Laser Pointer for Shoulder Fired Weapons

An Evolving Capability for the User

NDIA Presentation

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Nammo

M72 LAAW
66 mm
Shoulder Fired
Weapon Family

Disposable
Anti-Armor &
Anti-Structure
Weapons

SECURING THE FUTURE

Nammo

Background

- Partnership formed with Crimson Trace Corp. (CTC) to develop a laser pointer system for use on M72 66 mm Family of Shoulder Fired Rockets
  - Based on CTC commercial laser technology
  - Range adjustable to match weapon (M72A7, M72A9)
  - Low cost, disposable
  - CTC investment in design and test hardware
  - Nammo Talley investment in integration and testing

- Prototype hardware built and demonstrated in 2010
  - QE adjustment capability
  - Establish located on launcher
  - Firing demonstration on Trainer Launcher
  - Draft performance spec and qualification plan
  - Refined size, launcher interface and human factors

Design Overview

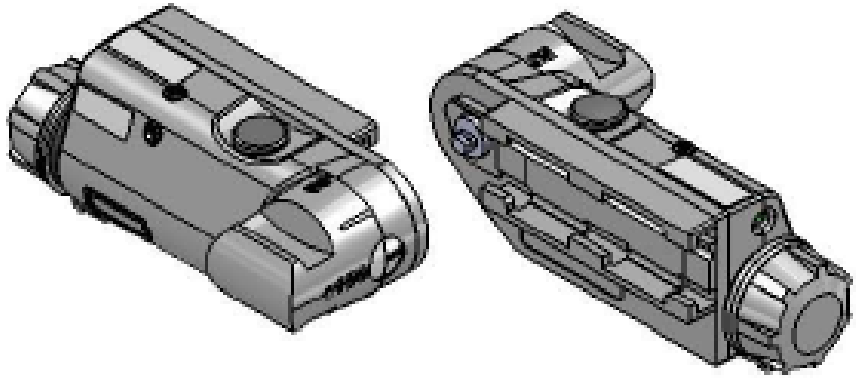
Forward mounting best ergonomic option

Requirements

- Sample Performance Specifications
  - Eye safe laser, Visible Red and Invisible IR options
  - Commercial technology, i.e. low cost
  - Selectable range settings
  - Powered by commonly available battery, replaceable
  - ±3 Mils system accuracy
  - Disposable but Laser Pointer reusability highly desired
  - Capable of surviving typical M72 environments
    - High and Low Temp Storage
    - Humidity
    - Temperature Shock
    - Vibration
    - Water Immersion
    - Salt Fog
    - Sand and Dust
    - 1.5M Drop

Design Overview – cont'd

- Laser Pointer
  - Source Controlled from CTC
  - Eye safe Class 3R Red and Class 1 IR laser options
  - Range adjustment 50-200M, 25M increments
  - Interchangeable to A7, A9 or other variants
  - Single AA battery, on/off button activation
  - Quick attach/detach to Range Plate
  - Intended to be disposable but proves to be reusable
  - Mostly injection molded glass reinforced urethane plastic
  - Aligned at factory (CTC)
  - Comes complete with sheath, battery, manual
  - Intended to be sold/shipped separate from Launcher



Design Overview

- System consists of Laser Pointer and Range Plate

Background – cont'd

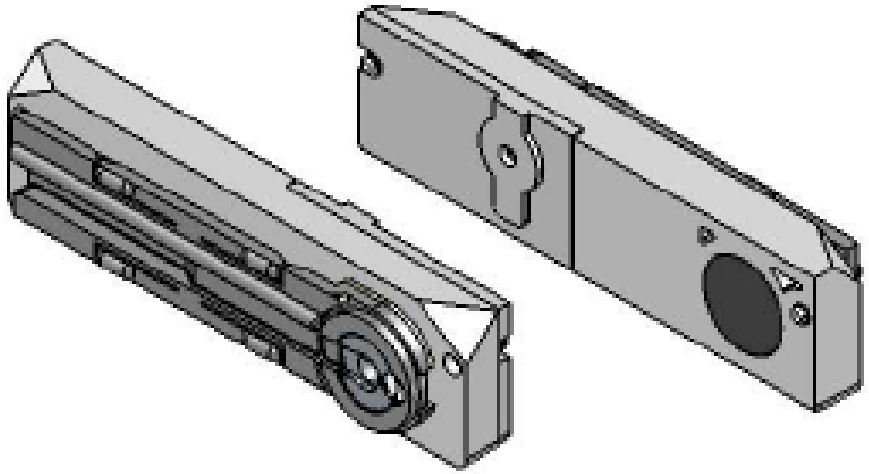
- 2nd iteration of prototype hardware demonstrated
  - Smaller unit
  - Refined human interfaces
  - Improved QE adjustment capability
  - Improved human interfaces
  - 2nd demonstration firing with prototype hardware
  - Good results

- Development IRAD kicked off Q1 2011
  - Funding for completion of design and qualification
  - Includes non-recurring cost for manufacturing integration
  - High probability to be included in GOI contract

- CTC kicks off production tooling Q1 2011

Design Overview – cont'd

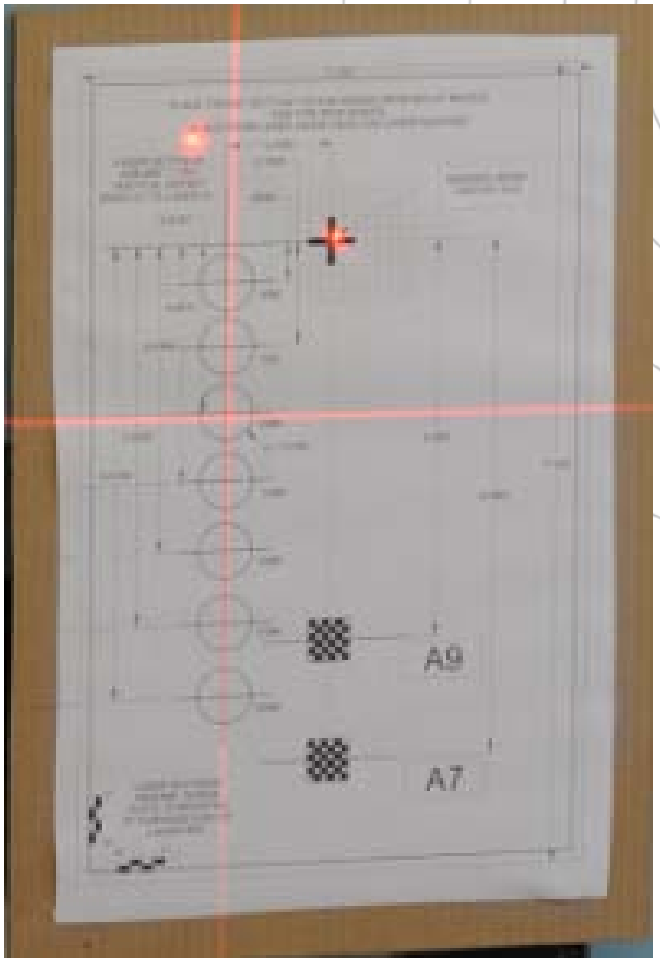
- Range Plate
  - Source Controlled from CTC
  - Contains cam for QE adjustment, unique to A7, A9, etc.
    - 50-200M, 25M increments
  - Keyed for mating with Laser Pointer
  - Mostly injection molded glass reinforced urethane plastic
  - Bonded to Launcher with screw and epoxy
  - Aligned during installation on Launcher (Nammo Talley)
    - Launcher mounted on mandrel with bore laser
    - Pivots on screw for QE adjustment
    - Set screws for AZ adjustment



Manufacturing Overview

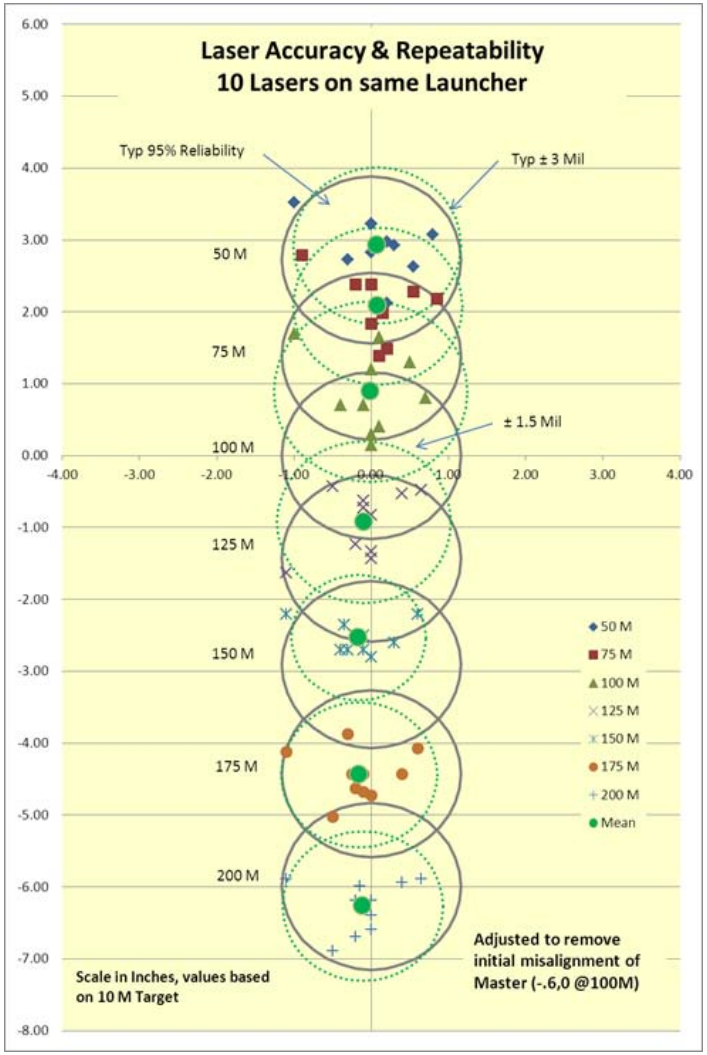
- Range Plate Installation to Launcher
  - Launcher mounted on mandrel
  - Mandrel contains bore spotting laser to target on wall
  - Camera and monitor used to assist in alignment
  - “Master Laser” used to align Range Plate at 100M setting
    - Master is slightly modified version of production
- Process is conducive to retrofit of Launchers in field

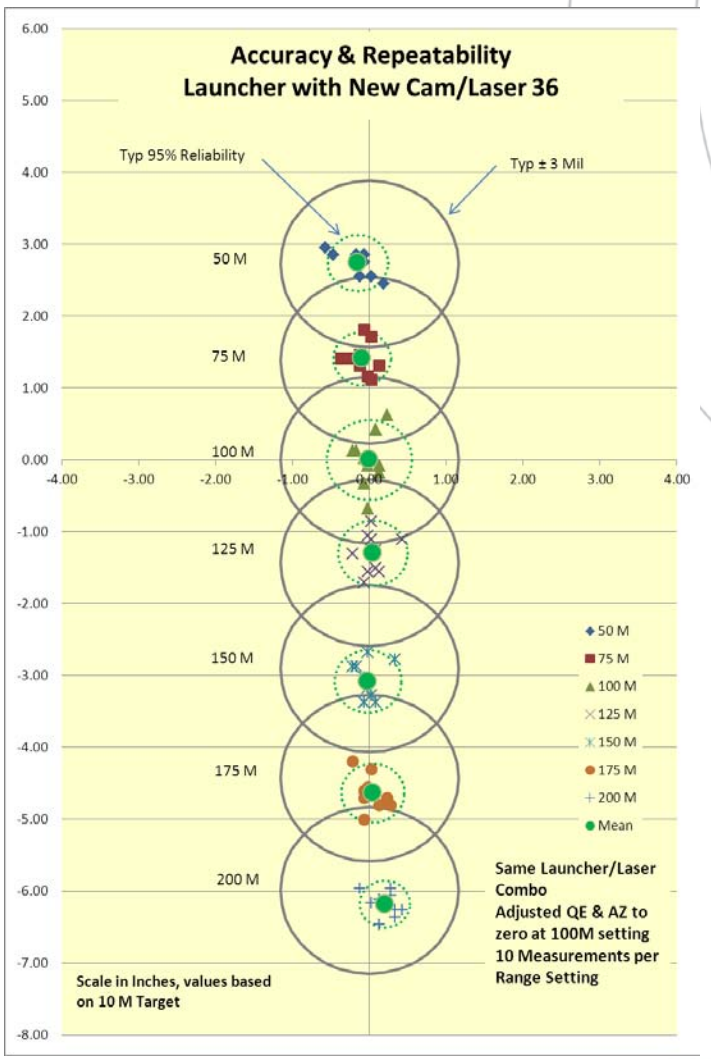
Manufacturing Overview – cont'd



Engineering Test Data – cont'd

- Accuracy and Repeatability





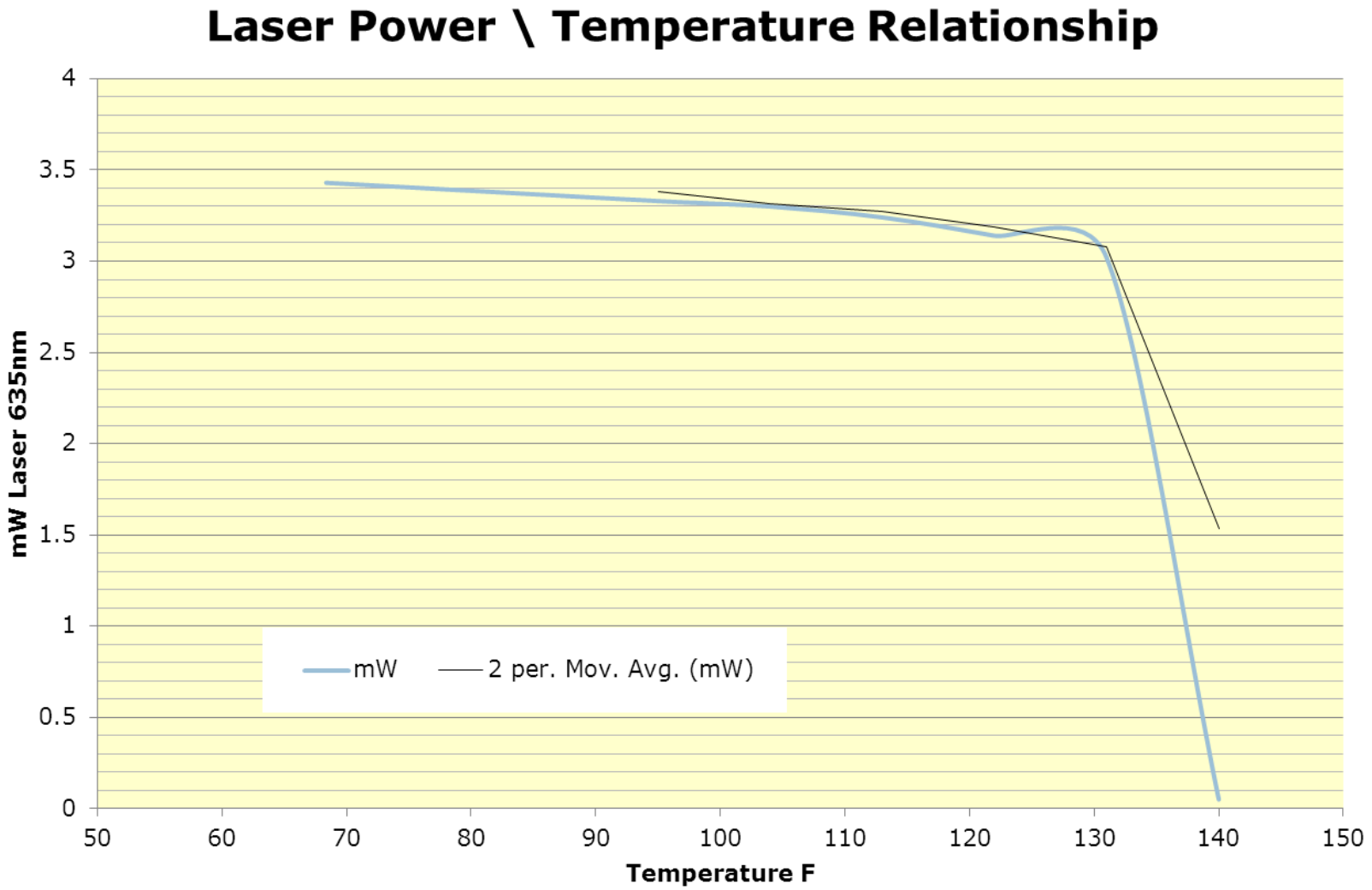
Engineering Test Data – cont'd

- Environmental conditioning
  - High and Low Temp Storage, Temp Shock, Loose Cargo Vibration, Drop
  - Water Immersion, Humidity
- Conclusion
  - Launcher remains safe during after temp storage, temp shock, loose cargo vibration, drop
    - Laser will break away during cold drop, slight damage at hot
    - Laser continued to work
  - Humidity and water immersion acceptable for Launcher, slight corrosion on Laser battery but still functional
  - Laser drop caused slight sonic weld break and affected alignment

Engineering Test Data – cont'd

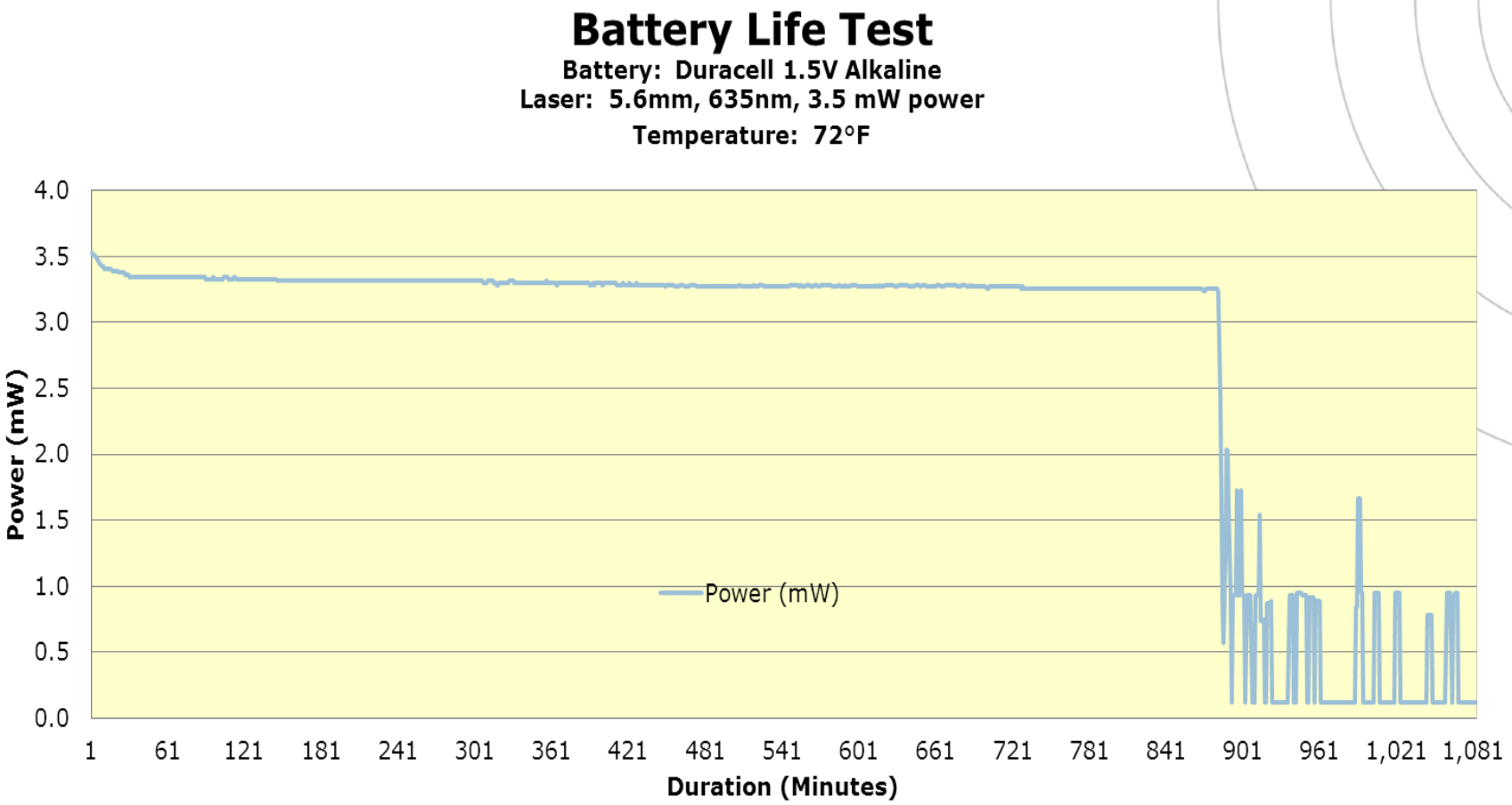
- Electrical
  - ESD and EMC
  - Battery life
  - Power operating range (temperature limits)
- Conclusion
  - Passed ESD and EMC
  - Battery life 14 hrs at ambient
  - Power drop off at ~135°F but reversible when cooled
    - Operating range of diode is 14 to 122°F
- Actions
  - Determine battery life at hot and cold

Engineering Test Data – cont'd



Engineering Test Data – cont'd

- Battery Life approximately 14 hours at ambient



Qualification Testing

- Qualification plan included
  - System Safety
  - System Operation
  - Laser Pointer Operation
  - Laser Pointer Electrical
  - System Live Firing
  - System Durability
- Qualification Completed September 2011
  - Successfully met all criteria

Conclusion

- System entered serial production in March 2012