



# U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND

## Micro Laser Ignition

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# MICRO LASER IGNITION

- What is micro laser ignition?
  Ignition of a light sensitive primary explosive/pyrotechnic using a solid state micro sized laser diode

## Benefits

- Designed to be HERO compatible
  - Physical separation between energetic & ignition source/electrical stimuli
  - Diode requires a specified voltage & amperage before laser threshold achieved
- Seamlessly compatible with many existing electric ignition systems
- Enables the elimination of lead based ignition compounds
- Laser diode emitter can be tested and re-tested to assure functionality during assembly

# MICRO LASER IGNITION

- Why laser ignition, what has changed?
  - Increased risk of significant electromagnetic contact, i.e, RF, ESD, DE, $E^3$ effects
  - Fire control systems being developed that enable coincidence based engagement *
  - The need to have ‘smarter’ munitions at the lowest cost per round
    - The need to be able to communicate with, and program, munitions
    - Micro-miniaturization
    - Automated Assembly (Pick and Place)
  - Domestic and international commercial availability of diode lasers
  - Disposable, environmentally benign materials.
  - Alternative energetics (Lead Free)

*** TrackingPoint ™ concept elimination of mechanical shear**

# MICRO LASER IGNITION

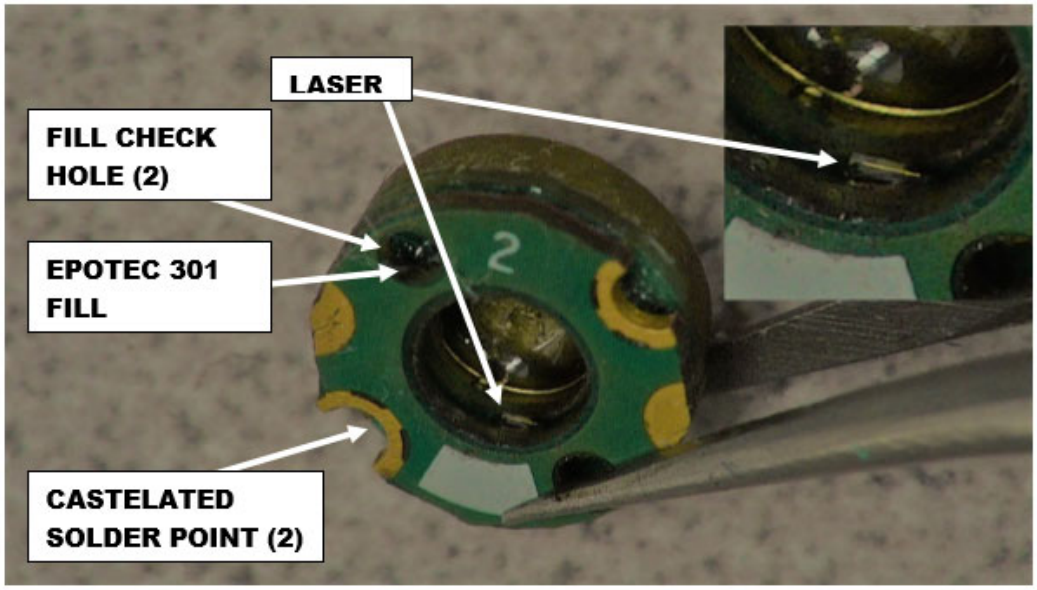
- Who can make a laser ignition module
  - Any microelectronics company. The Army/USG owns the patents & can license for commercial applications.
- Who may want the technology (besides the military)
  - Mining Industry
  - Automotive Industry (i.e. air bag deployment)
  - Commercial CAD/PAD
  - Demolition / Rescue
  - Fireworks Industry
- Why don't we have it
  - Lack of infrastructure for mass production
  - Reluctance to adopt new technology
  - Reluctance to adopt alternate technology (Kodak Syndrome)

# MICRO LASER IGNITION

## Horizontal projection

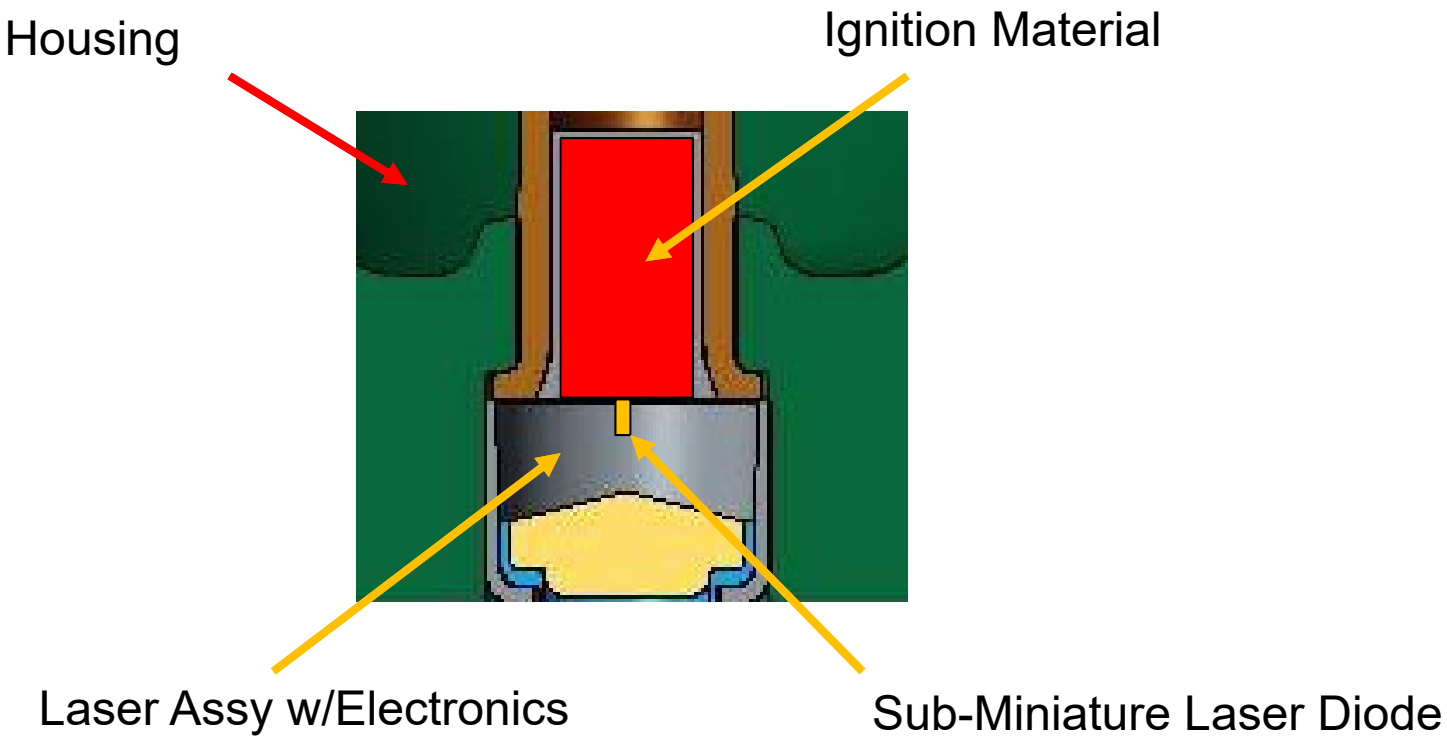
0.130” dia. Pyrotechnic well (cavity)

Liquid slurry, syringe dispensed, dried

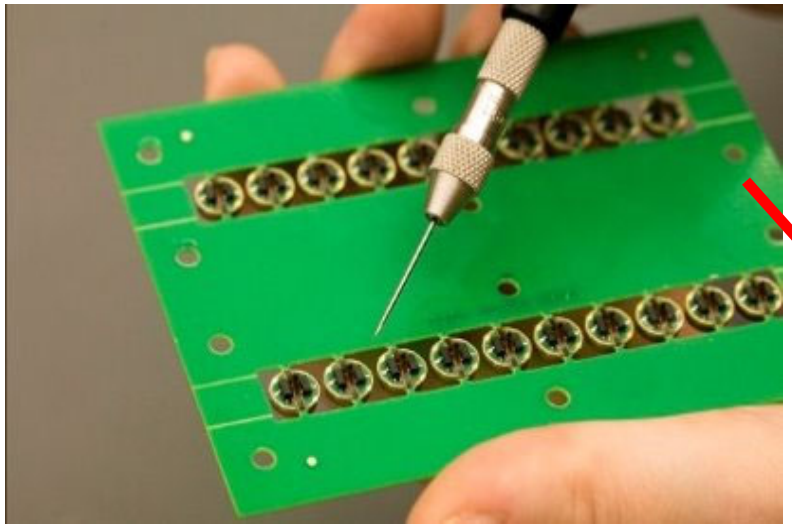



# MICRO LASER IGNITION

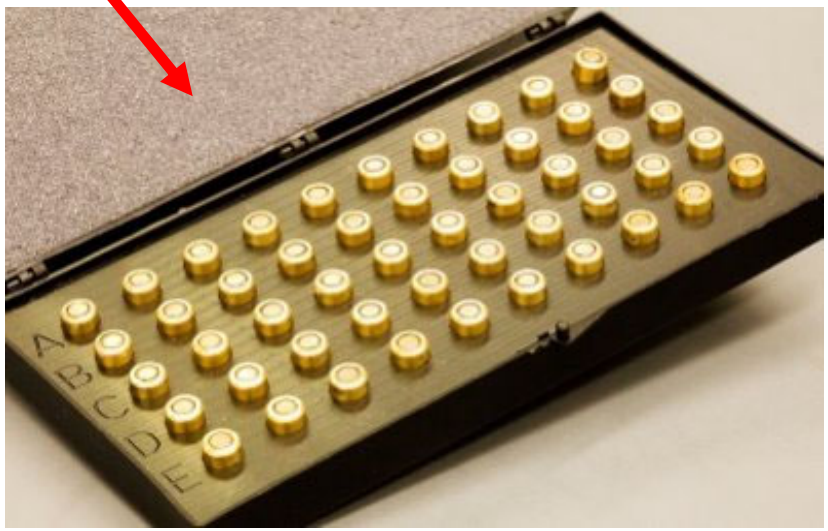
## VERTICAL PROJECTION (CUT AWAY)



# MICRO LASER IGNITION



From SMT to finished primers



# CURRENT STATUS

Medium cannon caliber program

- Currently funded: Vendors GD and ATK
- 3500+ units scheduled for delivery in 2022

Other programs under consideration

- CAD/PAD devices
- Replacement for M1 and M6 detonators
- Large caliber primer substitution

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# MICRO LASER IGNITION

Backup

# LASER IGNITION

- Demonstrated to pass HERO
- COT's supply, manufacturing and commercial carrier shipping
- Physical separation between energetic from ignition source/electrical stimuli
- Laser Diode emitter can be tested and re-tested to assure functionality during assembly
- US based supply of diode lasers:  in many energy levels and wavelengths
- Compatibility with novel energetics
- Eliminates lead based compounds
- Mechanical part reduction
- Seamlessly compatible with many existing electric ignition systems
- SMT (Surface Mount Technology) compatible assembly
- DEVCOM-AC patented technology  (6 completed, 2 pending supplementals)
- Coordinated fires, enhanced coincidence