



Fuze for Tiger Helicopter Rocket Inductive Setting and Motor Ignition

***55th Annual Fuze Conference
"Fuzing's Evolving Role in Smart Weapons"***

Salt Lake City, UT - May 24-26, 2011

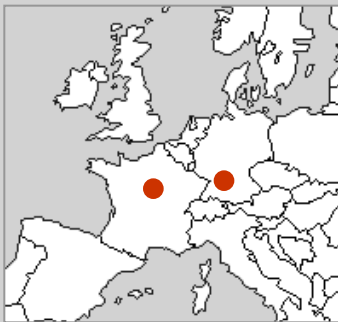
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JUNGHANS Microtec

Outline

- Tiger Rocket system
- Operational Issues
- Fuzing Solutions
- *METAE* Fuze – Inductive setting
- *METAE-AI* Fuze – Inductive setting + motor ignition
- Future developments

Company Presentation

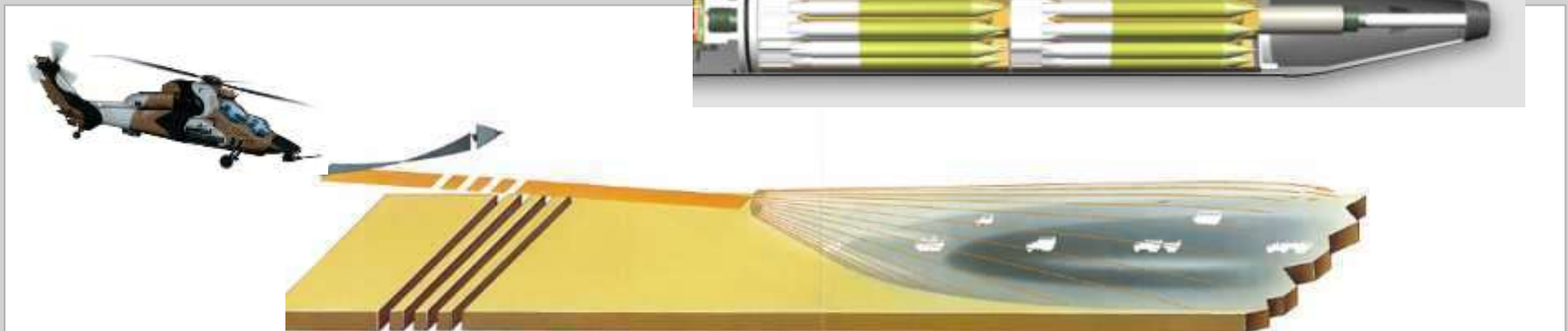
- A leader in the field of ammunition fuzes and S&A devices
- Full range of products
- Key competences in
 - Fuzing technologies
 - Micro-technologies
 - Ammunition electronics



Rocket System for Attack Helicopter

Anti-vehicle Flechette Warhead Concept

- The efficiency of air-to-ground rockets fitted with a flechette warhead has been proven in the past as well as in today's conflicts
- Basic features
 - Used against light armored targets
 - Contains a large number of small arrow-shaped projectiles (darts)
 - Target damage caused by the kinetic energy of the flechette
 - Flechette dispensing controlled by a programmable time fuze
 - Various dart size available for different target / terminal effect
- The projectile dispersal concept compensates
 - the target's movements
 - the inaccuracy around the point of impact



French Tiger Helicopter Rocket System

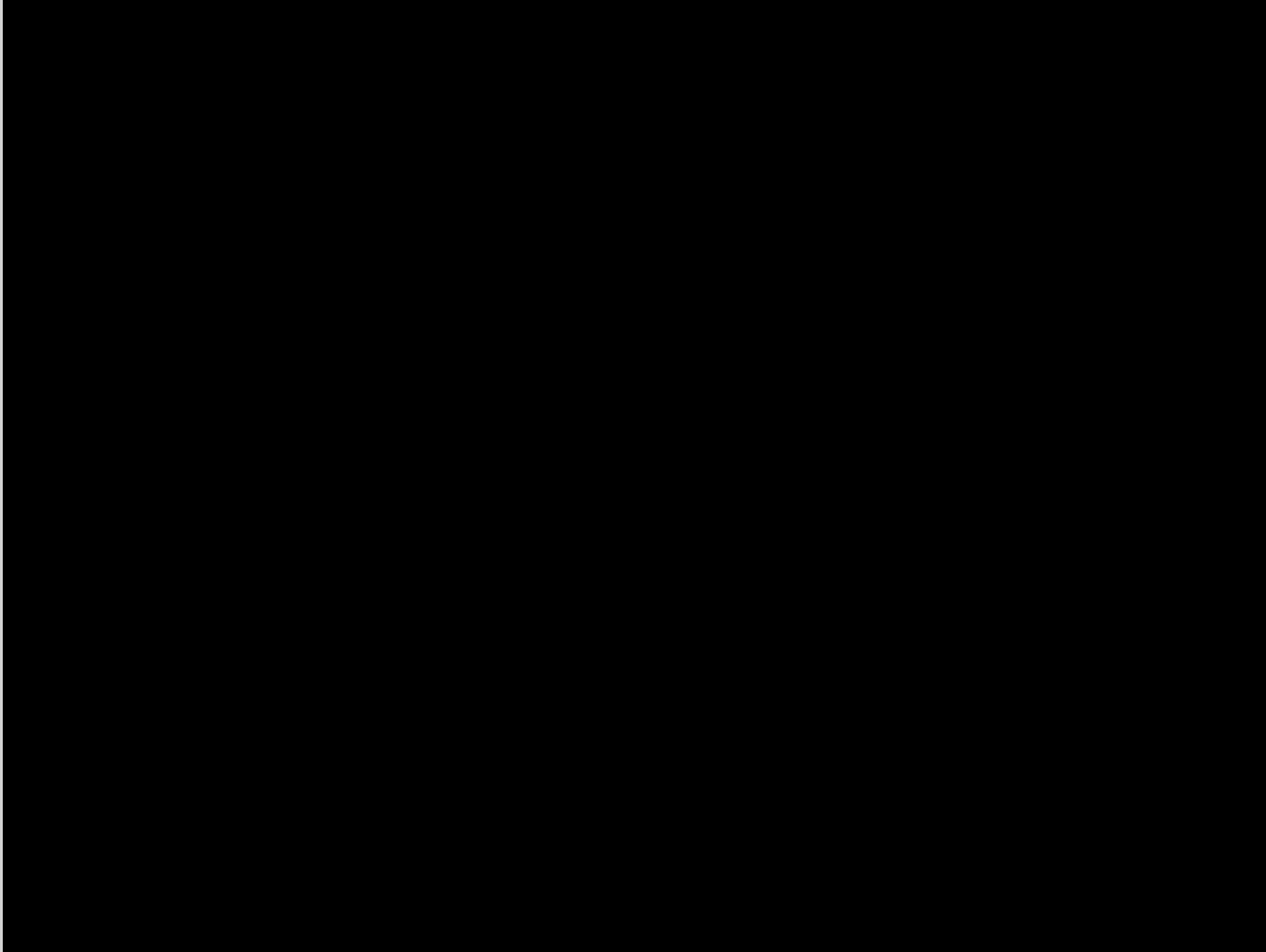
- Today the French Tiger Helicopter is fitted with the most modern rocket system. This system relies on 68mm caliber rockets
- It is currently in service in operational theaters
- The 68mm Rocket System is designed and produced by TDA Armements, France



68mm Rocket System on Tiger

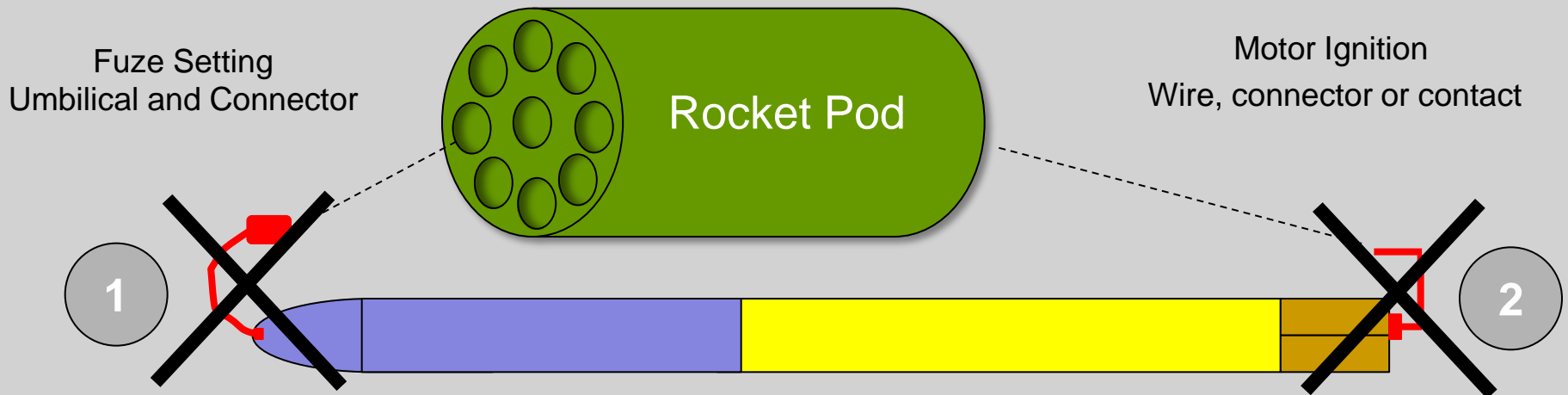


Video – Rocket System



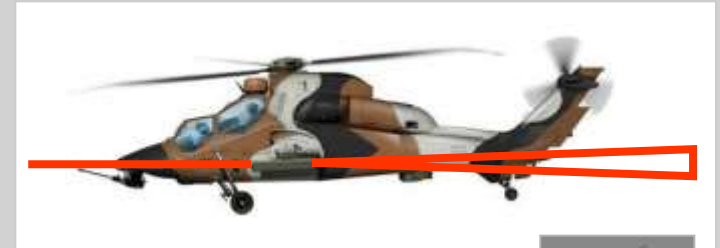
68mm Rocket System - Main Objectives

- Provide benefits to the user in terms of
 - Logistics – Maintenance – Reliability – Safety
- By removing any wire or contact connection between the launcher and the rocket
- Solution: Achieve fuze setting and motor ignition with wireless techniques
 - The 68mm Rocket System features this technique with a new generation electronic fuzing system



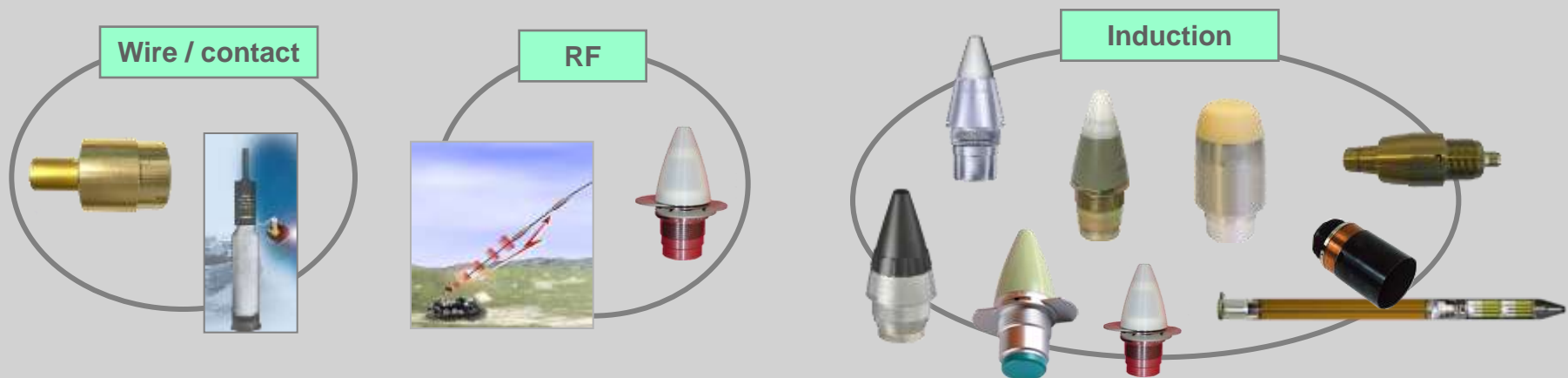
Operational Issues related to wire connecting

- Fuze setting and motor ignition with conventional solutions, based on wire or contact link, lead to significant operational constraints and problems:
 - Scattered scraps generated when firing the rockets (cables, connectors)
 - Safety issue if debris damage the helicopter body or controls
 - Long loading time of rocket in pods
 - Connection to be carried out for each rocket
 - Wire and connectors weaknesses
 - Possible clogging up of connectors and contacts
 - Loose connections
 - Watertightness issues
 - EMC issues



METAE and METAE-AI new generation fuzes

- Wireless fuze setting solutions developed by JUNGHANS have provided new generation rocket system with unmatched operational flexibility, safety and reliability
 - METAE fuze: Inductive setting.
 - Qualified and produced from early 90's onwards
 - Qualified on Tiger helicopter in 2000
 - METAE-AI fuze: Inductive setting + inductive motor ignition
 - Qualified in 2010, Serial production started early 2011
- JUNGHANS background in fuze setting / communication techniques



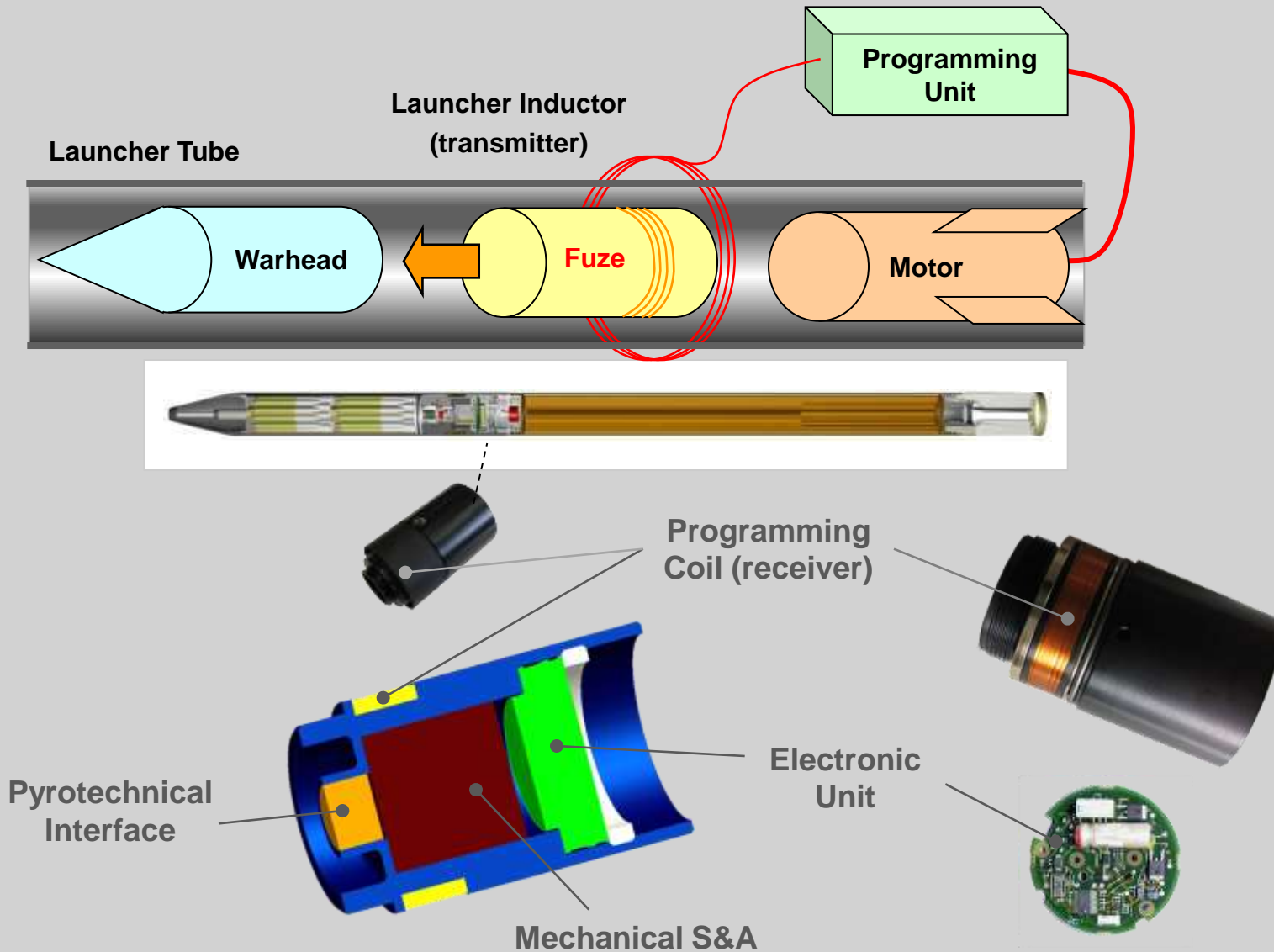
- Main technical challenges

- Inductive link through metallic launcher tube
- Multiple tube launcher
- Fuze power supply
- Fuze electronics power consumption
- Data transmission safety

- METAE Fuze solutions

- Selection of the good compromise for
 - suitable metal material for the tube
 - thickness of the tube
 - frequency of the carrier signal for data link to deal with inductive transmission issues
- No internal battery
 - Energy provided by the fuze setting unit and transferred at setting phase, prior to firing
- Use of safe communication protocol

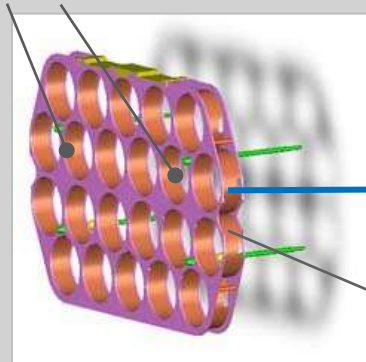
METAE Fuze – Inductive Programming



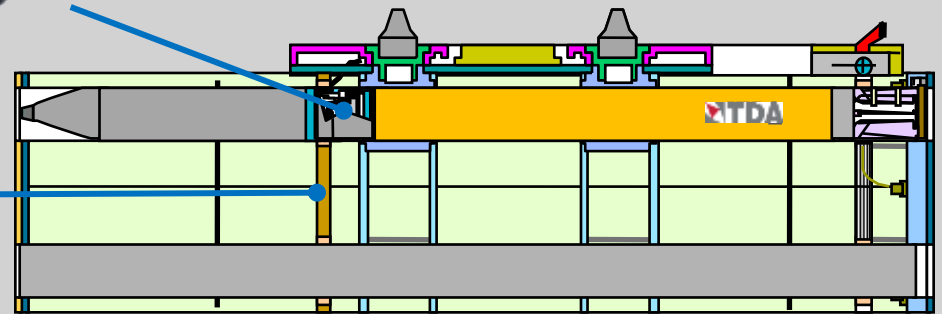
METAE and METAE-AI Fuzes Launcher integration



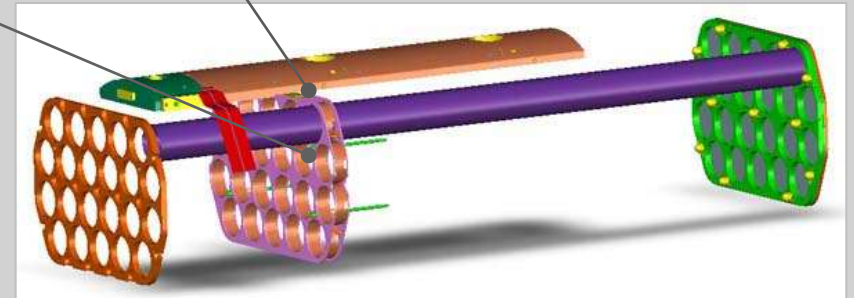
Launcher
Inductors



Fuze



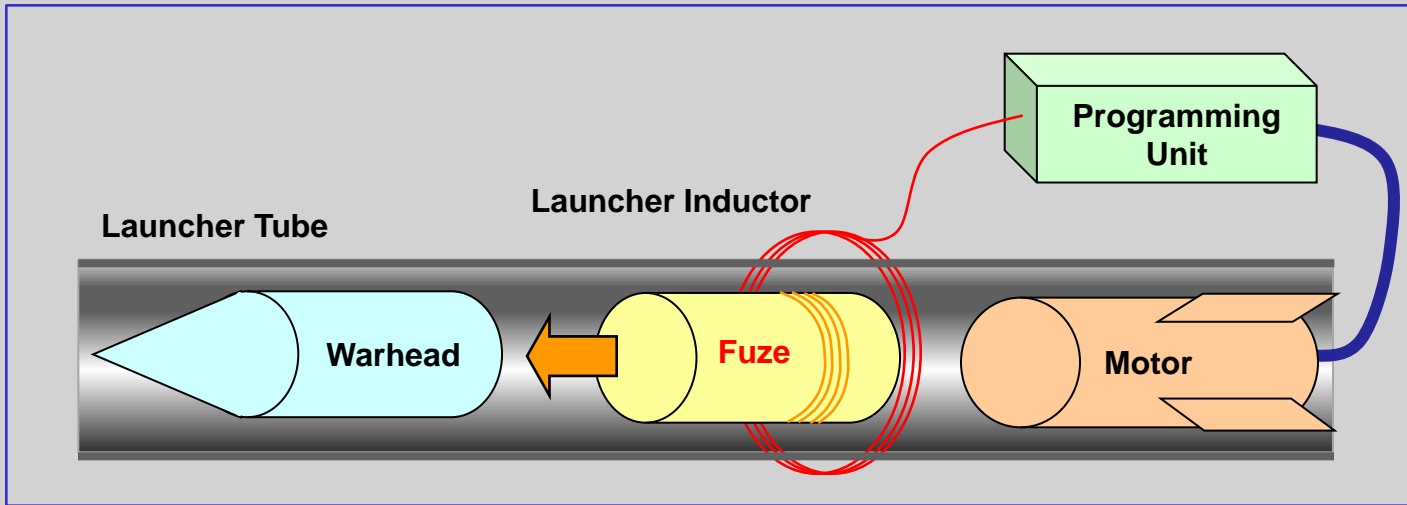
Integration
in the 22
rocket pod



METAE Fuze – Main Features

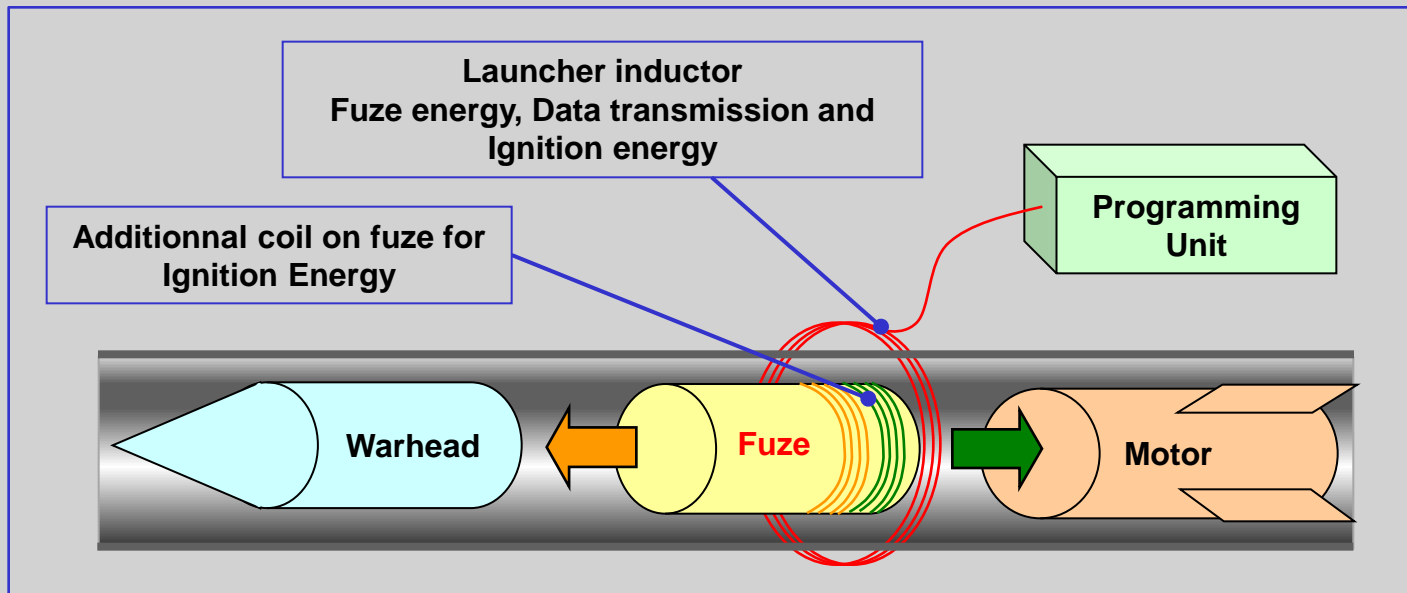
- Inductive fuze setting
 - Data transmission, electronic energizing and energy transfer
 - Fuze setting carried out just before firing
 - Message duration: 35ms
 - Manchester encoding
- Programmable flight time
 - From 1.28s to 30s
- Power supply
 - Energy transfer at inductive programming
 - Energy storage by capacitor
- Digital electronics
- Safety distance
 - Mechanical S&A unit: 0.7s arming delay

METAE-AI Fuze – Programming + motor ignition



METAE Fuze

Inductive Programming
+
Contact / connection
for motor ignition



METAE-AI Fuze

Inductive Programming
+
Inductive Motor Ignition

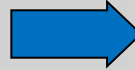
METAE-AI Fuze – Main Features

- Fuze setting:
 - Same as the METAE fuze
- Fuze features
 - Same as the METAE fuze
- Motor ignition
 - No contact nor connection with the launcher
 - Fully controlled by the fuze
 - Dual coil to transmit suitable ignition energy
 - Motor ignition carried out just after message transmission
 - Ignition signal generated when two conditions are met
 - Decoding of the correct message and flight time
 - Checking that the required ignition energy is available

METAE-AI Fuze

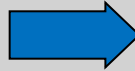
Summary of Operational Benefits

- No wire - no connector



- Reduced time for maintenance
- Reduced time for loading operation
- Enhanced reliability

- No scattered scrap and debris when firing



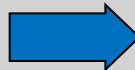
- No damage to helicopter
- Enhanced safety

- Qualified in severe EMC environment



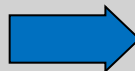
- Enhanced safety
- Enhanced reliability

- Digital electronics



- Enhanced precision
- Enhanced operational flexibility
- Growth potential for new weapons

- No external access / induction protocol needed to activate motor or fuze

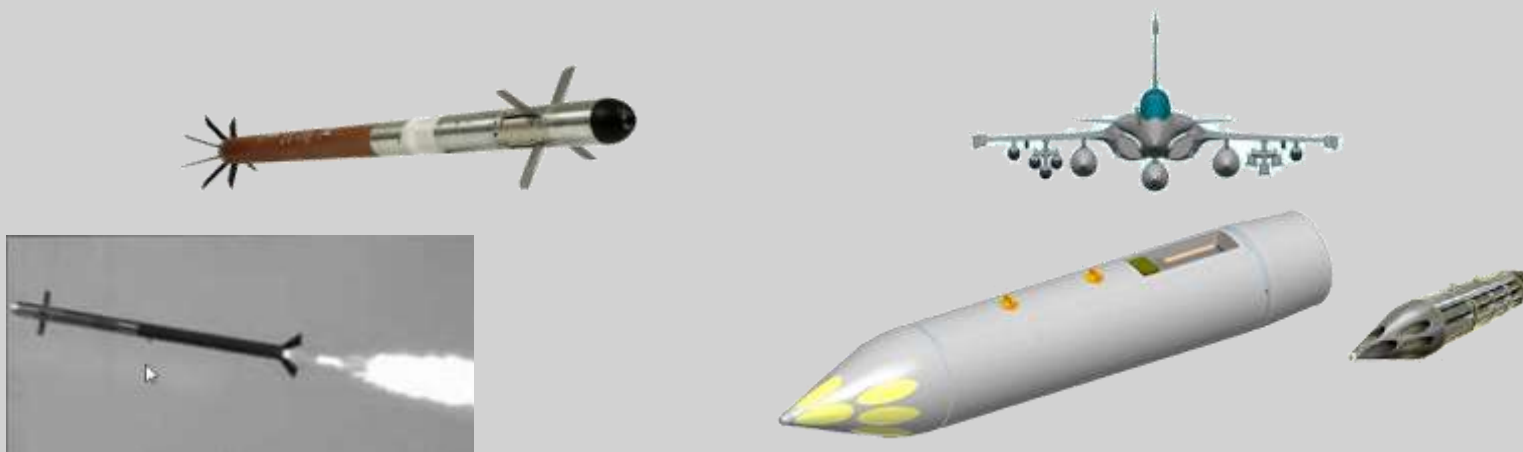


- Prevent enemy to reuse the rocket as improvised weapon or IED

Future developments

Rocket System and Fuze

- Digital electronics and inductive setting features provide growth potential and capabilities to deal with further rocket system developments, e.g.
 - Advanced Guided Rocket development (TDA programme)
 - Capability to transmit additional data and mission parameters, eg. Laser code, etc..
 - New generation of warhead for rockets
 - Transposition of Tiger helicopter launcher to fixed-wing aircraft integration
 - Advanced Rocket Launcher for rotary-wing or fixed-wing aircraft



- Due to its inductive fuze setting and communication techniques, the 68mm Rocket System provides the Tiger attack helicopter with unmatched operational benefits:
 - Enhanced terminal effect on target
 - Better operational flexibility
 - More reliability and safety
- New trends in modern warfare highlight new operational needs. This concerns air-to-ground rockets as well as all other weapons and ammunition
- The fuze is the main contributor to the munition's performance. New weapon evolutions relies on progress in fuze capabilities and technologies as well as in fuze integration in the weapon systems
- The fuze designer/producer has a key role in the development of smart weapons



Thank You

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