

Development Of An Electronic Time Fuze For Self-Propelled Long Range Howitzer

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Company Background

Hanwha Group

- Top 10 Largest Biz. Group in Korea

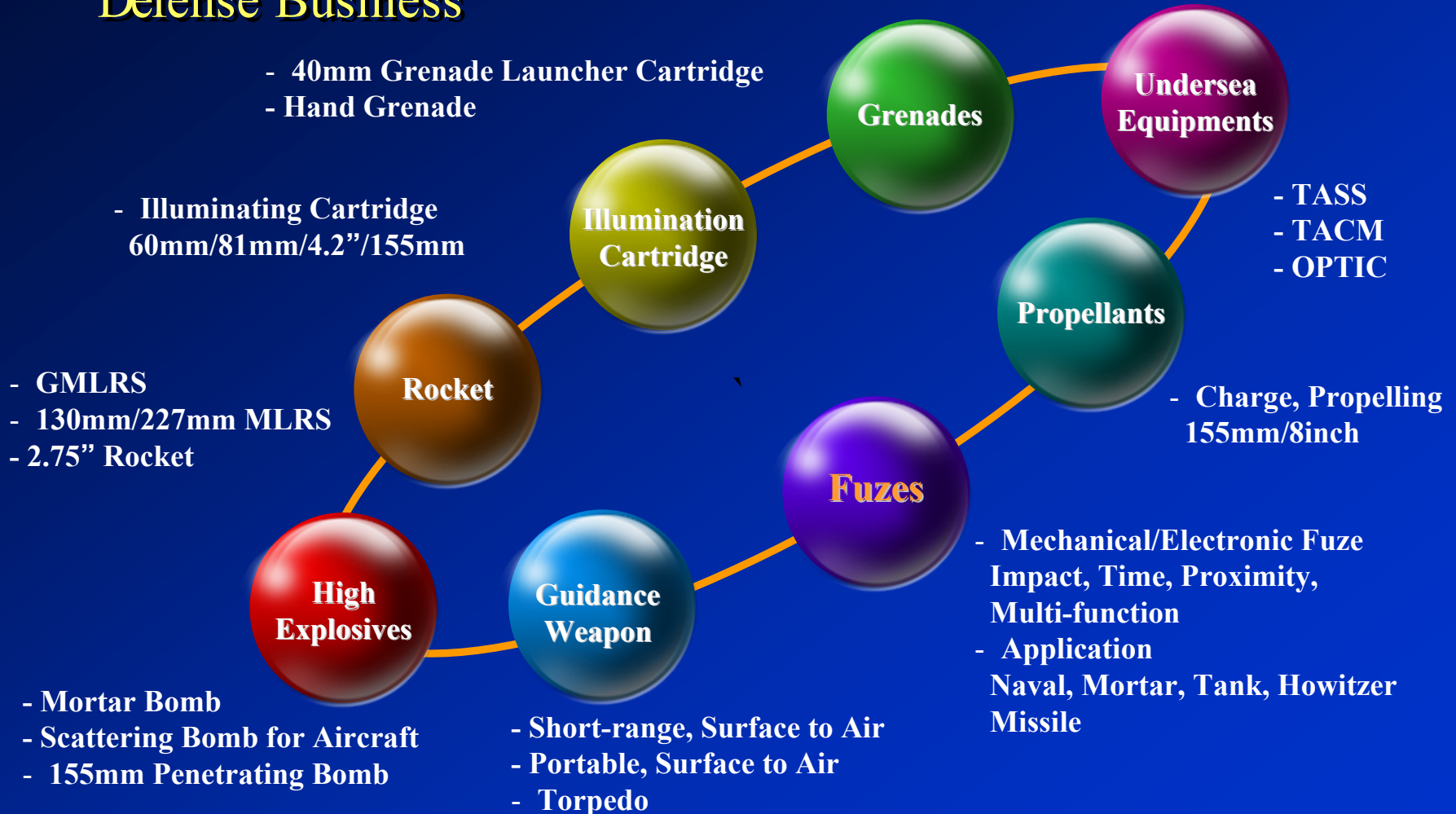
Hanwha Corporation

- Subsidiary of the Hanwha Group
- Founded in 1952, largest fuze company in Korea
- Sales : \$570milion
- Employees : 2,800 persons



Company Background

Defense Business



Fuze Capability

Participating today in leading next generation fuzes
Development of electronic & mechanical fuze for :

Artillery Ammunition

-105mm/155mm/203mm

Mortar Ammunition

-60mm/80mm/120mm

Tank Ammunition

-120mm

Medium Caliber Ammunition

-20mm/25mm/35mm/40mm



Submunition

-120mm

-2.75" MPSM, MLRS

Rocket & Mine

-MLRS

-NSDA

Missile

-Fuzes & ESAD



MEMS Safe & Arming Device

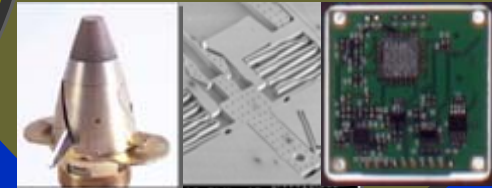
TCF

GPS Fuze

Smart Fuze

G-hardened ESAD

Non-lethal Weapon Fuze



Fuze Needs

Korean army needs an electronic time fuze for artillery and for high fire rate of self-propelled howitzer



K9 Self-Propelled Howitzer

155mm-52caliber, 40km Range

Automatic Fire Control System

Automatic Shell Loading System

Ammunition K310 DPICM BB etc

Fuze KM577A1 MTSQ etc

Propellant Modular Charge etc



Electronic Time Fuze, HW101

- Development by Hanwha investment for Korean army needs and global export
- Use in all types of 105 to 203mm HE, cargo, illuminating and smoke projectiles
- Time set either manually or by using an inductive fuze setter over a range from 0.5 to 199.9seconds
- The HW101 fuze is suitable for the latest generation of enhanced range munitions

Electronic Time Fuze, HW101



HW101



HW101A1

Operation	Mode	Function
	PD	PD
	ET	ET/PD
	Accuracy	±0.1s
	Set	Inductive & manually
	* Set range : 0.5~199.9s (0.1s increment)	
Ballistic Environment	1,300~30,000G 2,500~30,000RPM	
Oper. Temp.	-43°C ~ +63°C	
Safety	400caliber	
Standards	Mil-Std-1316, Mil-Std-331	

Electronic Time Fuze, HW101

Dual setting system & high accuracy design
for user's requirements

- **Dual setting system**
 - Uncabled setting by inductive means
 - Manual setting by three setting rings
 - Unlimited setting storage time
(no use of battery for setting)

- **Electronics**
 - High G ruggedized by crystal based devices
 - Hybrid IC for small size
 - Time algorithms for high accuracy

Electronic Time Fuze, HW101

G-hardend modular design of subass'y for common use artillery fuze

- **Power Supply**
 - Reserve battery for long storage

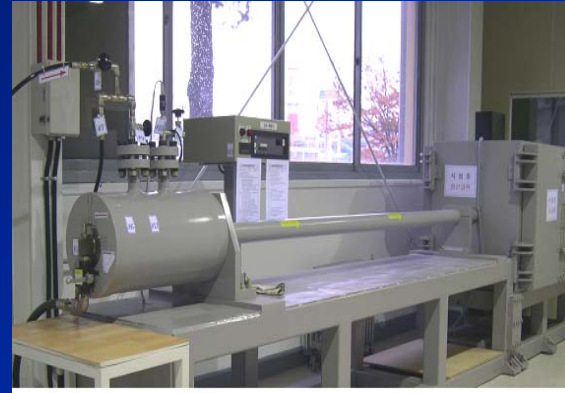
- **Safety & Arming Device**
 - Two independent environment locks
 - Electronic arming not arm until 0.45s

- **Explosive train**
 - Out-of-line explosive train prior to 400caliber
 - 27g RDX Booster (for HE)

Electronic Time Fuze, HW101

High G test by gas gun system

- High G demonstration of parts and assemblies



Electronic function test by special instrument

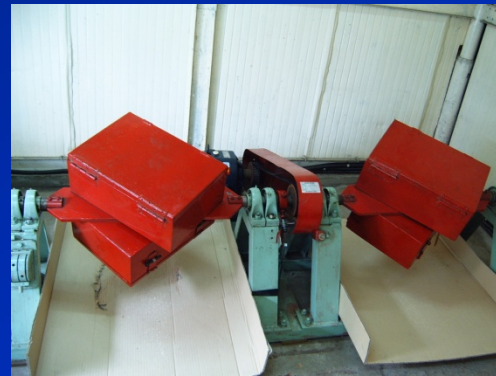
- Electronic function demonstration of assemblies



Electronic Time Fuze, HW101

Environmental test : MIL-STD-331

- Vibration
- Temperature & Humidity(28days)
- Salt Fog
- Waterproofness
- Thermal
- Jolt/Jumble/1.5m Drop/12m Drop



Electronic Time Fuze, HW101

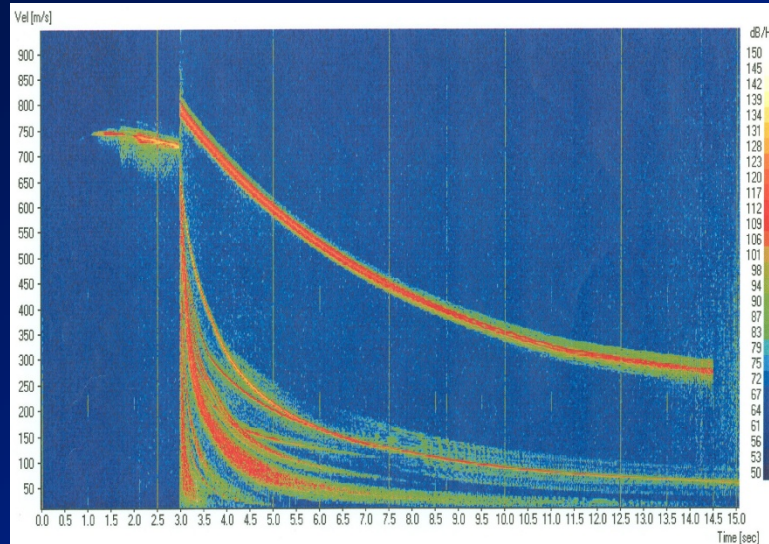
Field test : Full charge validation



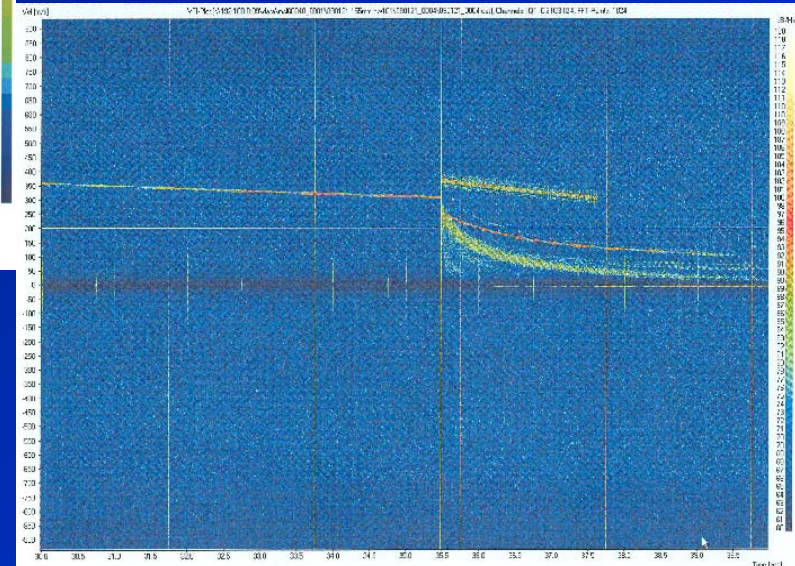
Caliber	Weapon	Projectile	Charge/Zone	Setting(s)	Accuracy(s)
155mm	K9 Howitzer(52cal)	K310	K676 MCS	35	Requirement : $\lt; \pm 0.1$ Recorded : $\lt; \pm X.XX$
	M198 Class(52cal)	K310	K676 MCS	109	
	KH179(39cal)	KM549A1	KM203/8S	97	
105mm	KM101A1	KM1	KM67/7	48	
203mm	KM115	KM106	KM2/5	20	

Electronic Time Fuze, HW101

Field test : Submunition expelling validation



K9-K310 DPICM-MCS



Fuze Setter

Developed for hand held use and vehicle mounted use



Interface with user via
LED & keypad
Low power consumption
>3,000setting operations

Operation	Mode	Function
	Display	Seven seg. LED
	Setting	16 keypads
	Monitoring	Set time
		Power capacity
Oper. Temp.	-43°C ~ +63°C	
Power	Lithium Battery Auxiliary External Power	
Standards	Mil-Std-810F, Mil-Std-461E	

Fuze Setter

Setter can be integrated with automatic shell loading system and fire control system.

Setting operation

Interface with user via LED & keypad

Have two mode : Set Mode, Read Mode

Display



Time set



PD set



Power

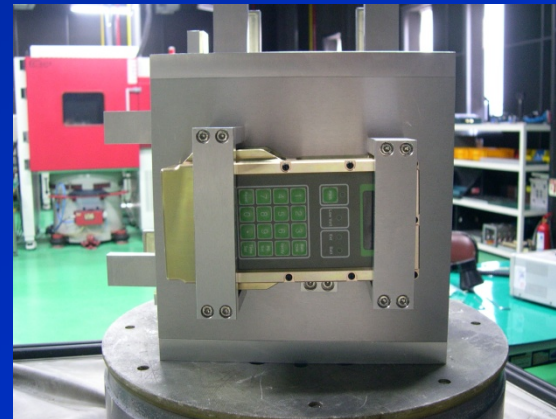
Fuze Setter

EMC test : MIL-STD-461F



Environmental test : MIL-STD-810E

- Thermal
- Leakage
- Transport
Vibration



Summary & Conclusion

- Wide operational flexibility
 - HW101 and HW101A1 fuzes
 - Inductive mean setting
 - Fuze setter operation
 - . Hand hold or vehicle mounted
 - . Integrated with auto shell loading system and fire control systems
- Improved performance with high time accuracy
- Low cost achievement by modular design
- Proved reliability by real fire test