

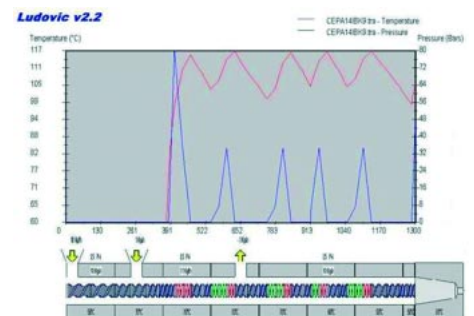
Internal ballistics and gun propellant development

'TNO Defence, Security and Safety' is the title under which TNO operates as a strategic partner for the Dutch Ministry of Defence. We use our accumulated knowledge for foreign governments and for defence-related industries.



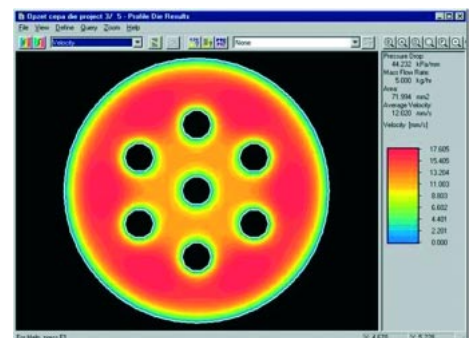
Capabilities

- Modeling & simulation
 - Thermodynamics
 - Processing (extrusion etc.)
 - Internal ballistics
- Lab-scale production (up to ~ 1 kg for analyses)
- 'Small scale' production (up to ~ 300 kg)
- Performance testing
 - Closed & vented bombs
 - Test guns
 - Thermal, IM & safety properties



Research and development of gun propellants is focussed on:

- Propelling charge development
- High energy LOVA (E)TPE composite gun propellants
- Temperature independent propellant
- Layered propellants (co-extrusion)
- Barrel wear
- Plasma ignition
- Functional lifetime assessment and surveillance

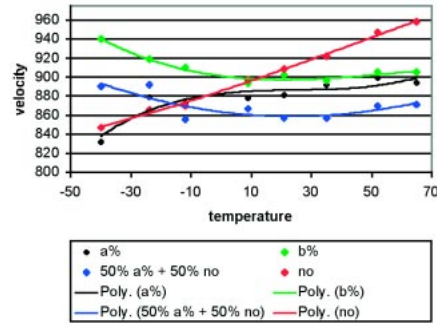


Test facilities

- Closed Vessels
 - 43.5 cc / 130 cc LPCV (20 MPa)
 - 25 - 700 cc CV (150 – 500 MPa)
 - 400 cc HPCV (1000 MPa)
- Erosivity & burning interruption tests
 - 130 cc – 20 MPa
 - 500 cc – 150 MPa
- Plasma ignition
- Instrumented guns
 - .50 gun
 - 29-mm / 50-mm /78-mm accelerator

Examples of R&D projects

- Propelling charge development
- Temperature independent propellant
- Barrel erosion
- Ageing & lifetime assessment



Proven temperature independency.

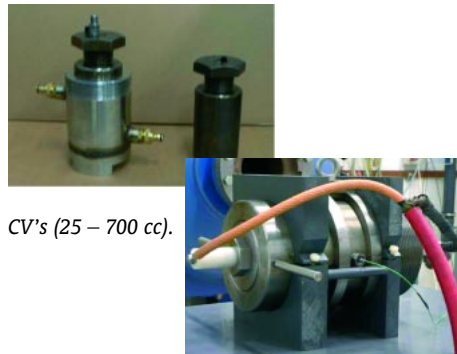
TNO Defence, Security and Safety

'TNO Defence, Security and Safety' is the title under which TNO operates as a strategic partner for the Dutch Ministry of Defence and makes innovative contributions to enhancing the security of the Netherlands both at home and abroad. We also use our accumulated knowledge for foreign governments and for defence-related industries.

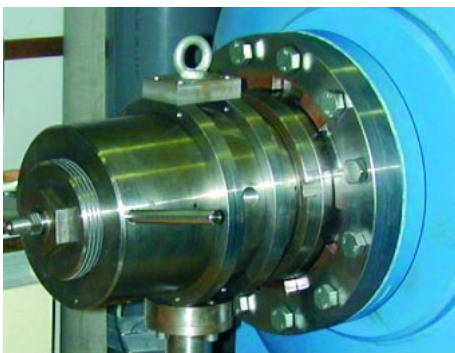
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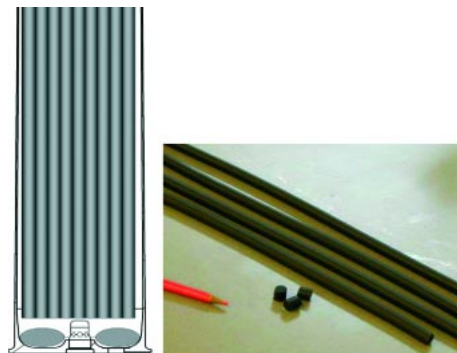
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CV's (25 – 700 cc).



Vented HPCV and catch tank.



Stick propelling charges for excellent ignition behaviour.

