DNDA GUN PROPELLANTS

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41st Annual Armament Systems:

Gun and Missile Systems Conference & Exhibition

March 27 – 30, 2006, Sacramento Convention Center

Sacramento, CA, U.S.A.

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Content

- Processing Technologies
- DNDA Gun Propellants
  - Temperature behaviour
  - Influence of the Processing Technology
  - Sensitivity datas
  - ARC
  - Longterm Stability
  - Closed Bomb Tests
  - Gun Test Firing
- Results & Conclusion

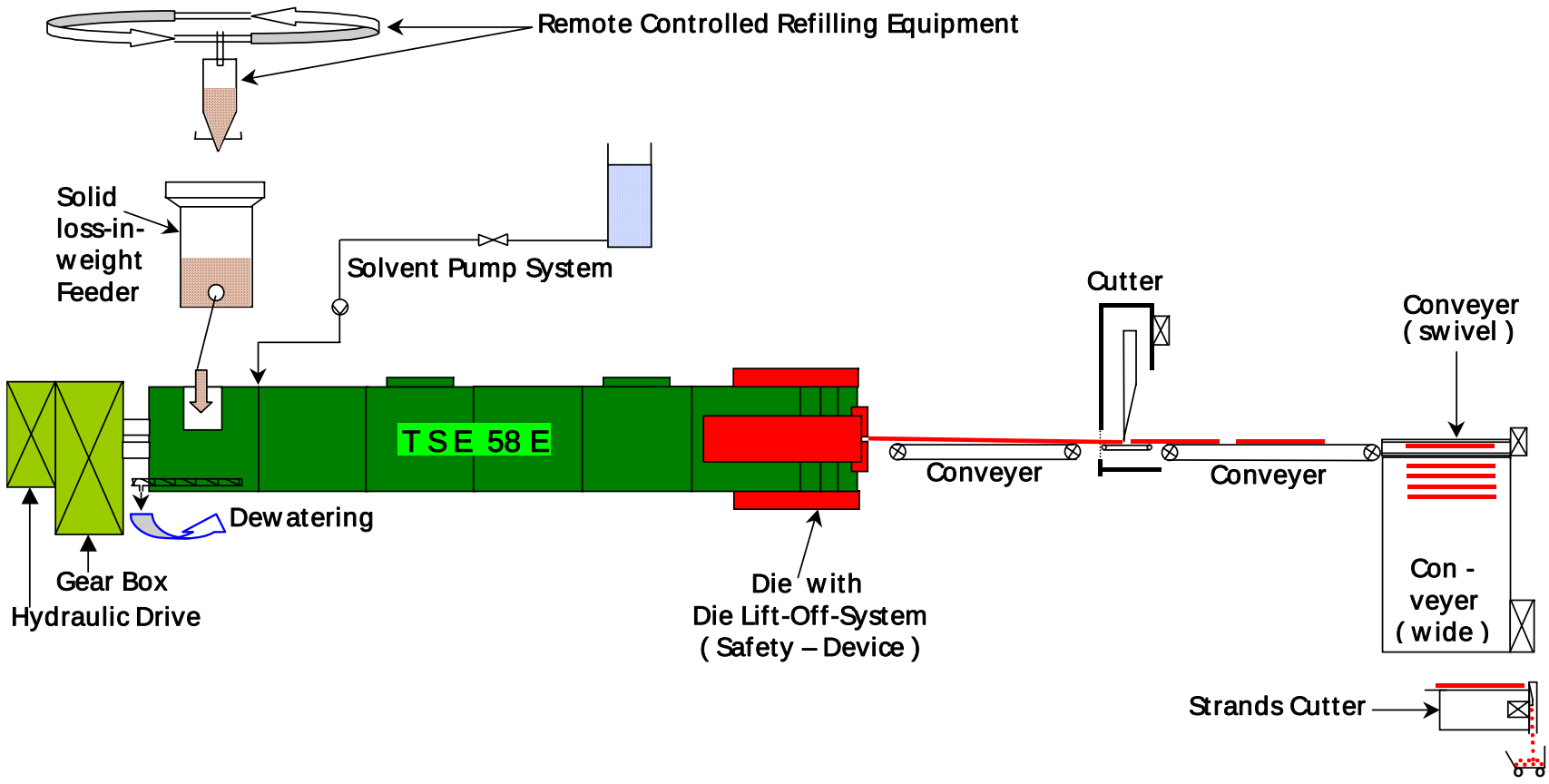
Batch - Process using Duplex Mixer

Solvent Process

Continous Shear Roller Process

Process for waterwet Paste

Twin - Screw Extruder Process



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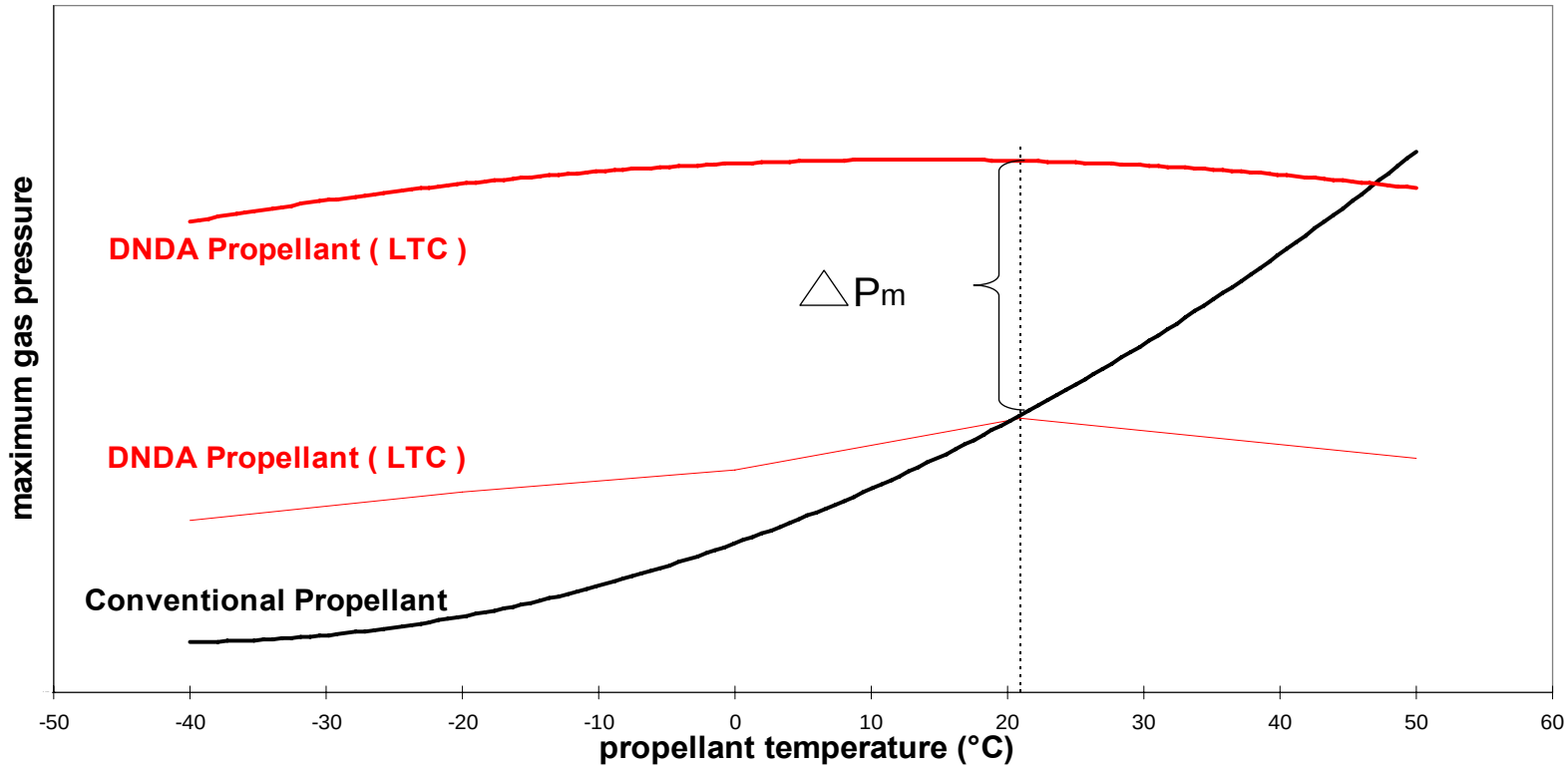
Temperature behaviour of gun propellants

Max. gas pressure vs propellant temperature



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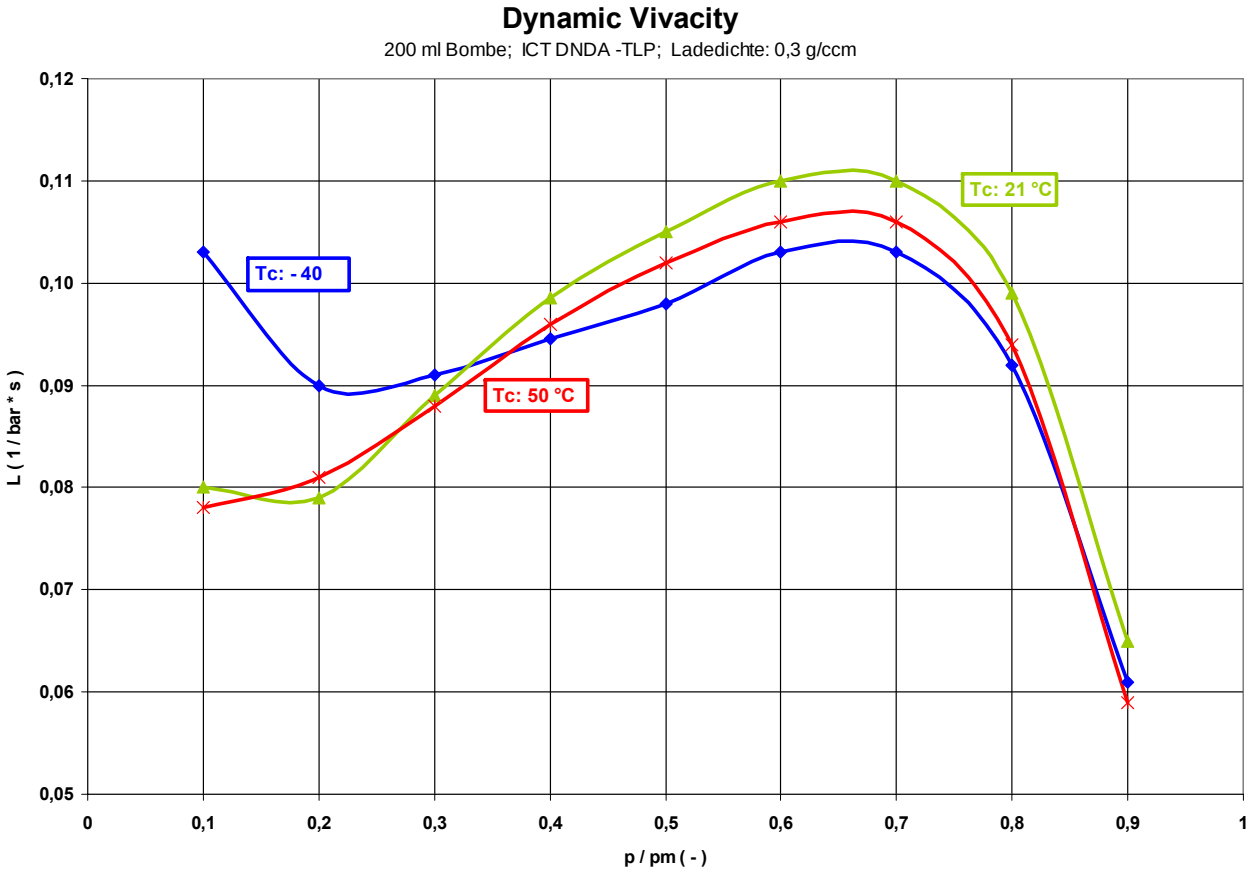
Behaviour of DNDA - Propellant at -40°C, +21°C, +50°C in Closed Vessel



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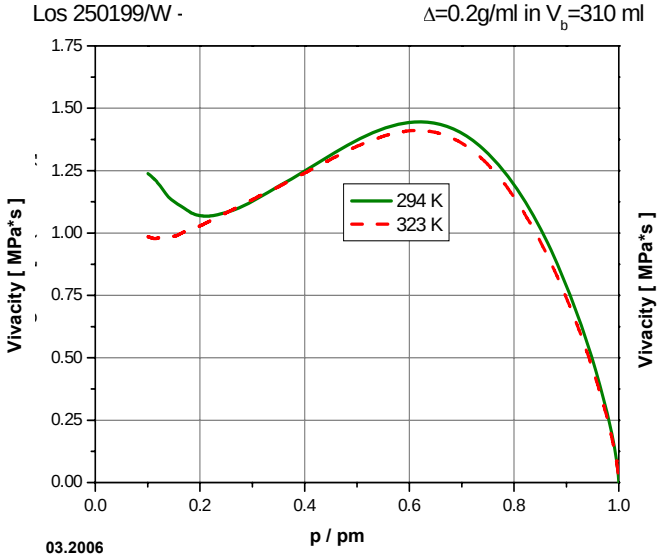
Influence of the Processing Technologie / DNDA Propellant

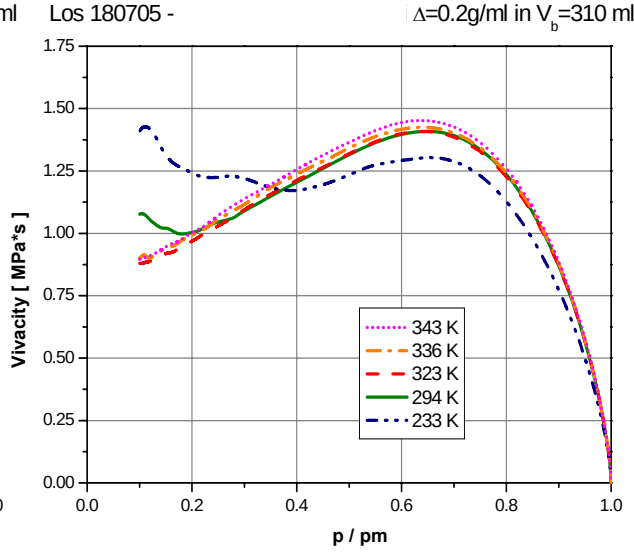
Batch - Process
Mixer

Shear Roller
Continous Process
Waterwet Paste

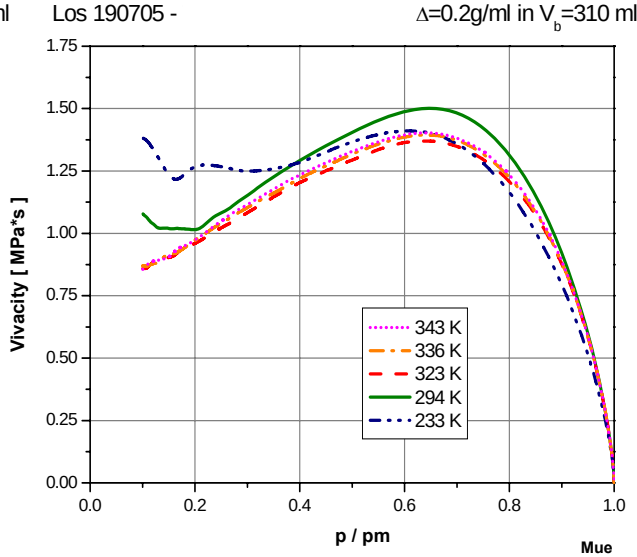
Vivacity of the Propellants

Low Friction





High Friction



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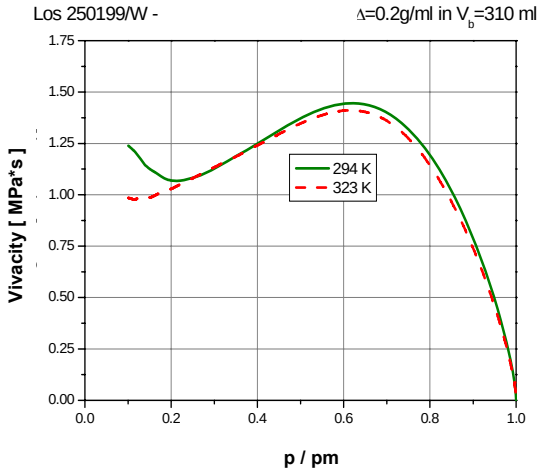
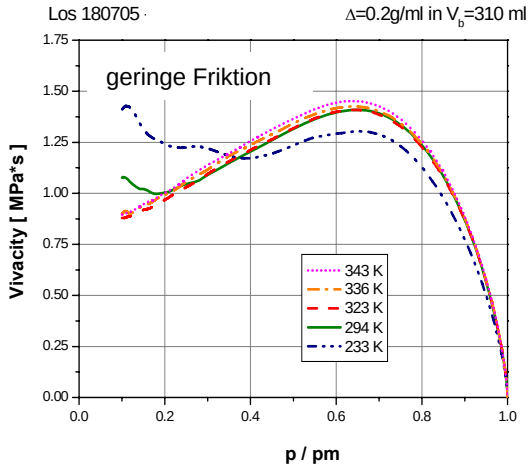
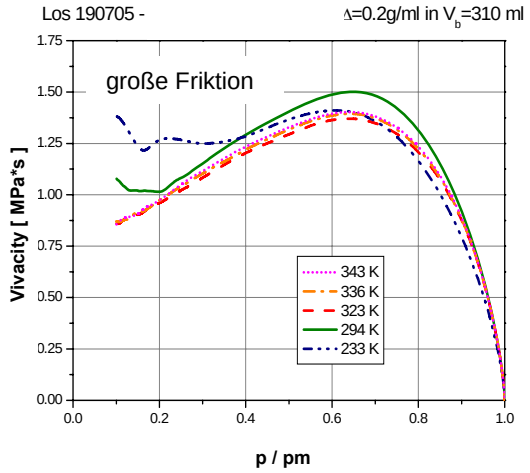
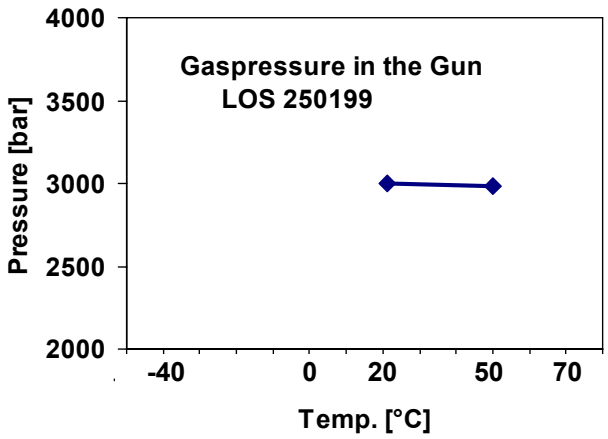
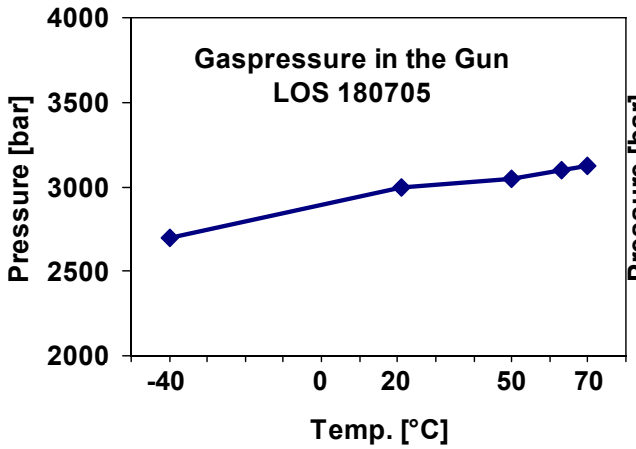
Influence of the Processing Technology

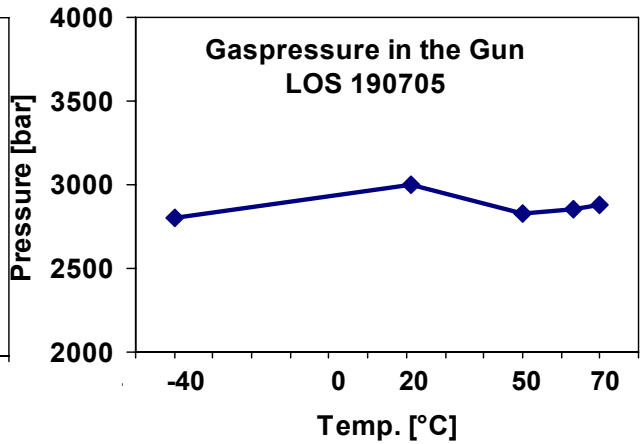












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DNDA Gun Propellants

- RDX
- Binder, Nitrocellulose
- DNDA Plasticizer

✳ Plasticizer mixed into the Propellant – Dough

NO SURFACE COATING

- energy density adaptable
- flame temperature approx. 500 K lower than that of conventional propellants

Formulation	*Impetus (J/g)*	*Flame Temp (K)*	*Mol wt (g/mole)*
A	*1080*	*2540*	*19.4*
B	*1180*	*2910*	*20.8*
C	*1300*	*3390*	*21.6*

Safety

Safety datas

Loss of weight after 18 days	< 1.10 %
Loss of weight after 30 days	< 1.65 %
Sensitivity to friction	160 N
Sensitivity to impact	4 J
Ignition temperature	approx. 200 - 220°C
Fast cook off test	burning
Shaped charge impact test	burning
Cook – off Temp.	approx. 205 °C

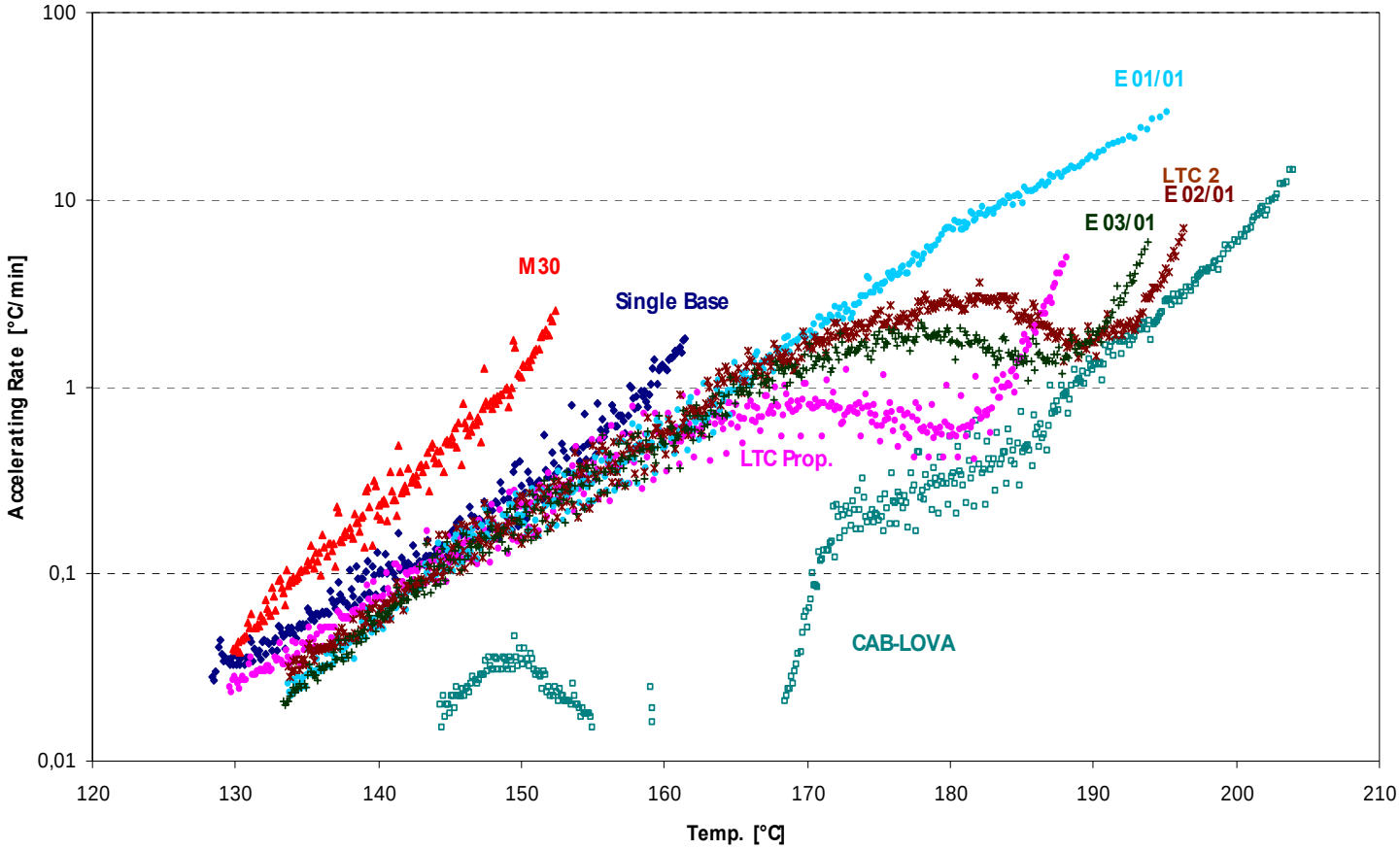
Viscosity of the DNDA Plasticizer

Rotational Rheometer Results

+ 50 °C	20 mPa*s	
+ 20 °C	137 mPa*s	Newton Behaviour
0 °C	1532 mPa*s	
- 6 °C	5595 mPa*s	
- 7 °C	6928 mPa*s	Structurally Viscose Behaviour
- 8 °C	9059 mPa*s	
- 9 °C	11351 mPa*s	

ARC

Accelerating Rate Investigations of DNDA - Propellants compared with CAB-Lova, M30 and Single Base Prop.



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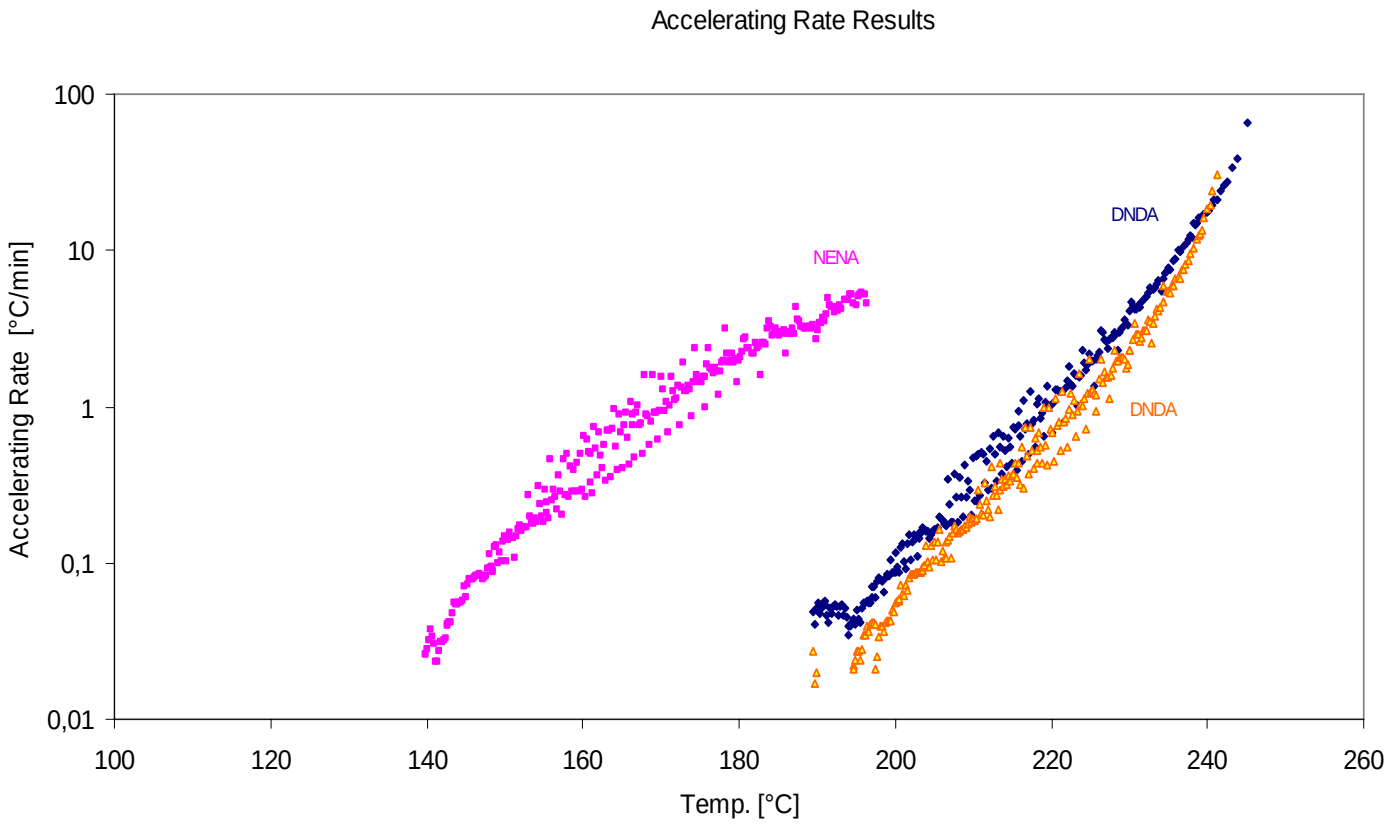
ARC

DNDA compared with NENA



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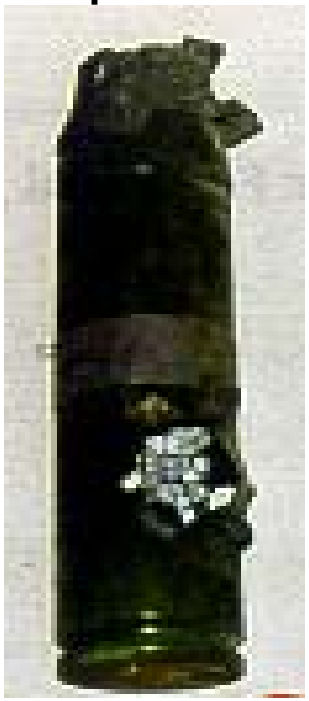
Shaped Charge Test (cal. 44 mm)

Cartridge cal. 35 mm

CAB -LOVA Propellant



DNDA Propellant

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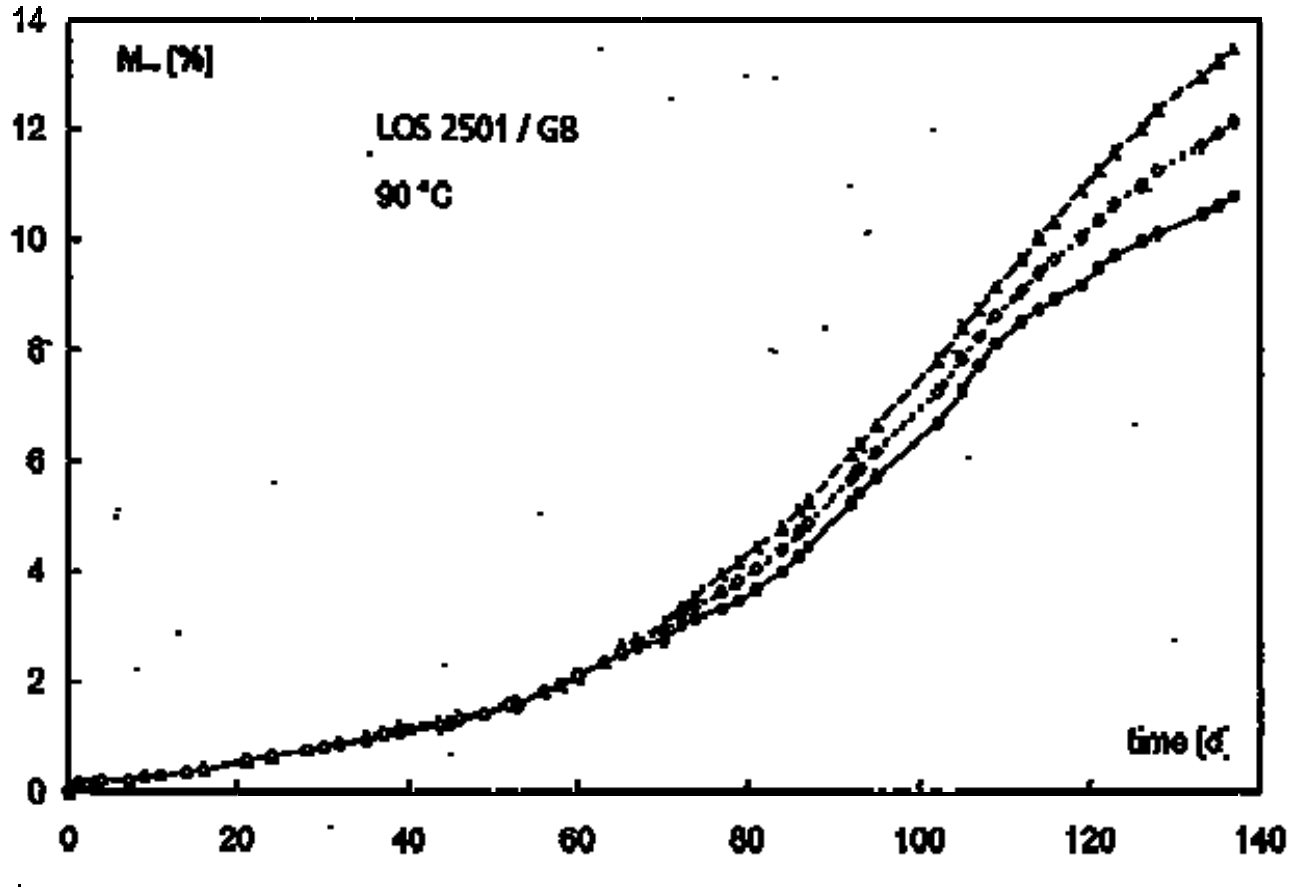
Longterm Stability at 90°C / DNDA - Propellant



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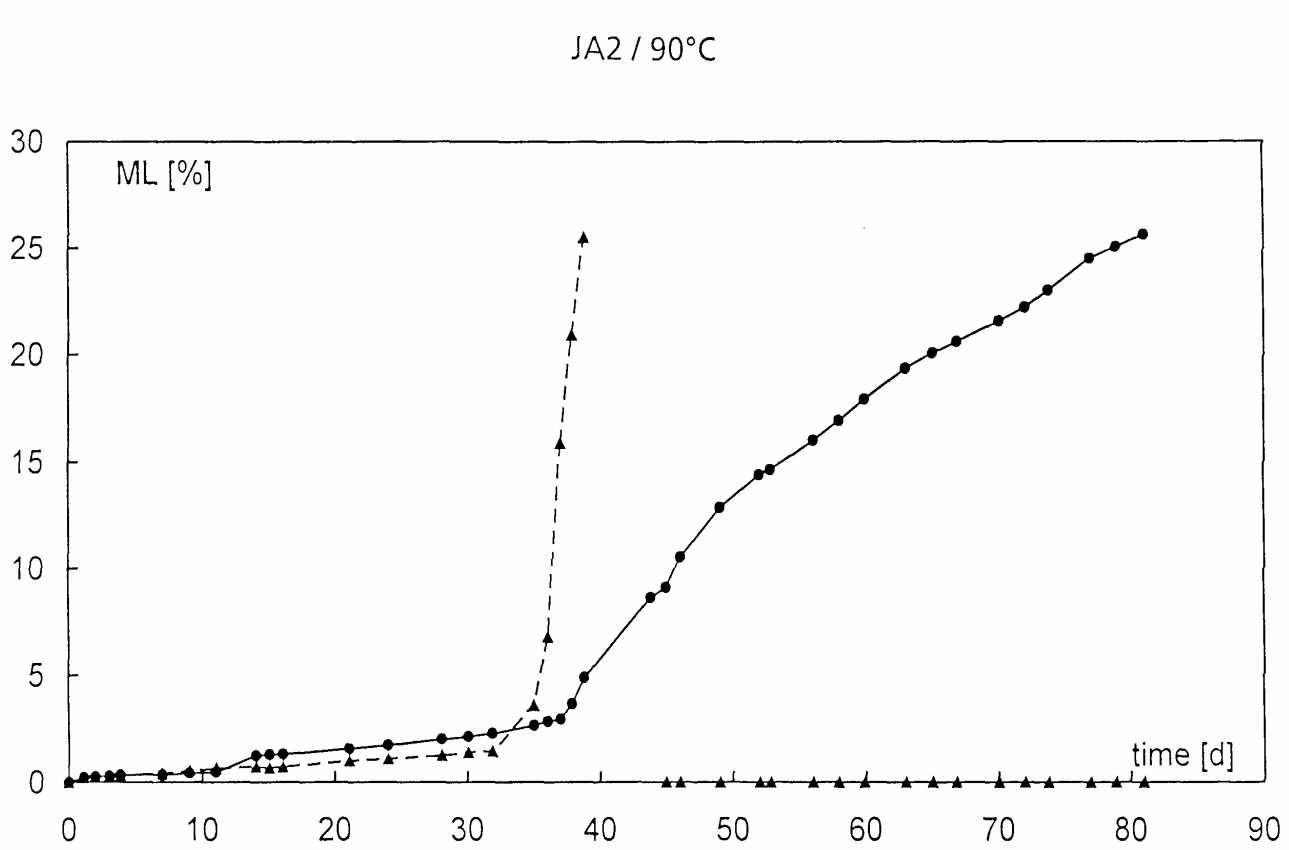
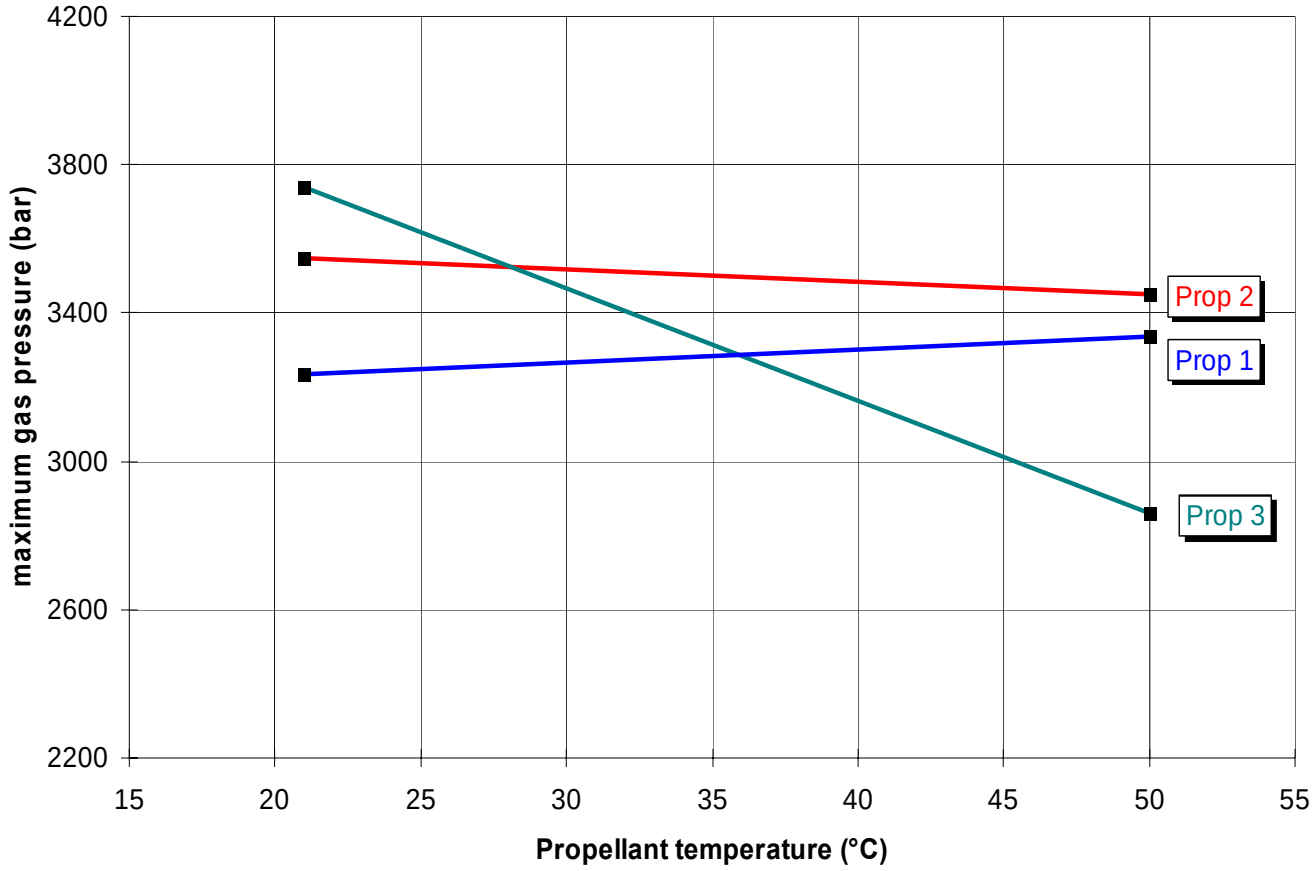
Longterm Stability of JA2 at 90 °C



40 mm Gun Firing Tests of 3 propellants

from -40 °C till +50 °C



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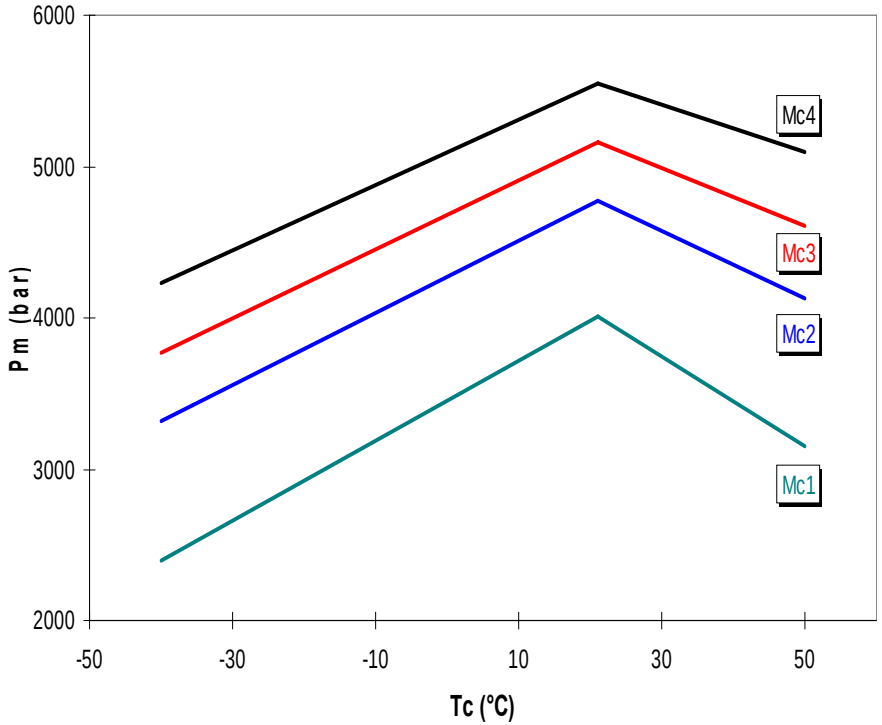
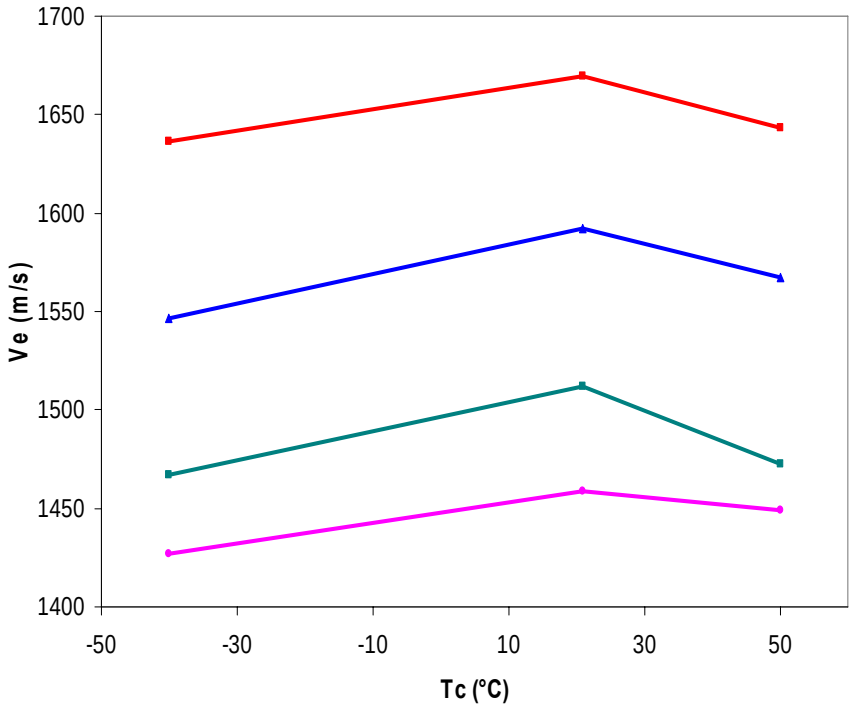
40 mm Gun Firing Tests

Temperature behaviour unaffected by loading density and pressure level





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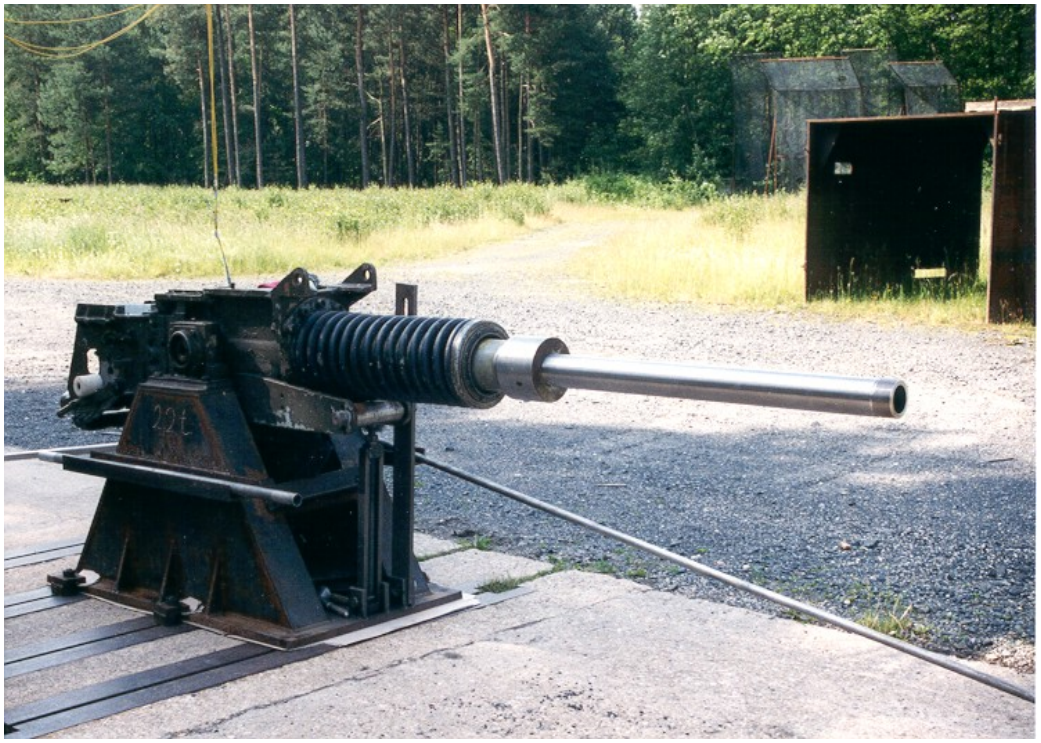
75 mm Scale model gun derived from 120 mm tank gun

- based on interior ballistic similary laws
- less cost (combustible paper case, less propellant mass)



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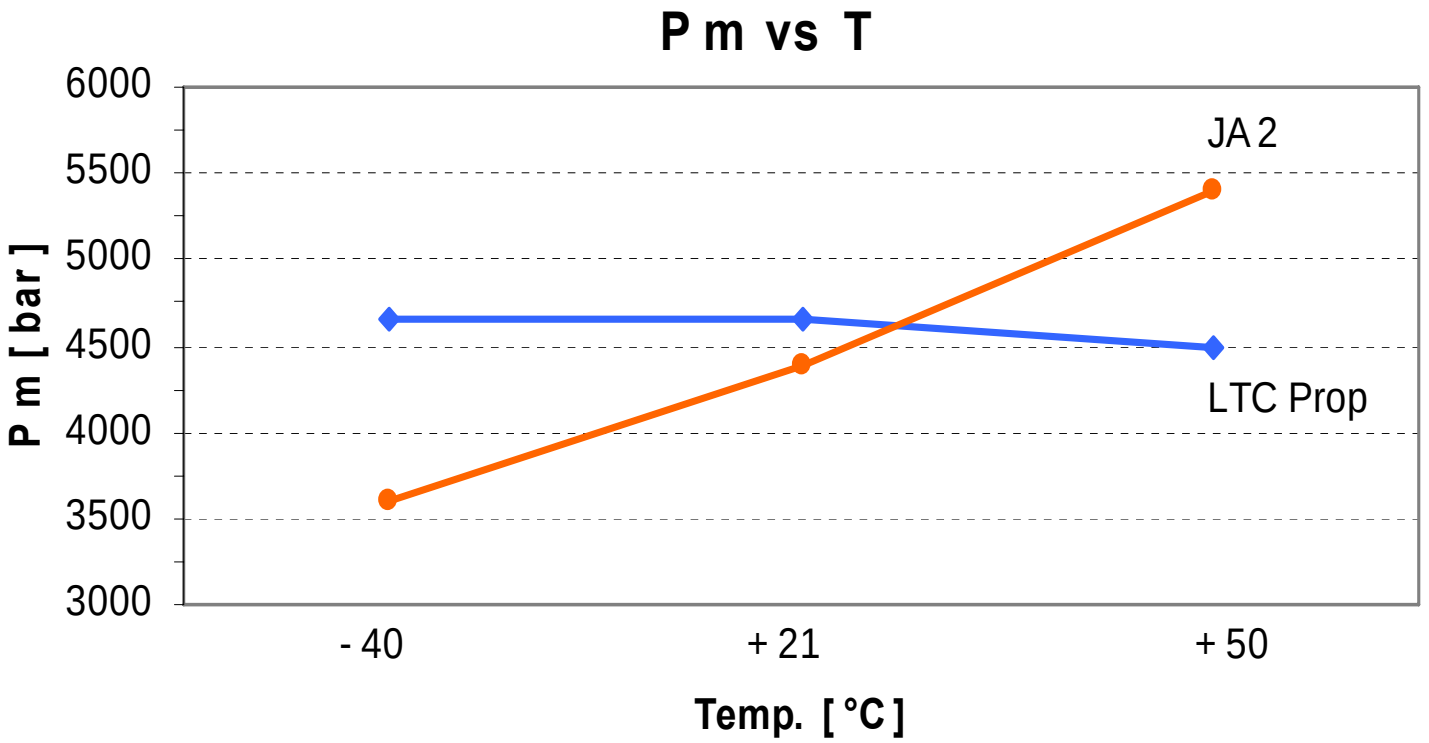
Test Firing in 75 mm cal. Model Gun

Optimized Propellant for firing at 21°C

Gaspressure vs Temp.



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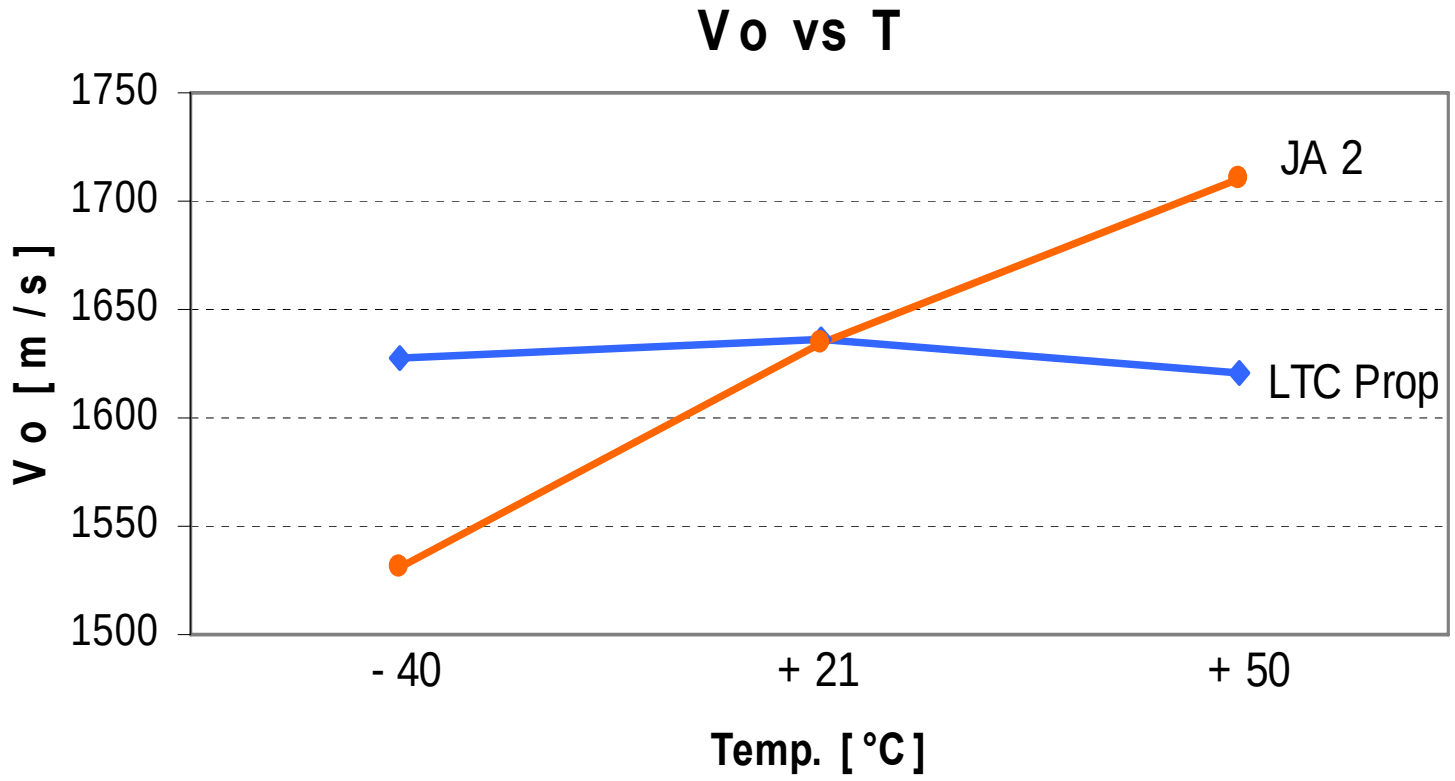
Test Firing in 75 mm cal. Model Gun

Optimized Propellant for firing at 21°C

Muzzle velocity vs Temp.

Muzzle velocity of LTC Propellant same at 21°C like JA2



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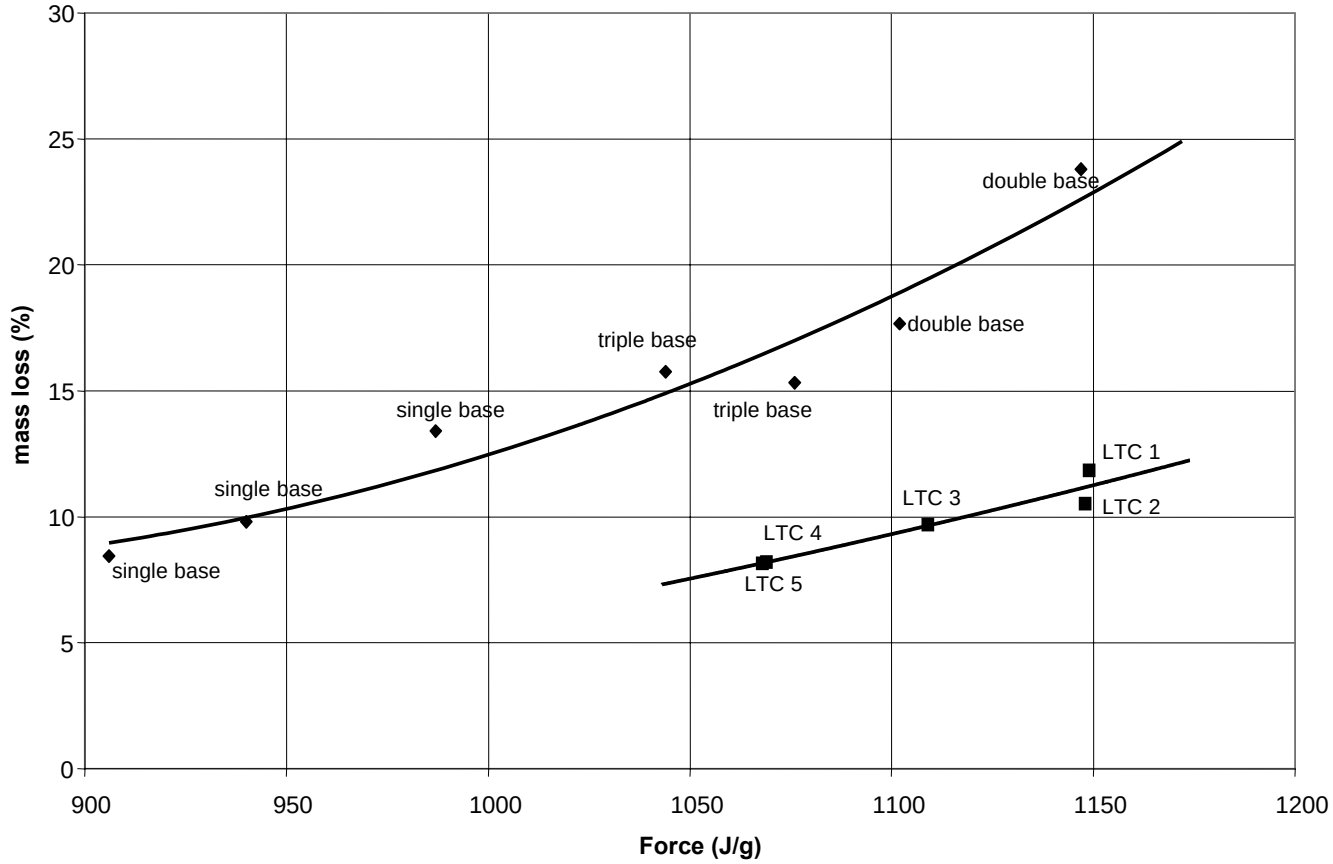
Erosivity of LTC - Propellants and Conventional Propellants



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Results & Conclusion

- DNDA - Propellants (LTC) for a wide Caliber - Range
- High Cook - Off Temperature ≥ 205 °C
- High Selfignition Temperature > 210 °C
- Less Sensitive (Shaped Charge Test etc.)
- Excellent Longterm Stability
- Low Barrel Erosion
- Easily to Ignite by Pyrotech.