Australian Government
Department of Defence
Capability Acquisition and
Sustainment Group

Demolitions Stores – Bangalore Torpedo F60 Technical Refresh for the Australian Army

GWEO Land Branch, Thales Australia, Applied Explosives Technology

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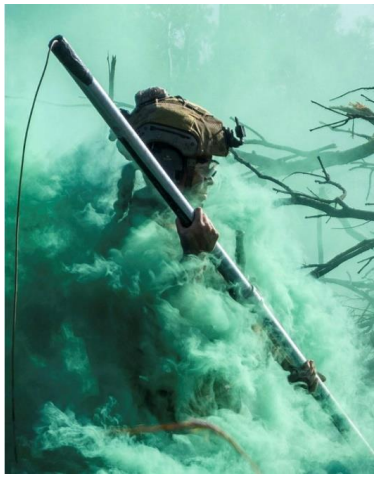
PARARI 2024, Canberra
19-21 NOVEMBER 2024

Overview of Program

- AIC Strategic Initiative:
  - Increase Australian industry involvement
  - Supply Chain Surety
  - Reduce Stock Piling, Maintain Surge Capacity

- Technical Refresh for the Australian Army Demolition Stores

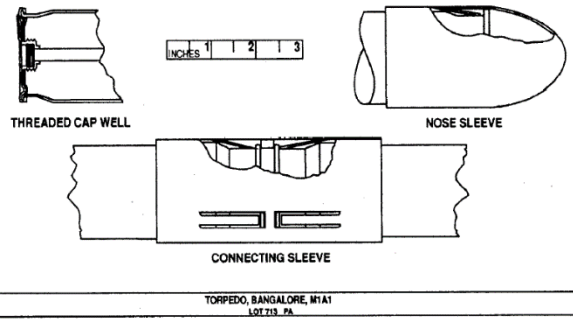


Overview of Program

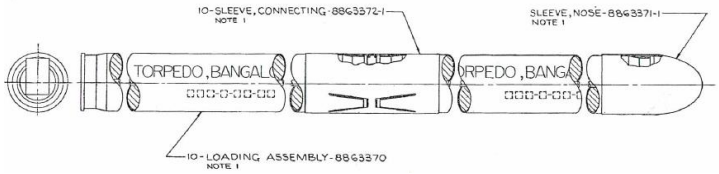
- Demolitions Program:
  - AET providing accelerated design development/prototyping, LAP (including melt casting) and design evolution/enhancements.
  - Vertrex providing packaging solution, with sling.
  - Thales provided RDX/TNT energetics, QA/testing (incl. Compatibility testing) and program/technical support.

U.K. Variants

- Bangalore Torpedo 1.5” Mk 1/2
  - Steel Case
  - Ammonal, CE Pellet Booster
  - 41mm diameter, 1830mm length

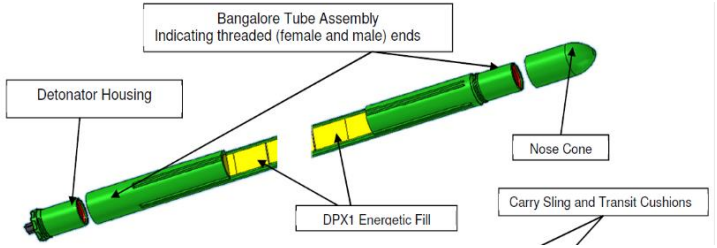


- Bangalore Torpedo L26A1
  - Aluminium case
  - 50mm diameter, 1000mm length
  - DPX1 / DPX10 booster

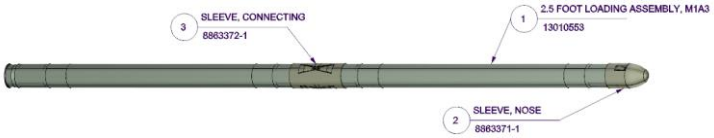


US Variants

- Demolition Kit, Bangalore Torpedo, M1A1
  - Amatol, TNT Booster



- Demolition Kit, Bangalore Torpedo, M1A2
  - Steel Case
  - Composition B4 / Composition A3 Booster
  - 54mm diameter, 1520mm length



Case Study - Bangalore Torpedo F60

- Australian designed and manufactured with Australian RDX/TNT
- Suits ADF ergonomic, improved human factors and enhanced performance requirements
- Initiated by existing in-service electrical/non-electrical detonators and detonating cords
- Improved Charge loading coupled with adjustable length of the operational configuration to the obstacle size/type
- Bangalore Torpedo kit comprises:
  - 6 x 650mm high explosive tube assemblies,
  - 6 connecting sleeves, 3 nose cones, 3 end caps with detonator gland,
  - 6 slings and a Box Ammunition Wood (BAW).

- Applied Explosives Technology (AET)

Steve – Matrix Movie 'Oscar' – Special Effects

Chris – Set of Gallipoli Movie

Mad Max - Rodinga booster from Ikara

AET

- Australian SME in shaped charges. AET currently provide a patent FLSC liner to U.S. Special Forces community
- Long History in local manufacture of Demolition Charges for Defence and Mining sectors. E.g. CDS150, Ausdisc, ballistic discs for mining industry.
- Long history with Thales Australia, leverage Mulwala RDX/TNT products for various applications.
- Ability to rapid prototype and provide design enhancements
- Enable direct input from Australian User to local manufacturer
- Simple designs with novel industrialisation and manufacturing in the Australian context.

Vertrex

- Australian SME EO Packaging.
- Packaging Solution and Bangalore Torpedo Sling.

Inert - Fabrication

- Surface finishing
- Fit/Form - Connection System
- Human Factors

User Work Shops

- School of Military Engineering, 24 Nov 2021
- School of Infantry, 25 Nov 2021

Live Fabrication and Functioning

- Functional firings against targets
- Takeover testing

User Enhancement

- User Handling/Carriage
- User Interface
- Employment

Bangalore Torpedo F60

- 650mm long
- 60mm in diameter
- Aluminium case.
- Australian RDX/TNT (Hexolite)
- TR1 Booster
- NEQ - 1.8kg
- Mass - 3.5kg

Explosive Ordnance No. (EON)	650.050.A2.01	650.050.A2.02	650.050.A2.03
Name	CHARGE DEMOLITION BANGALORE TORPEDO F60	CHARGE DEMOLITION BANGALORE TORPEDO F60 DRILL (INERT)	CHARGE DEMOLITION BANGALORE TORPEDO F60 INSTRUCTIONAL (INERT)
Logistics Name	CHGE DEM BANG TORP F60	CHGE DEM BANG TORP F60 DRILL (INERT)	CHGE DEM BANG TORP F60 INST (INERT)
NSN	1375-66-167-0186	1375-66-167-0188	1375-66-167-0189
Part Number / CAGE Code	10001 / Z7G01	10002 / Z7G01	10003 / Z7G01
ASN	01305-38	01303-38	01304-11
TSN	01305	01303	01304
Manufacturer	Applied Explosives Technology (AET)	Applied Explosives Technology (AET)	Applied Explosives Technology (AET)
Country of Manufacture	Australia	Australia	Australia
DEOCL	5932	Not applicable	Not applicable
UN Number	0048	Not applicable	Not applicable
UNHCC	1.1D	Not applicable	Not applicable
NEQ	1.8	Not applicable	Not applicable

- **Australian Fabrication Techniques**

  - Plastic Injection Moulded components.
  - Machined Metal Components
  - Aluminium Extruded Components.
  - Polymer Extrusions
  - Wire Bending – Australian Stainless Spring Steel
  - Anodised Aluminium Surface Finish
  - Oxide Surface Finishing
  - Slings/Packaging

Case Study - Bangalore Torpedo

Melt Casting

- Mechanical Mixer, limited slip stirring arm
- 400 litres of cast product
- manual filled
- RDX/TNT (Mil-Spec)
- Pre-heating oven

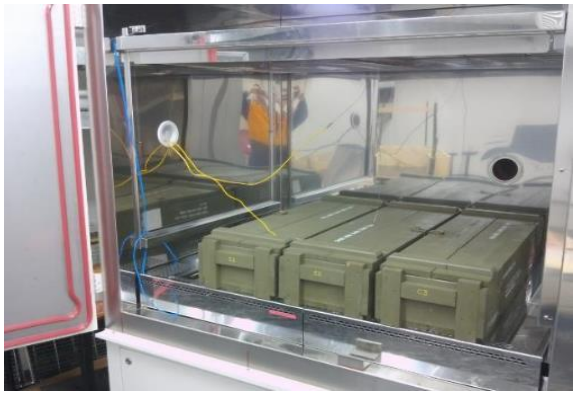
Load, Assemble and Pack (LAP)

- Primer 38 Gram
- Inert Component assemble

Testing

A1 Temperature Cycling
MIL-STD-810H, Method 501.7

C2 Temperature Cycling
MIL-STD-810H, Method 502.7



Loose Cargo Bounce
AECTP400 Method 406

Vibration Road
AECTP 400, Method 401, Figure A-4

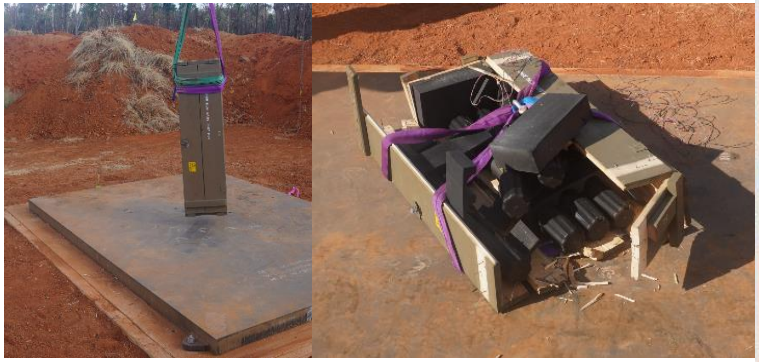
Immersion Testing
1m for 60 mins

Vibration Rotary Wing
AECTP 400, Method 401, Figure A-17

Testing

UN Series 4(a) Thermal Stability

12m Drop Test 1



Bonfire

Initiation post 12m Drop

12m Drop Test 2

Case Study - Bangalore Torpedo

Testing

X-Ray Examination

Unpackaged Drop (0.75m)

Packaged Drop (2.1m)

Temperature Conditioning (-32˚C / +49˚C)

Functioning – 6mm NATO Plate

Functioning – Low Wire

Functioning – CAT2

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Thank you for your time!
Question time…