wide range of applications within the mining, explosive metal welding and energy exploration field. Many of these uses could not be accomplished using conventional blasting equipment without a compromise of safety.



Exploding bridgewire and exploding foil initiator ordnance components are offered by Reynolds as either off-the-shelf devices of various sizes with pigtail lead or coaxial connector input, or can be designed, developed, and manufactured as devices to meet specific customer requirements.

Product Applications

Operational safety and/or timing repeatability are the major justifications for the use of secondary explosive initiators in ordnance or commercial applications. Both the EBW and EFI require a specific high energy electrical pulse to function thus precluding accidental initiations by radio transmission, static charges or proximity to high tension lines.

EBW's and EFI's provide a great deal of timing simultaneity. Premium RISI detonators are available with a timing simultaneity of less than 0.025 microseconds while the standard RISI detonators have simultaneities of 0.100 microsecond.

Ease of Transportation is another advantage of EBW's and EFI's since both are classified by the U.S. Department of Transportation as either 1.4 B or 1.4 S.

When existing RISI firing units will not satisfy a specific application, RISI has the ability to design or repackage firing systems for a particular application.

Reynolds explosive products have found far-ranging applications in explosive welding of pipe and tubing, seismic studies, oil well perforating and hard rock mining. Ordnance testing grounds find significant advantages using Reynolds EBW detonators including increased safety and precise timing of events. The newer EFI technology has provided new capabilities for advanced Electronic Safe, Arm and Firing Systems.