

Defence & Security Group

DSG Technology

*Supercavitating Ammunition is
Changing the Rules*

DSG

Commercial in Confidence © DSG Technology AS



Ammunition that works underwater and in air, from air into water and from water into air

Small calibers in production now – in USA

***supercavitating
Multi Environment Ammunition™***



Supercavitation

- In water at velocity >100 m/s the cavitating core (underwater bullet and projectile) forms a cavity that is optimally designed to exceed the size of the projectile
- Water resistance in the cavity acts solely on the leading edge
- Stabilization is achieved through contact with the cavity by rear of the cavitating core
- The cavity collapses when velocity of the cavitating core reduces to approx 100 m/s



Caliber

underwater range



30mm

200m/600ft



20mm

150m/450ft



12.7mm

60m/200ft



7.62mm

30m/100ft



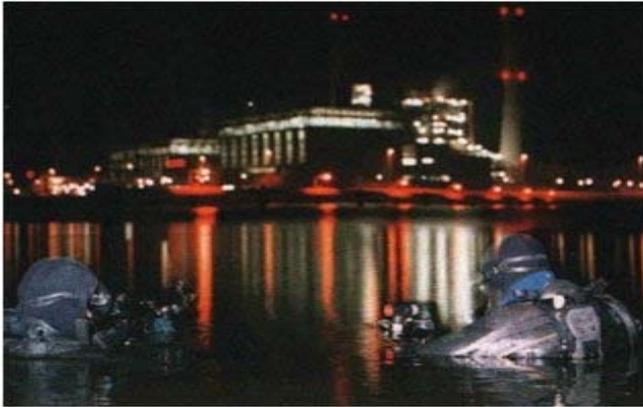
5.56mm

15m/50ft

MEA features

- Low angle water entry
- Low angle armor piercing (cylindrical shapes)
- Multiple-layer targets
- From Air & Water *to* Air & Water
- Caliber-sized holes (depending on application)
- Hydro-static shock & direct effects of cavity in water
- Extended range in air by up to 25%
- Standard weapons
- Multiple patents
- Scalable across calibers





Special Operations, harbor protection, swimmer defense, Coast Guard

5.56mm to 12.7mm MEA

ASW, Torpedo Hardkill, UUVs, MCM, Swarming Surface & Semi-submersible

12.7mm to 155mm MEA



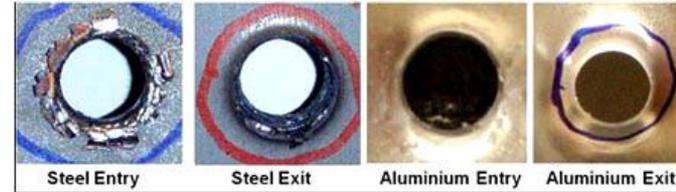
Medium & Larger Caliber MEA Changes the Rules for Undersea Defense

12.7mm to 40mm
(and up to 155mm)



Supercavitation & ASW Applications

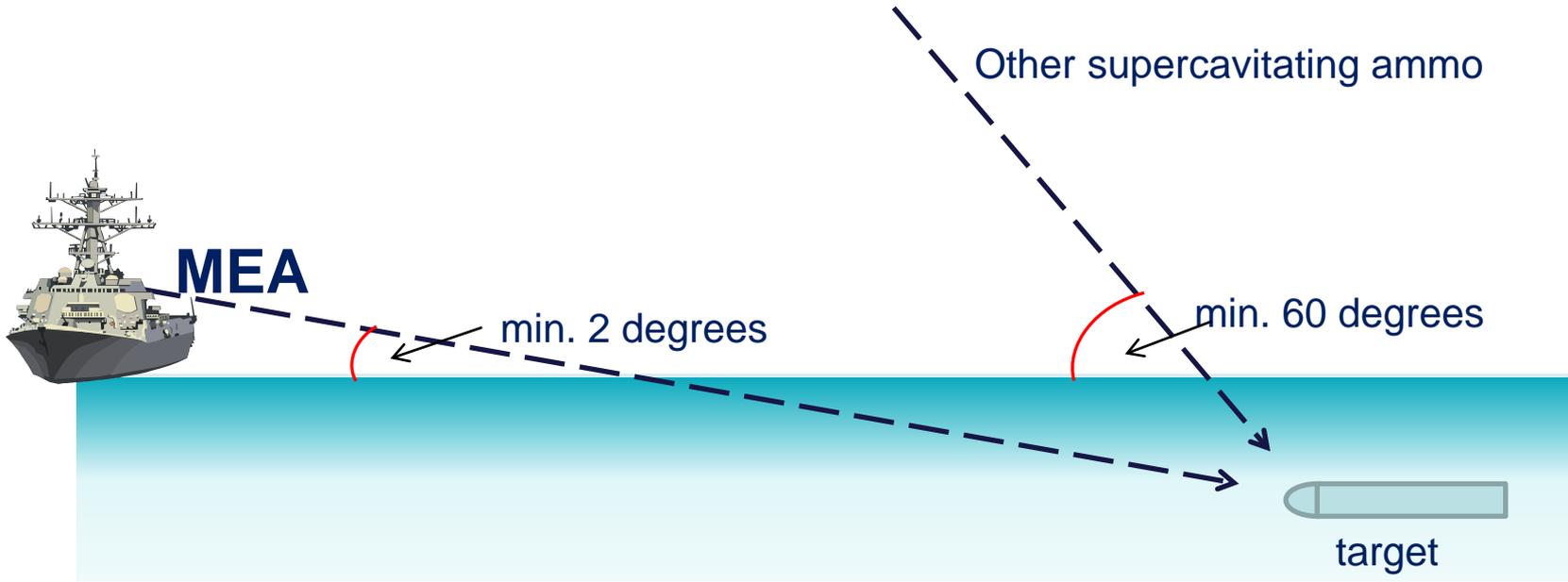
- **Anti Torpedo Solution (Hardkill)**
Last 250 meters defense of ships – the ‘Inner Ring’
- **Arming Unmanned Underwater Vehicles (UUV)**
Defense against airborne threats, from below surface
Diver support
- **Mine Counter Measures**
Not just from helicopters
- **Swarming Surface or Submerged Threats**
Ship defense using standard weapons



New capabilities - Tactic Changing – Rule Changing

MEA: Solution for Armada threats





Thus only MEA Supercavitating Ammunition can be used from low angle needed to fire from ships

- 30mm cavitating core (underwater projectiles)
- Shooting of inert 324mm MK-46 type torpedo
- Sea water at range of 125m



Enhanced Effects of the 'super' Cavity:

- **near misses are still effective**
 - destructive effect of collapsing cavity even with 200mm near misses
- **cavity persists in water (more than 30meters for 30mm)**
 - increases chances of affecting target
- **hydro-static shock extends damage-radius**
 - more than 1 meter radius in surrounding water volume



Integrated Hardkill System

**High RoF
weapon
(CIWS)**

+

HF sonar

+

MEA

=



Midget Sub/Semi-Submersible

- like a bigger, slower torpedo

Swarming Surface Attack Boats

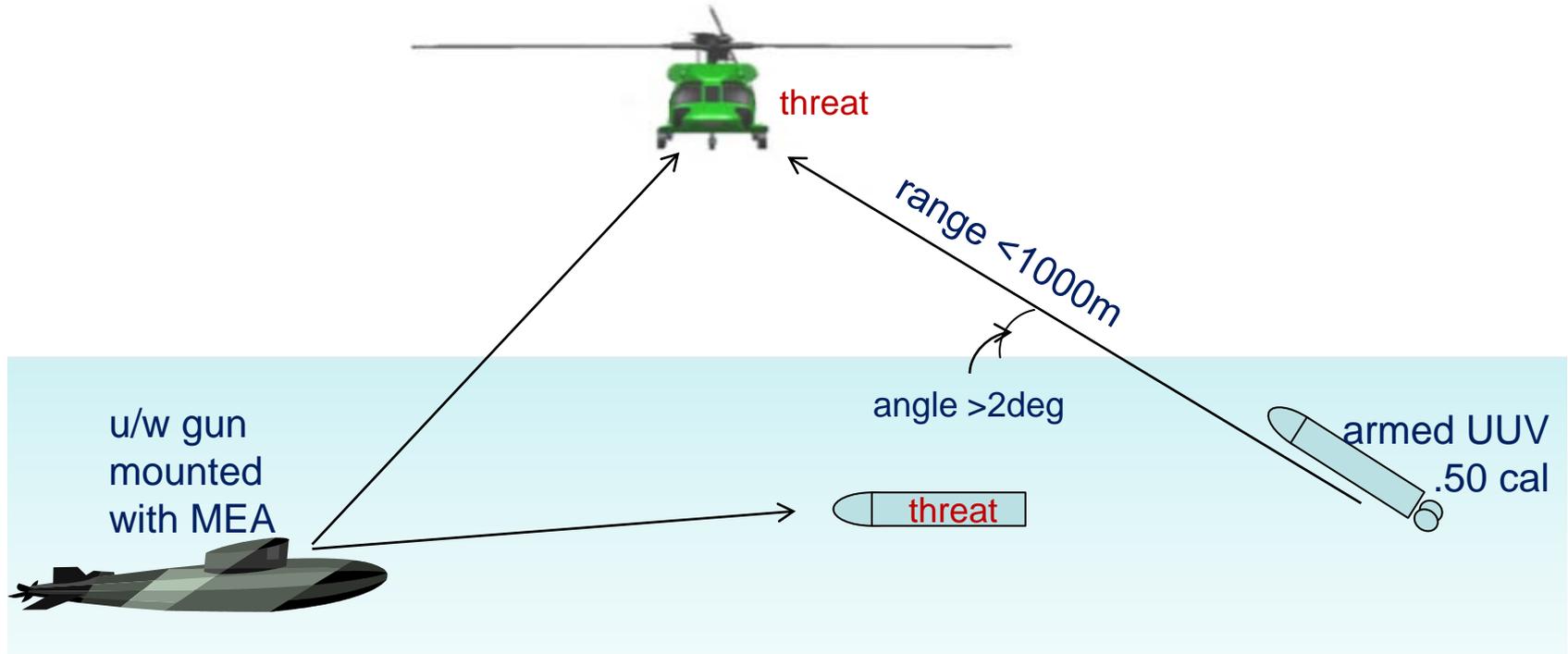
- MEA not deflected by waves, even at low angles (>2 degrees)
- Bullets pass through waves/air and penetrate target above or below surface

Standard Weapons

- CIWS with automated fire control
- .50 caliber deck gun



**MEA is an effective solution
– even when submerged**



- MEA supercavitating ammunition delivers new ASW capabilities for new applications:
 - Ship defense against torpedoes, semi-subs
 - 'last resort' hardkill solution
 - complementary defensive layer to softkill or ATT
 - Armed UUVs for multiple roles
 - Enhanced Mine Counter Measures
 - Standard weapons - **Just Change the Ammo**

Enhanced Capabilities for Small Caliber

5.56mm to 12.7mm



- MEA bullets work in water
- MEA bullets enter or leave water at very low angles
- MEA bullets give up to 25% more range in air
- MEA bullets are 10-15% more effective against armor
- MEA bullets can penetrate sand and mud (wet or dry)
- Increased stopping power – cavitation effect
- Bridges the caliber gap
- Scalable across all calibers
- All benefits are achieved with standard weapons

underwater range



12.7mm

60m/200ft



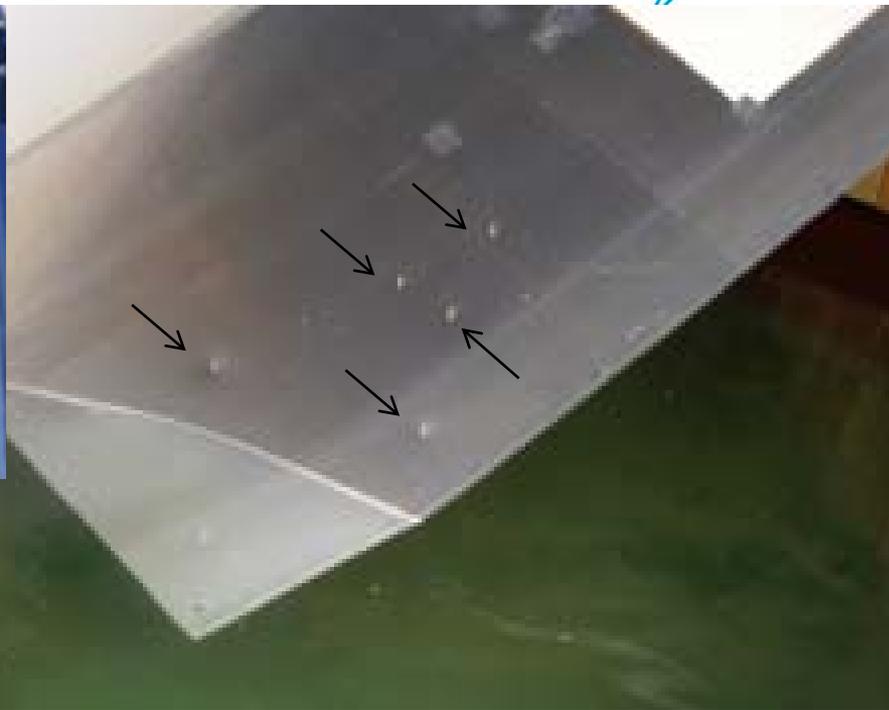
7.62mm

30m/100ft



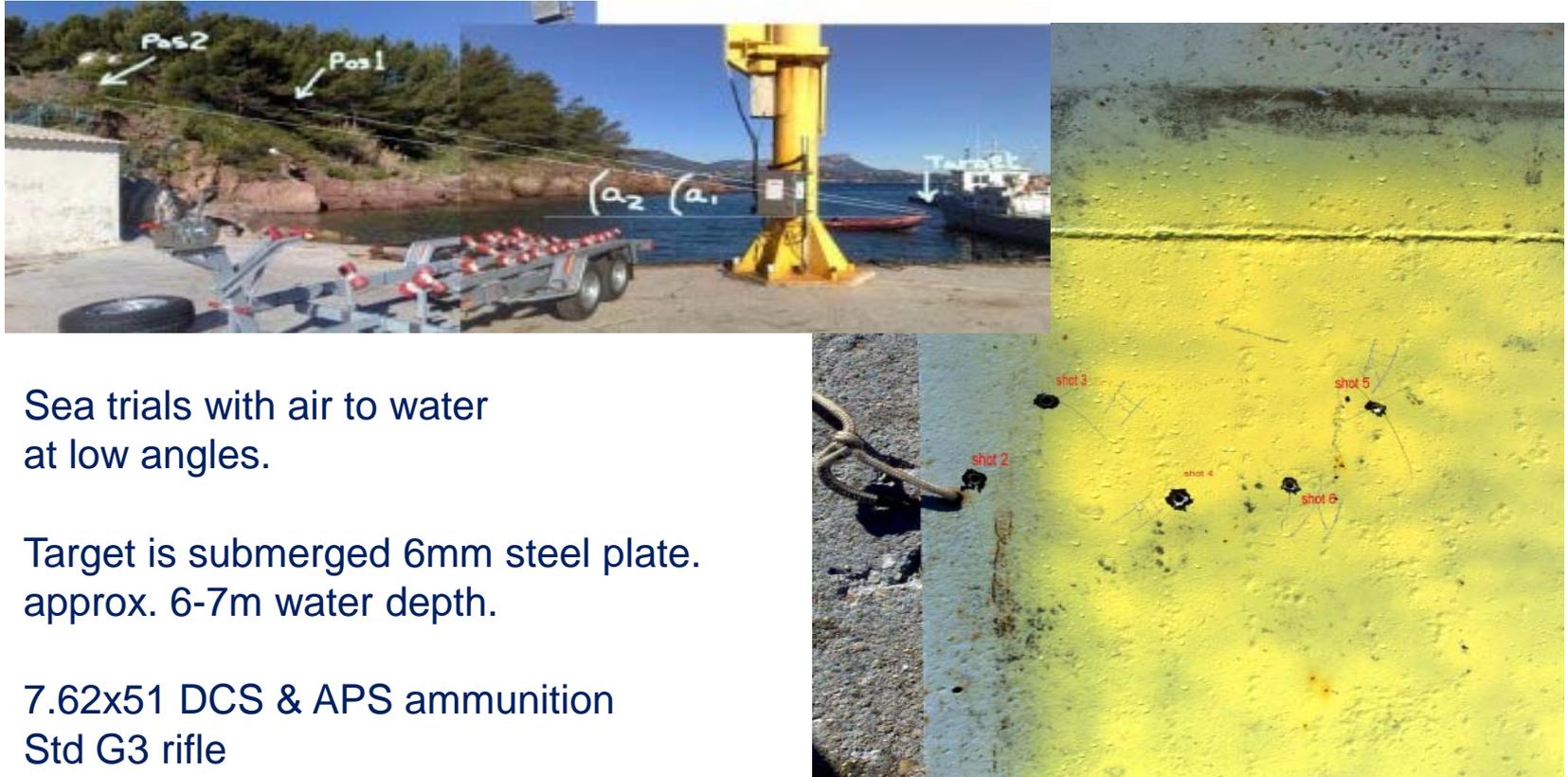
5.56mm

15m/50ft



5.56mm DCS bullets
Single shot & full-auto
5 shots
10 meters underwater
Aluminium target

Target Effectiveness



Sea trials with air to water
at low angles.

Target is submerged 6mm steel plate.
approx. 6-7m water depth.

7.62x51 DCS & APS ammunition
Std G3 rifle

Other Target Data with MEA

- Inclined targets (cylindrical and angles <45 degrees)
- Multi-layer targets (parallel or combined normal/incline)
- Windscreen glass (including at compound angles <45 degrees)
- Sand bags
- Gelatin - *supercavitation creates hydro-static shock, enhancing stopping power.*
- Near-misses still effective – *destructive vacuum cavity diameter 10x greater than caliber*

Target penetration performance depends on range, air/water environment and matching of MEA bullet type and caliber to intended target application.

- Wet gun operation – air or water (some weapon types may not work in water)
- Diver protection and enhanced diver capabilities
- Anti-piracy – shoot into air from under water, or into water from air at low angles
- Anti-piracy/terrorism – use 7.62mm or 12.7mm against small boats' hulls or engines
 - penetrate steel with small calibre beneath water, even from small boats
- Harbour protection, anti-propeller/rudder, non-lethal disabling of vessels
- Arm UUVs or Swimmer Delivery Vehicles (with 7.62mm or 12.7mm)
- Submerge sniper positions (12.7mm up to 5m depth is effective up to 1000m in air)
- Effective sand, mud penetration may be useful against IEDs or mud-constructions
- One round, more capabilities, standard weapon

- Supercavitating ammunition scalable to all calibers
- MEA works in water, from air to water, water to air
- Proven, patented technology
- Standard weapons
- ASW, TCM, UUV & MCM unique solutions
- New and enhanced capabilities, new applications
- Small caliber enhanced performance for SOF
- Improved stopping power, greater range – bridges a caliber gap

- Small caliber samples available for T&E today
- Production quantities available to order today
- **Made in USA – 100% Berry Compliant**
- MEA Ballistic Workshops – enrolling now



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supercavitating
Multi Environment Ammunition™

Richard Morgan
Managing Director
rmo@dsg.no
+44 7867 977588
www.dsg.no

DSG Technology AS
Norway

US Office
McLean, VA



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