

**JUNGHANS Defence - Paper proposal for technical presentation at  
PARARI 2019 Symposium (abstract)**

Presentation type: **Technical Brief**

***New S&A and Initiation Technologies For  
Safer and More Effective Munitions***

Ordnance safety and operational effectiveness are closely linked to the way the explosive warhead (or propellant) is initiated. New solutions to achieve safety, arming and firing functions are significantly contributing to capability by providing enhanced performances on these features.

Modern munitions demand enhanced safety over the complete logistical and tactical cycles and must comply with the last release of safety standards as STANAG 4187 and STANAG 4368. In addition, features as IM (Insensitive Munition) capability is now frequently requested.

New munitions also require additional features and functionalities to achieve better terminal effect as well as operational flexibility. Such features directly impact the design of lethal packages/warheads, in particular when it comes to scalable or tailorable effect warheads, hard target defeat, integration in complex weapons and smart munitions.

New technologies in safety, arming and firing devices/functions, as well as in explosive initiators and firing trains, provide today valuable solutions to cope with both requirements for increased safety and operational effectiveness.

Recent developments in micro-technologies and in EFI (Exploding Foil Initiator) technology enable significant improvements of both types of Safety & Arming devices and firing trains (interrupted-train S&A devices and in-line S&A devices). Main areas of improvement are miniaturization, high shock survivability, IM features, electronic control as well as capability to distribute initiation functions with precise timing sequences.

The presentation will introduce and describe these technical solutions, recently developed or currently in development, able to meet these new requirements. It will be supported by results and examples from actual projects carried out in Europe, in both technologies.

On one hand, the paper will focus on new generation LEEFI-based fireset (Low Energy EFI), the LEEFI component itself, related components and S&A architectures. These new developments enable in-line S&A systems to become smaller, affordable and easily conformable, allowing the use for new generation munition warheads. It will also enable the design of scalable/tunable warheads as well as motor ignition safety devices for rockets or small missiles.

On the other hand it will describe technologies which also provide significant improvements for interrupted-train S&A device designs. This regards in particular firing train miniaturization, new ways to achieve firing train interruption and to control it electronically.

These technical solutions enable the implementation of warhead safety/firing functions in new munitions, compatible with the most demanding safety requirements but also with terminal effect and flexibility improvement, thus significantly contributing to the operational capability.

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## **Author Bio**

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Max Perrin is graduated as an electronic engineer.

He started in 1983 as a R&D engineer in the French subsidiary of Philips company in France, operating in Defence and Ammunition electronics.

Since the merger of Philips and Thomson-CSF (THALES) defence activities in the early 1990's he has been in charge of electronic fuzing products within TDA Armements.

He is now Chief Technical Officer of JUNGHANS Defence, formed by the merger of DIEHL and THALES munitions fuzing activities in 2008.

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