GUNTOL – A Low Cost Melt Cast for IM

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2009 Insensitive Munitions & Energetic Materials Technology Symposium
May, 11-14, 2009

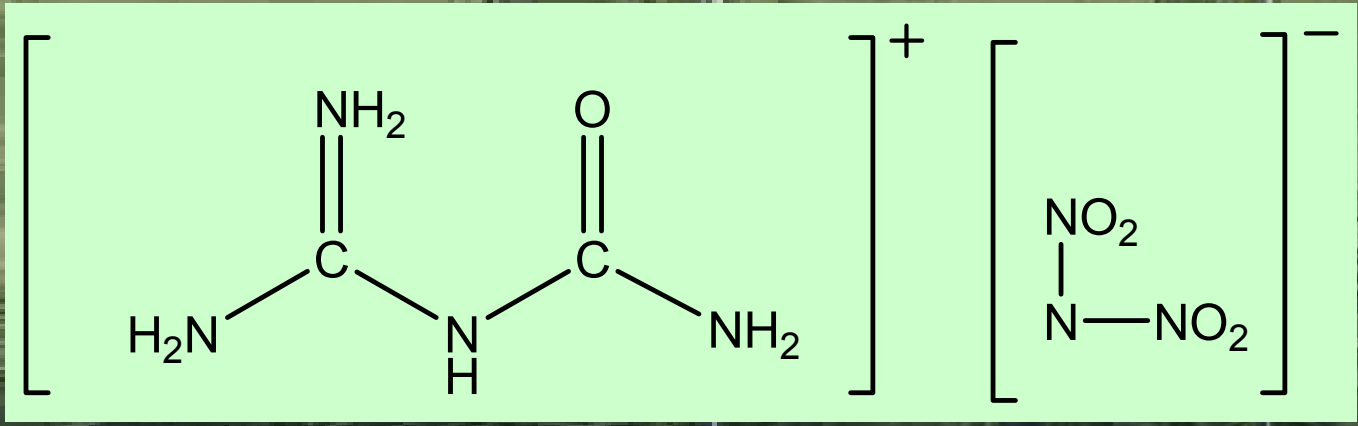
Loews Ventana Canyon Resort, Tucson
Arizona, USA

GUDN (FOX 12)

Name: Guanylurea dinitramid, FOX 12

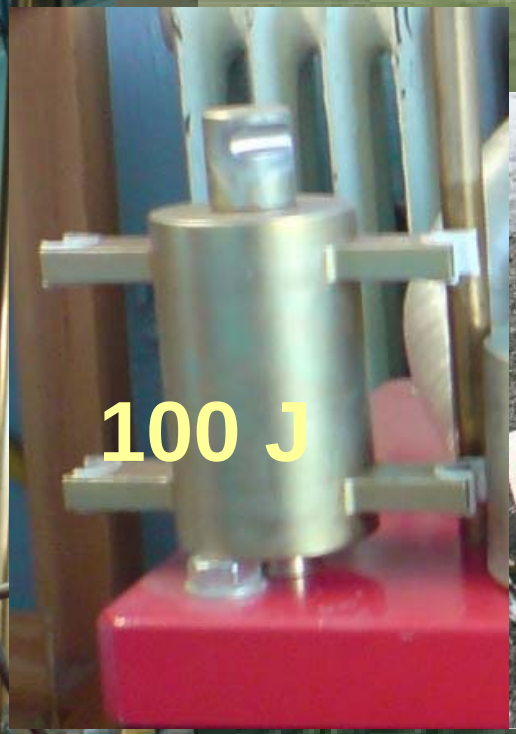
Formula: $[NH_2C(NH)NHCONH_3]^+ [N(NO_2)_2]^-$

CAS nr: 217464-38-5

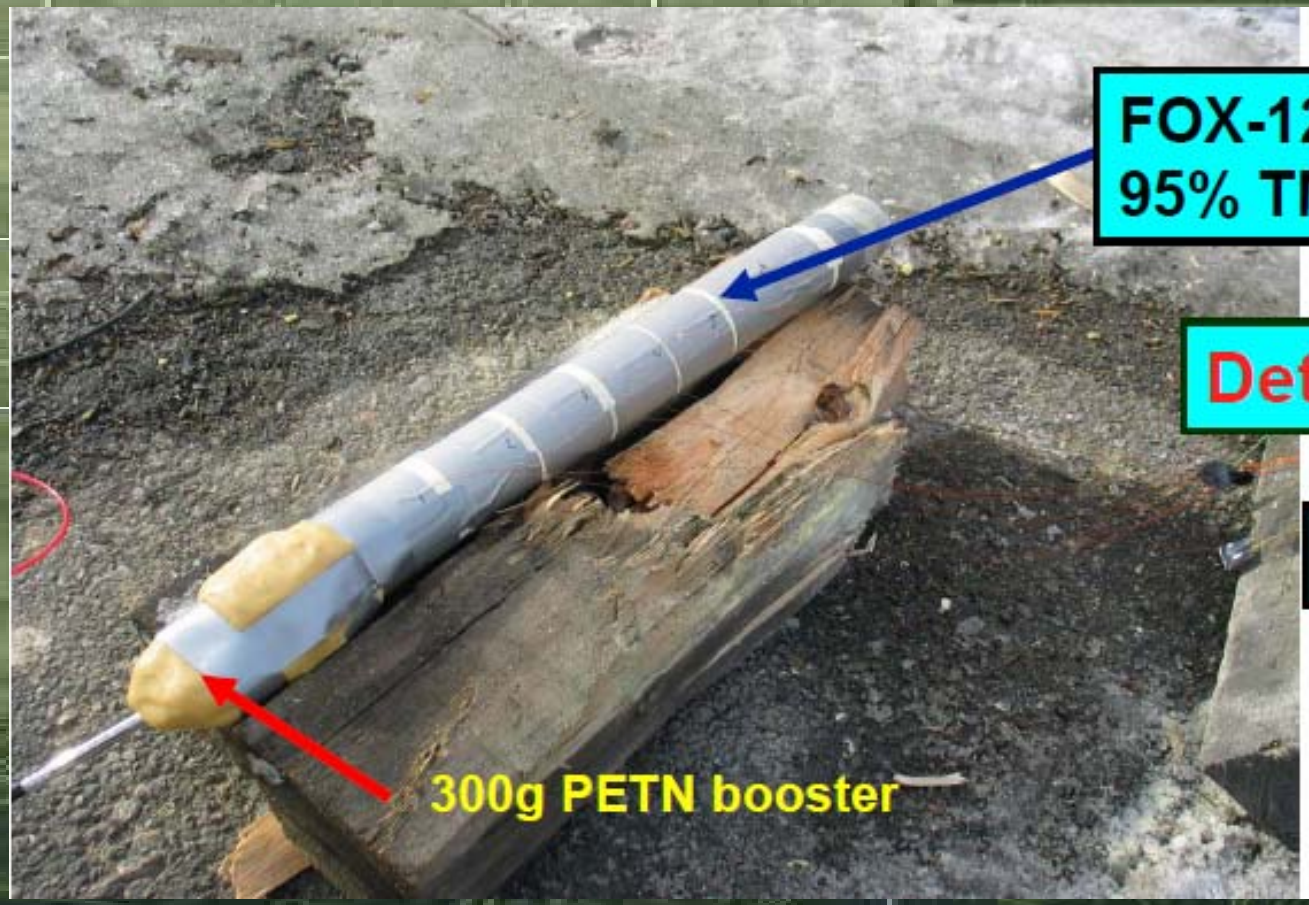


GUDN as HE

The Velocity of detonation is about 8000 m/s



but it is!



Transport classification

GUDN Particles

Four classes (particle sizes) are produced

Class 1 20-50 mic

Class 2 80-150 mi

Class 3 TBD

Class 4 250-400 mi

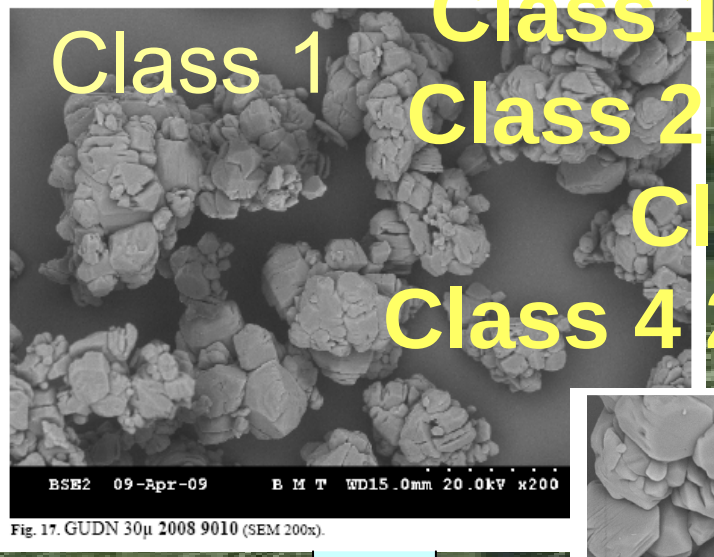


Fig. 17. GUDN 30µ 2008 9010 (SEM 200x).

Fig. 19. GUDN 30µ 2008 9010 (SEM 1000x).

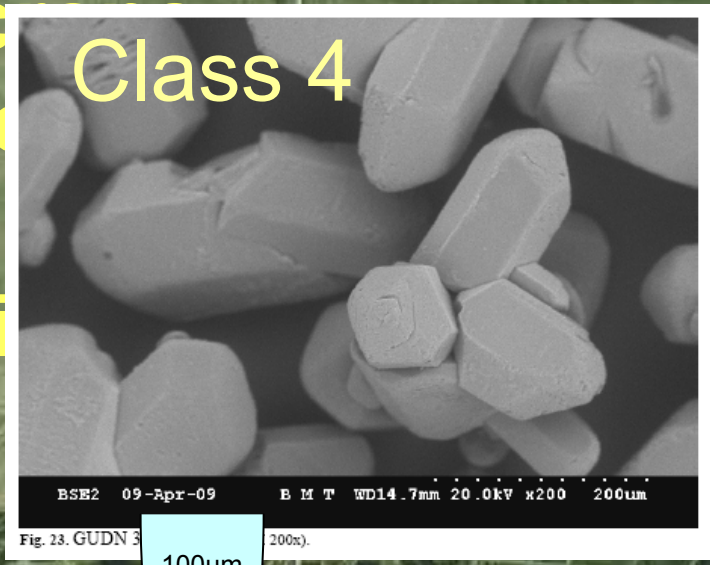


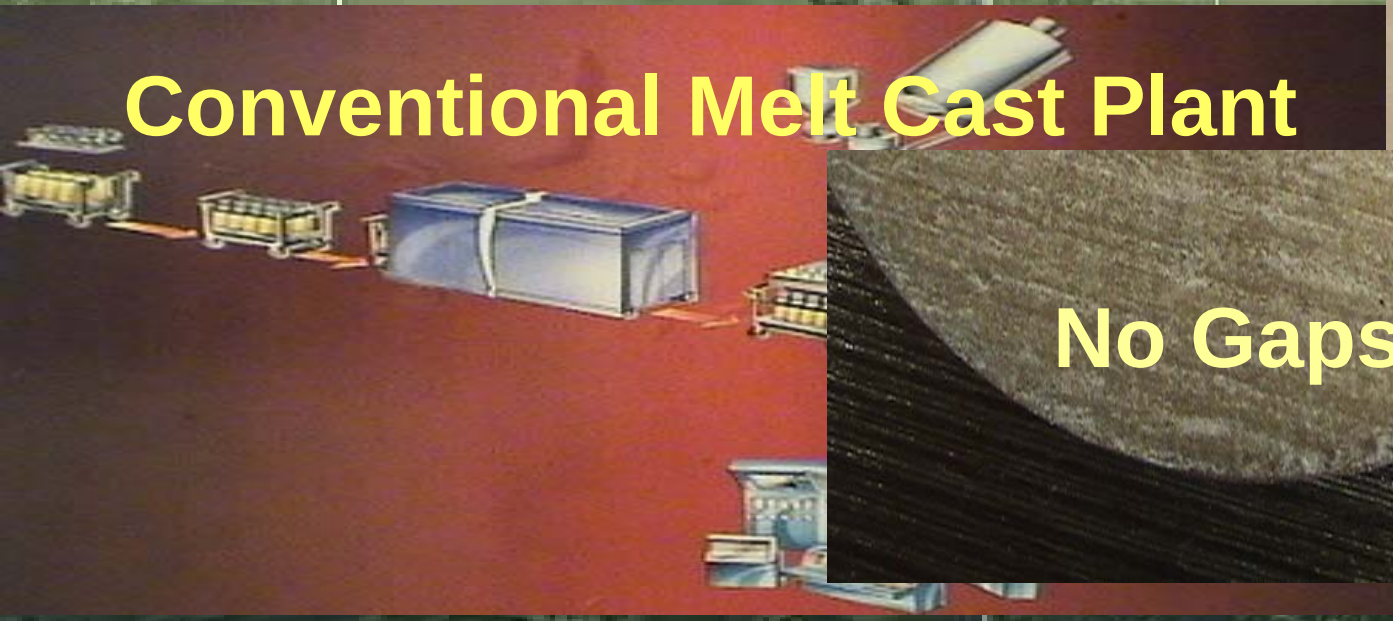
Fig. 23. GUDN 3 200x).

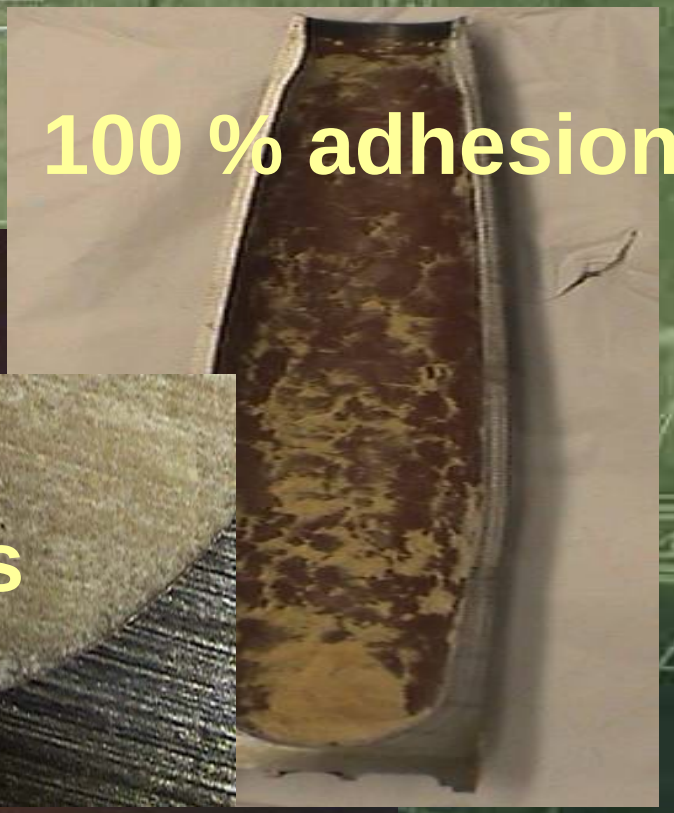
GUDN Stability Profile

- **Decomposition temperature: 212-215°C**
- **Weight loss 107^{0}C/408 h: less than 0.50 %**
- **Decomposition 110 ^{0}C: 0.01 umol/g/h (constant 70 h)**
- **Hygroscopicity: Nil**

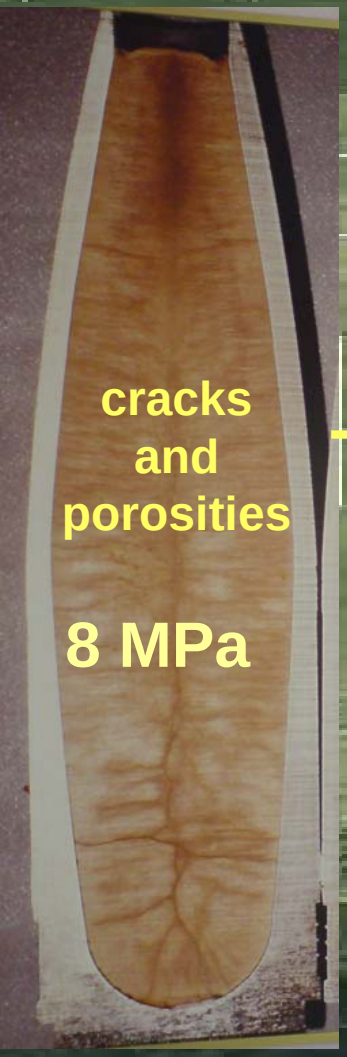
GUNTOL

- RDX in TNT = Hexotol (e.g. Comp. B)
- HMX in TNT = Octol
- GUDN in TNT = GUNTOL





USING TNT
- is that a problem?



- An amorf structure is obtained by adding HNS

- Adsorbent (> 30 years experience)
  - Exudation reduced 70% at 70 ^{0}C

TNT compositions are still widely used

- If you still lack confidence in TNT
  - Use GUDN in dinitroanisol (DNAN)

- Don’t forget the price tag: 1-2 USD/lb !

Bullet impact (0.5 cal)

SSGT (shock sensitivity) testing

	Inert	HMX	TNT	Al	GUDN	SSGT mm water
GUNTOL			55		45	0.9
GUNTOL + HMX +"plasticiser"	5	10	35		50	1.0
GUNTOL + RDX + Al		15	35	15	35	4.4
Composition B						18
PBXN-110						14
TATB						7

Gurney (performance) testing

	RDX	HMX	TNT	Al	GUDN	Gurney km/sec
PBXN-109	65			15		1.88
PBXN-110		90				2.21
GUNTOL			55		45	2.07
GUNTOL + HMX		25	40		35	2.44
GUNTOL + RDX + Al	15		35	15	35	2.23

IM testing on 155 shells (STANAG 4413)

Test results with BAE's 155 shells

- IM tests:
  - ⇨ Slow cook off → Burning (V) (mitigation)
  - ⇨ Bomblet SC → Deflagration (IV)
  - ⇨ RPG 7 SC → Explosion (III)
  - ⇨ Sympathetic detonation → III or IV

Affordable

- GUDN is produced from inexpensive raw material in a one step process
- Today we are offering large quantities of GUNTOL for ~ 20 USD/lb
- Target is ~ 15 USD/lb

Conclusions

- **GUNTOL is a Melt Cast with**
  - **Conventional performance**
  - **Very low shock sensitivity**
  - **Technology without investments**
  - **Affordable**

Acknowledgement

- Carina Bergvall-Laitila, Eurenco Bofors
- Mikael Westerlund, Eurenco Bofors
- Ricky Kinell, Nammo Liab AB
- Roland Wild, WIWEB