Shaped Charge Jet Initiation Phenomena of Plastic Bonded High Explosives

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MBDA MISSILE SYSTEMS

(*) NUMERICS

2012 INSENSITIVE MUNITIONS & ENERGETIC MATERIALS TECHNOLOGY SYMPOSIUM
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Planet Hollywood
Las Vegas, NV

Related IMEMTS & HVIS Contributions

IMEMTS 2007, Miami, USA

“Sensitivity of High Explosives Against Shaped Charge Jets”

IMEMTS 2010, Munich, Germany

“Shaped Charge Jet Initiation of High Explosives equipped with an Explosive Train”

Hypervelocity Impact Symposium (HVIS) 2010, Freiburg, Germany

“High Explosive Initiation by High Velocity Projectile Impact”

Hypervelocity Impact Symposium (HVIS) 2012, Baltimore, USA

“High Explosive Initiation Behavior by Shaped Charge Jet Impacts”

Outline

- **Motivation**
- **Test Set-up**
- **Results**
- **Initiation Transition**
- **Summary**

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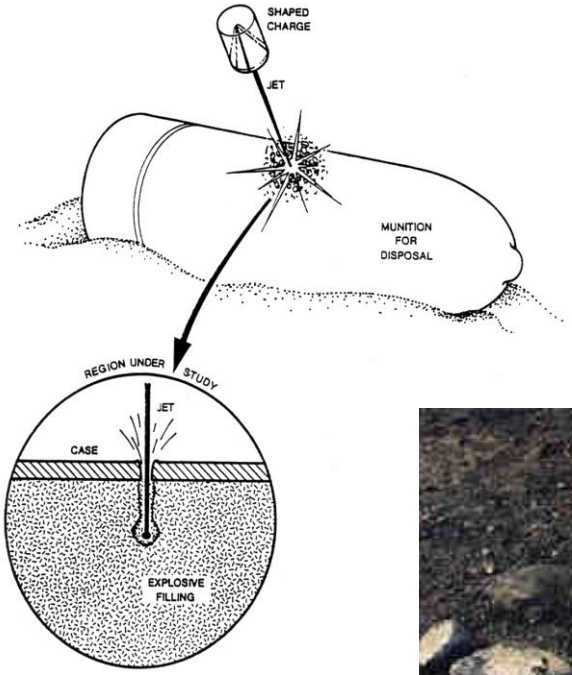
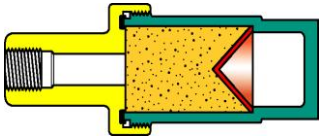
Explosive Ordnance Disposal (EOD) with Shaped Charge



EOD Shaped Charge



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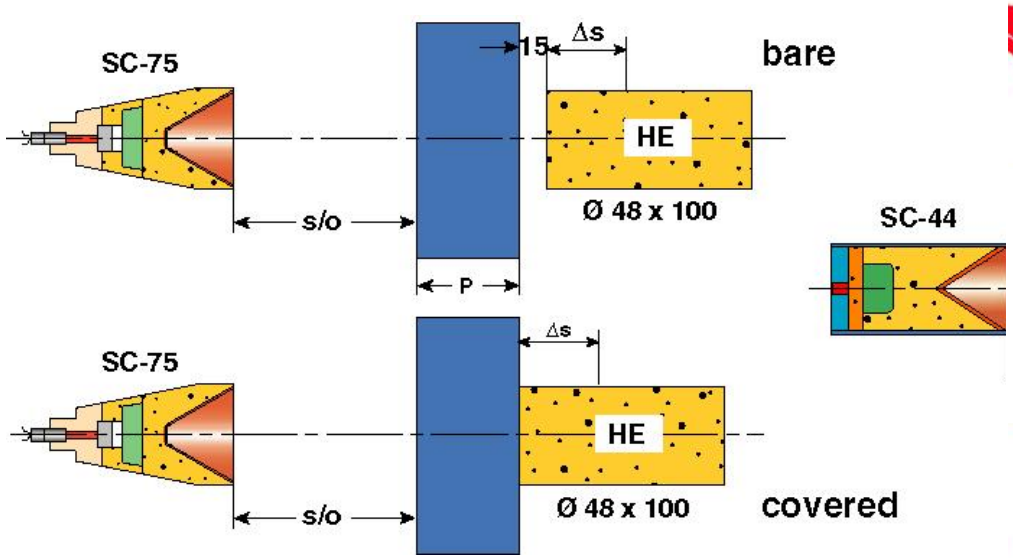
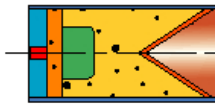
Test Set-ups: Bare and Covered / Cased



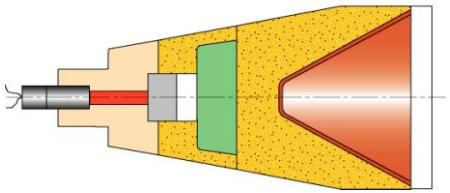
Investigated Sensitive & Insensitive High Explosives

Conventional Sensitive HE	Modern Insensitive HE
TNT Bonded HE	Plastic Bonded HE
Comp B RDX/TNT 65/35	KS32 HMX/HTPB 85/15
Manfred Held, TDW (former Studies)	Werner Arnold, TDW (current Study)

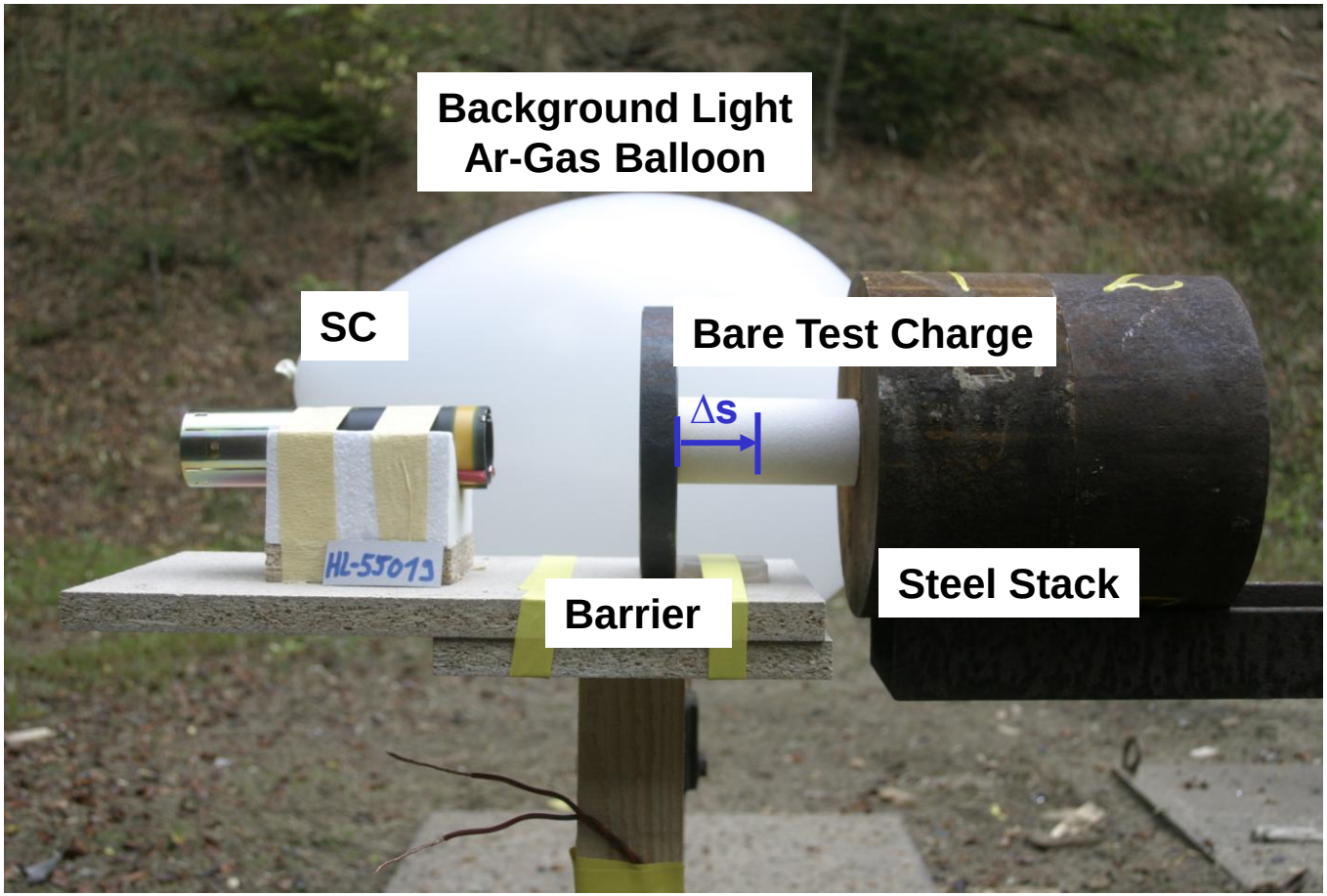
SC-44



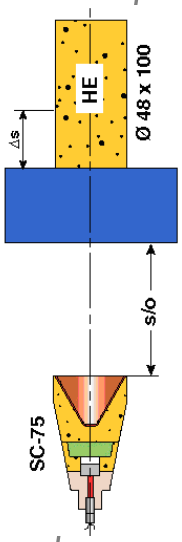
SC-75

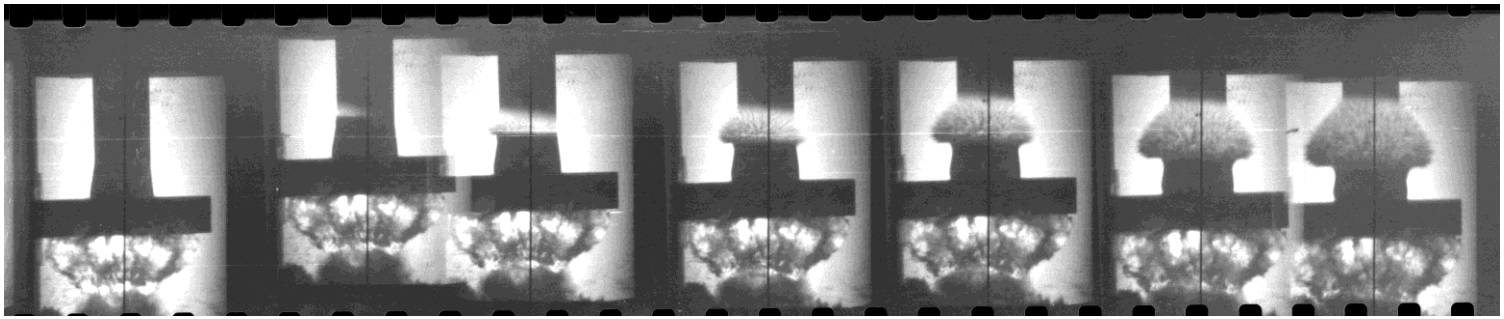


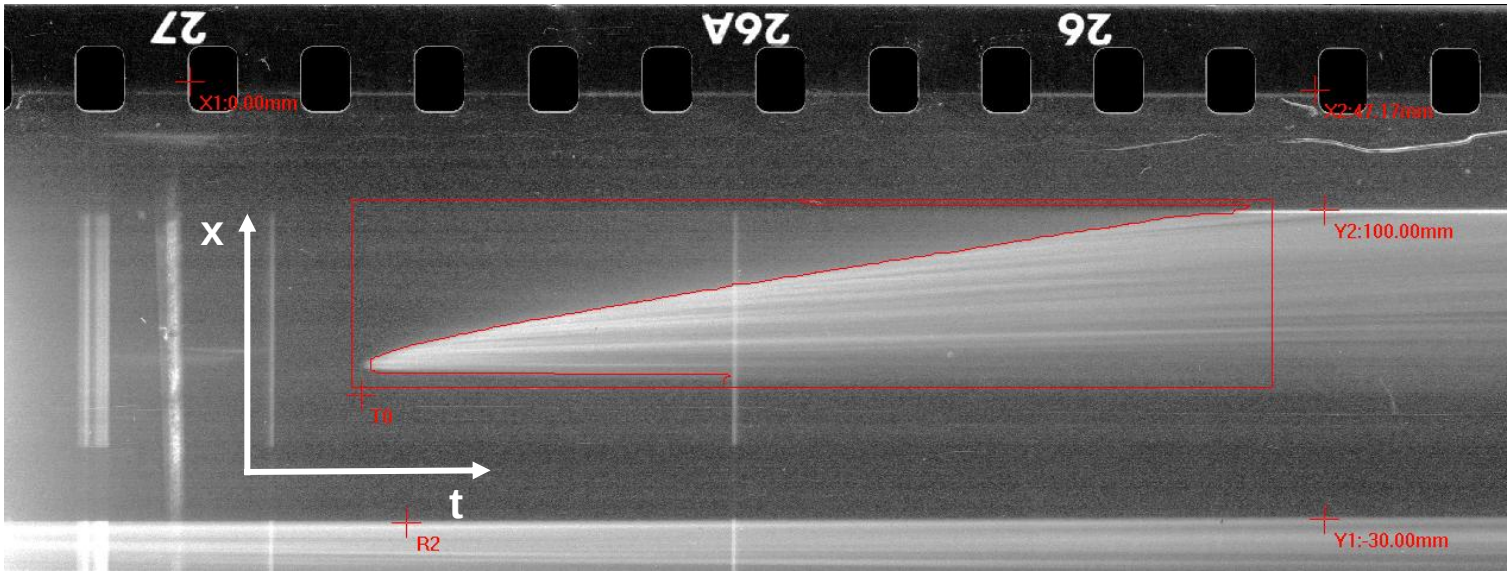
Test Setup for Covered Charge: Run Distance Δs



Rotating Mirror Camera: Framing & Streak Mode







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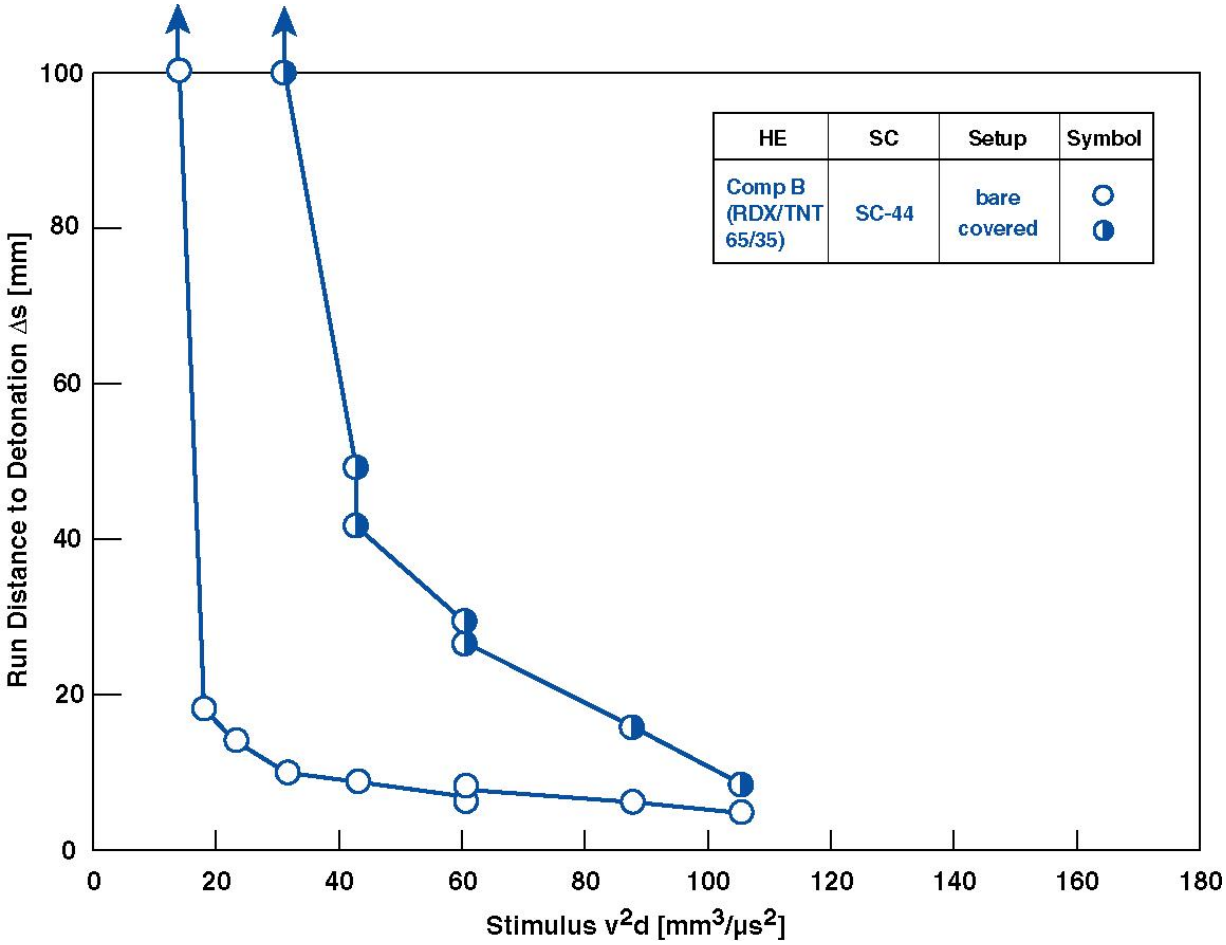
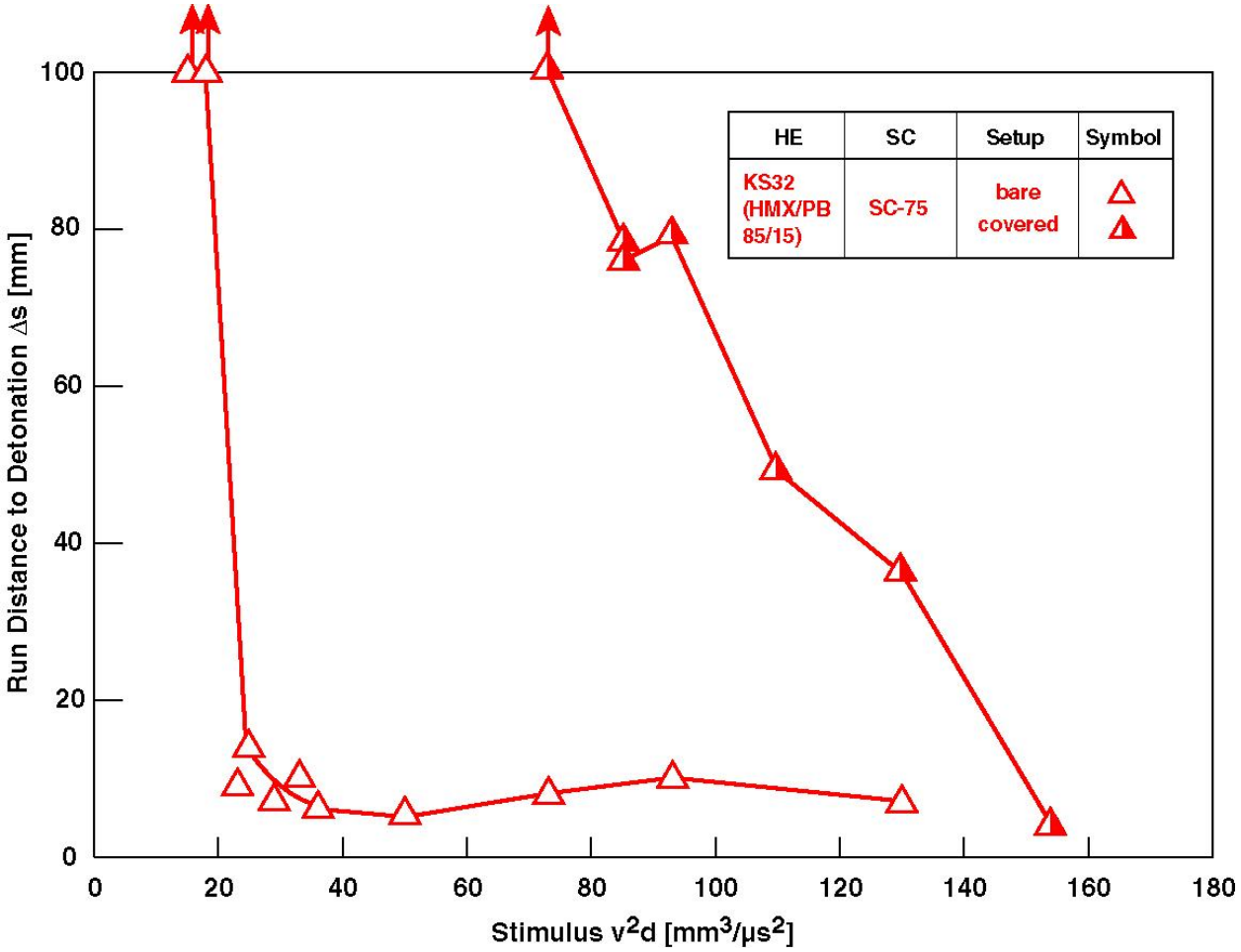
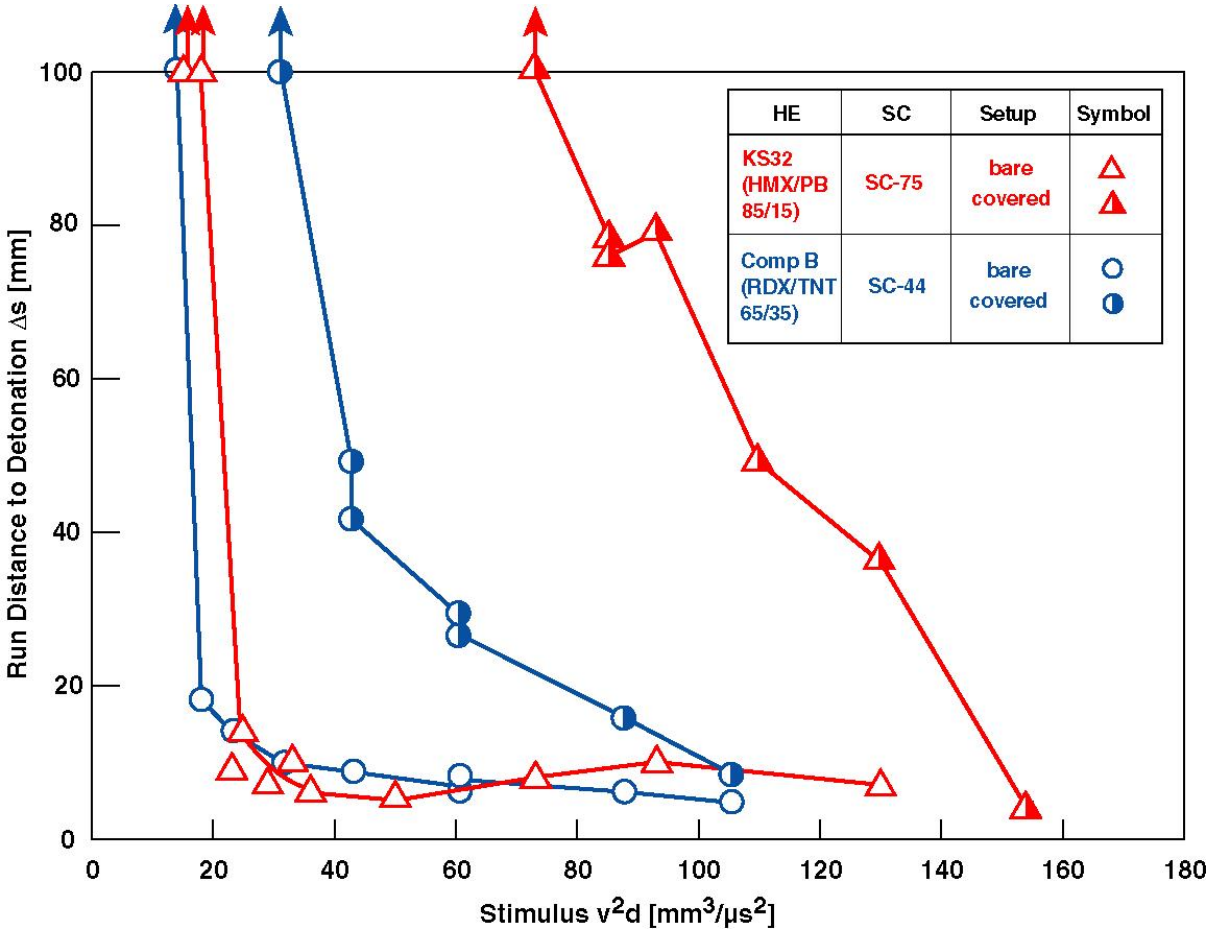
Run distance to detonation for *bare* and *covered* Comp B



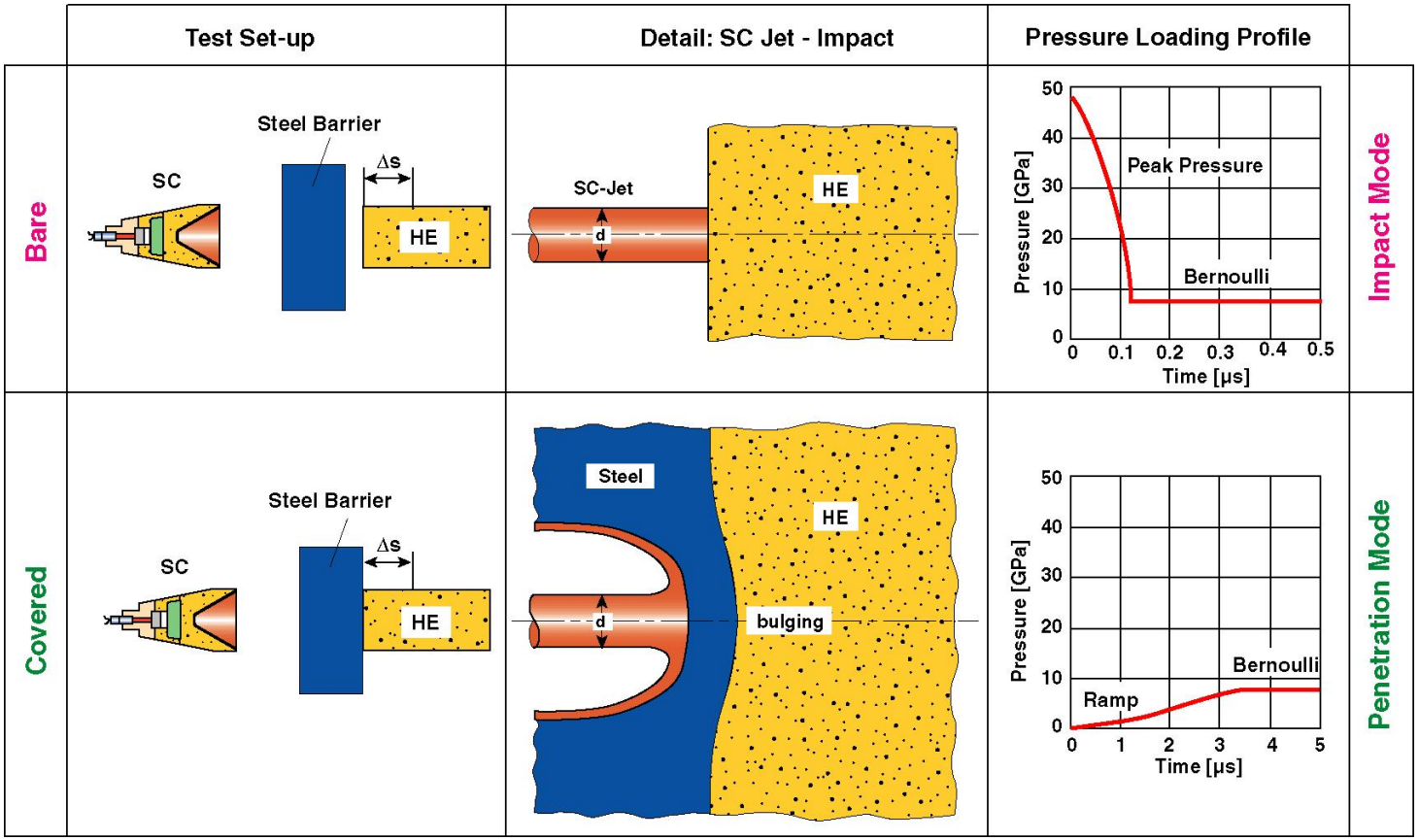
Run distance to detonation for *bare* and *covered* KS32



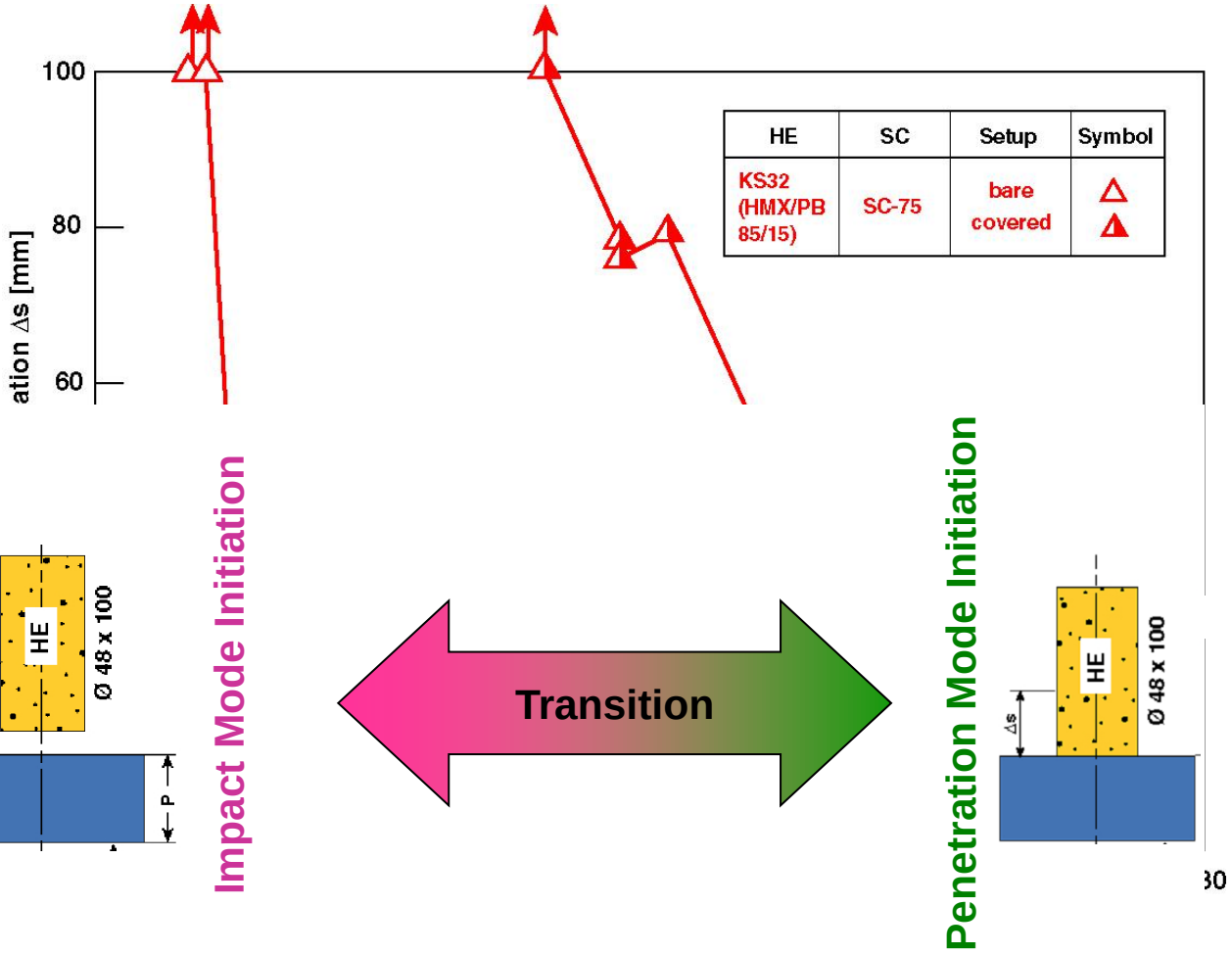
Run distance to detonation Δs for *bare* and *covered* Comp B vs. KS32



Initiation behavior: SCJ @ *bare* vs. *covered* HEs



Run distance to detonation Δs for *bare* and *covered* Comp B vs. KS32



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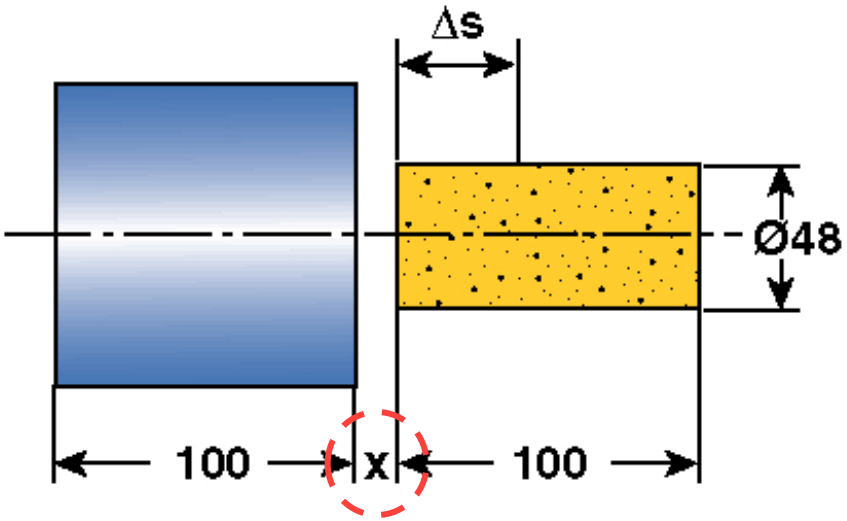
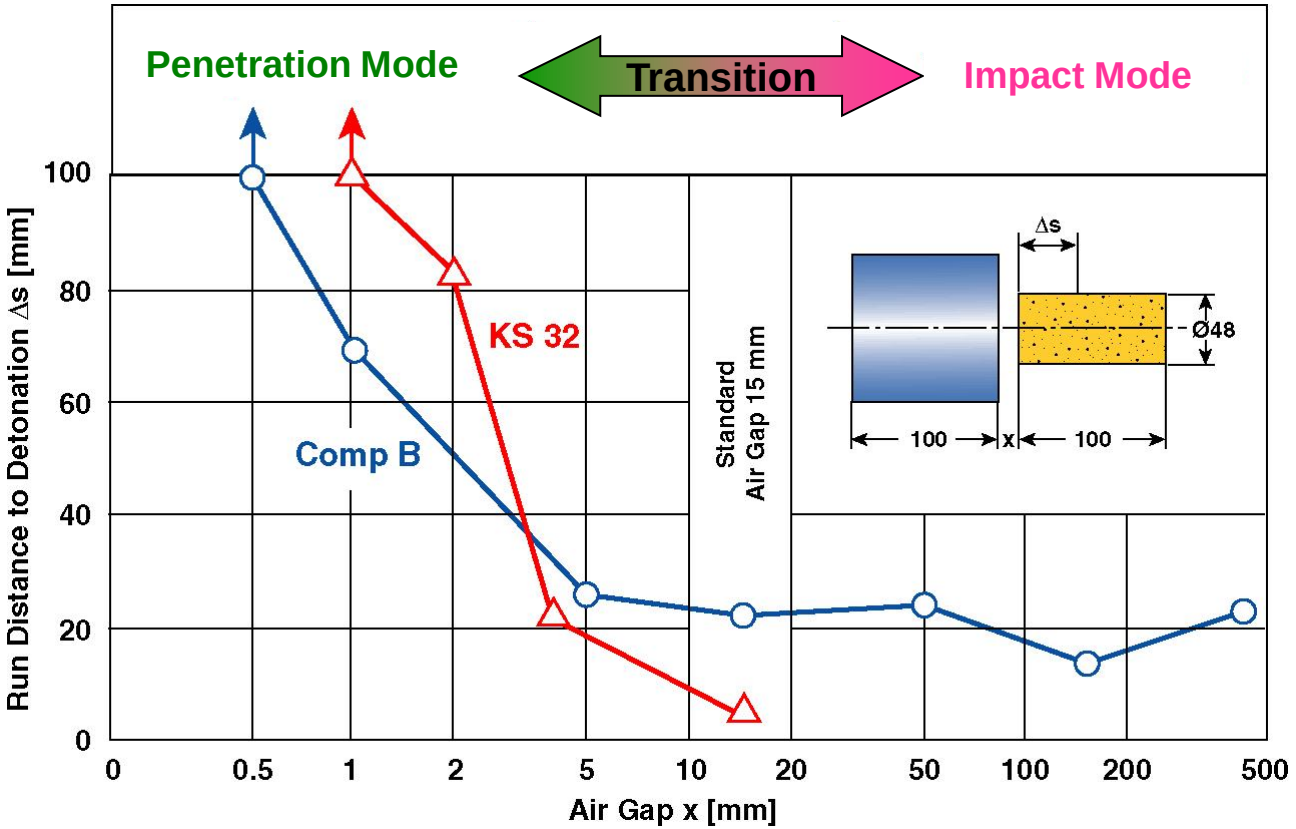
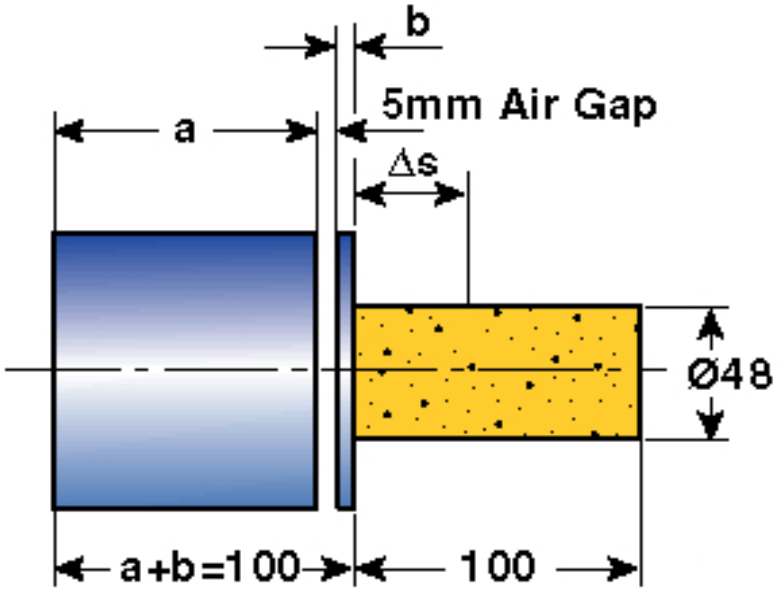
Variation of Air Gap (Steel Barrier P = 100 mm)



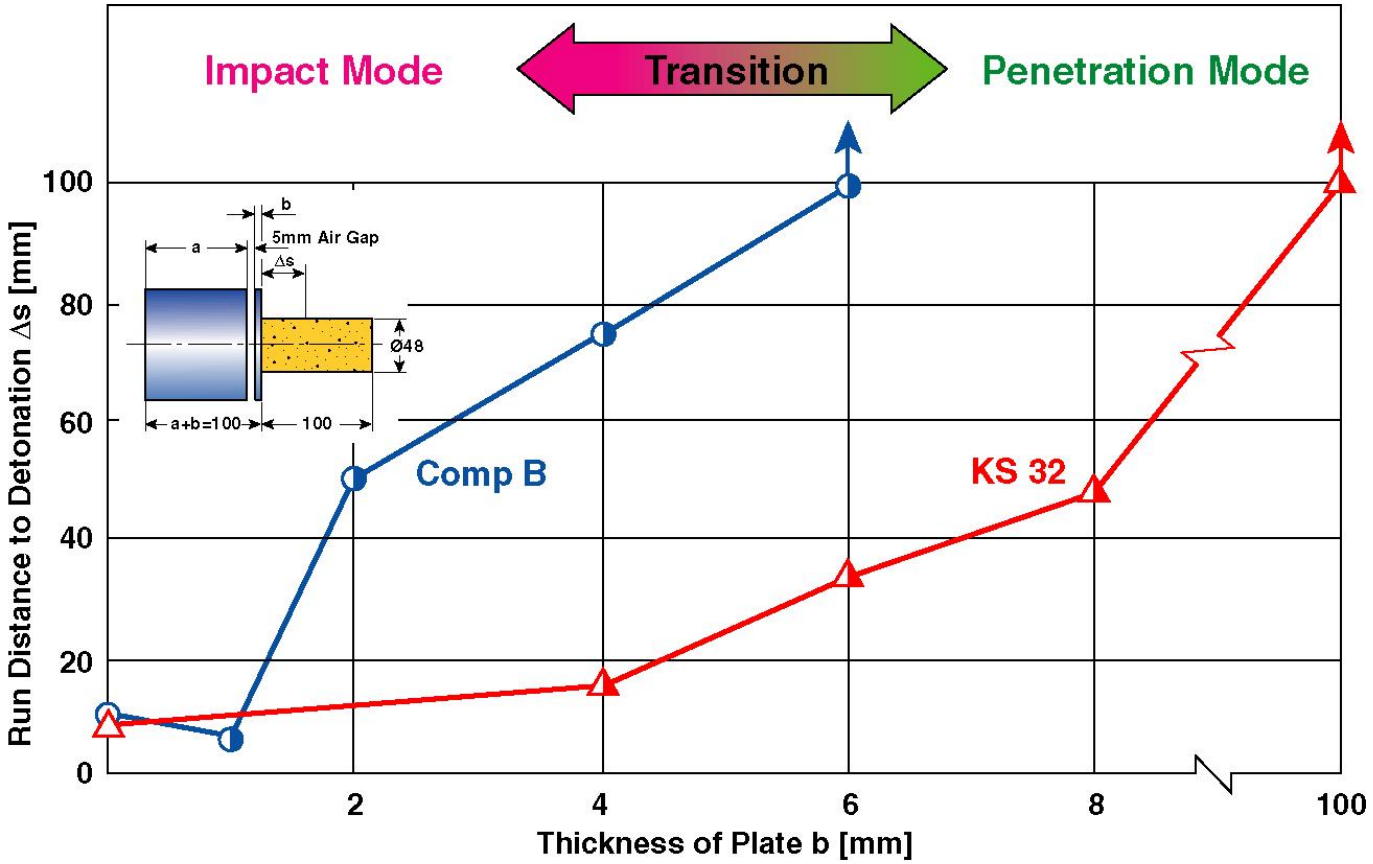
Δs for Comp B and KS32 vs. Air Gap (P = 100 mm)



Splitting of Steel Barrier P (P = a + b = 100 mm)



Δs for Comp B and KS32 vs. Thickness b = P – a (P = 100 mm)



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Summary

- **SCJ Initiation Behavior of TNT-Bonded vs. Plastic Bonded HE**
- **Bare Setup: Impact Mode (prompt) Initiation**
- **Covered Setup: Penetration Mode (run to detonation) Initiation**
- **Transition between these two Modes (Impact vs. Penetration)**
- **Tests with: Air Gap / Spaced Barrier**

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Thank You for Your Attention !

Any Questions ?

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