60 LET VÚPCH

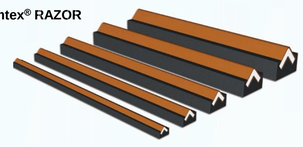
Výzkumný ústav průmyslové chemie

1954 - 2014

Demolition Charges

Semtex® Pl SE M
- Special thermoplastic explosive
- Many forms - basicaly in sheets
- Three types (PETN, PETN/RDX, RDX)
- Base explosive for demolition charges

Semtex® RAZOR



- Flexible Linear Shaped Charges
- 7 types (5, 10, 15, 20, 25, 30, 40 - mm of steel)
- Adhesive layer for better contact
- Possible vertical or horizontal bending

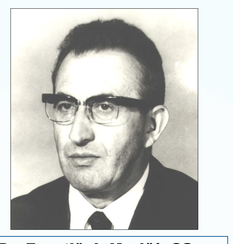
Semtex® Pl SE M LCT
- Cutting tapes
- Adhesive layer for better contact
- 4 types (20, 55, 205, 740 - grams per meter)

BREACHCASE - BC25
- Based on RAZOR 25
- Breaching the hole in brick or concrete wall
- Hole dimensions 1 x 0.5 m
- Man portable

Semtex® RAZOR Booster
- Booster charges primary for ignition of RAZOR Charges
- Adhesive layer for better contact
- 6 grams of thermoplastic explosive Pl TE M
- Possible use as small demolition charge

DISINTEGRATOR 13 **DISINTEGRATOR 50**
- For opening or liquidation potentially dangerous objects

DIRECTORS of VUPCH



Dr. František Krejčí, CSc.
1954 - 1955

Ing. Žalský Josef
1956 - 1961

Ing. Boris Vetlický, CSc.
1961 - 1985

Ing. Jiří Túma, DrSc.
1985 - 1990

Ing. Bedřich Štefan
1990 - 1992

Ing. Tomáš Král
1992 - 1993

Ing. Miroslav Horáček, CSc.
1993 - 2002

Ing. Lehký Ladislav, CSc.
2002 - 2010

Ing. Ladislav Velehradský, Ph.D.
2010 -

Aircraft Rescue Systems

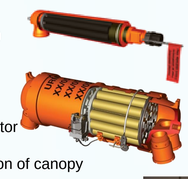
Military Aircraft Rescue Systems

Systematic development from 1955

Designed for AERO light (combat) aircrafts)
L-29, L-39, L-139, L-59, L-159 ALCA

The system consists of

URM-1 or URM-1M - Under seat rocket motor
ROP - Rocket motor for canopy ejection
PP-POP - Pyrotechnic cartridge for activation of canopy ejection mechanism
PP-TVM - Pyrotechnic cartridge for activation of ejection telescope
PP-GP - Pyrotechnic cartridge for activation of pyromechanism of rescue system
PP-VVPR - Pyrotechnic cartridge for activation of pilot fastening system
VMP-2M - Pyrotechnic cartridge for activation of parachute



Canopy Severance System - KRYT

Quick and safe clearance of catapulting path or quick creating the emergency exit from aircraft

Minimum level pressure and noise effect

Civil Aircraft Rescue Systems

Designed for ultralight aircrafts

For emergency parachute ejection

GRS

MAGNUM 450
MAGNUM 250

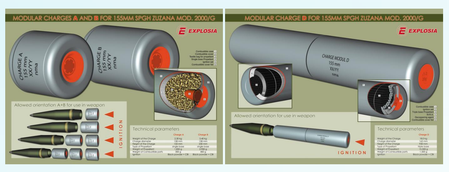
MAGNUM 600

MAGNUM 1000
MAGNUM 1500

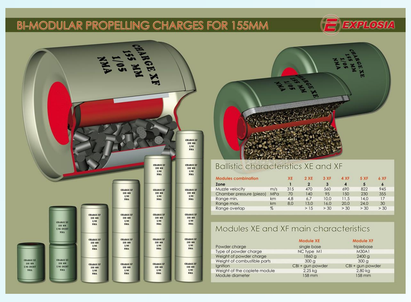
Large Caliber Ammunition

155mm MODULAR PROPELLING CHARGES
- Full combustible charges for 155mm systems
- Useful for 39, 45 or 52 calibers barrels
- More than 25 years of systematic development

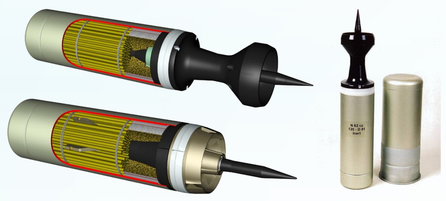
1st GENERATION of MODULAR CHARGE SYSTEM
- Three types of modular charges
- Modules A and B for range from 5 to 15 km
- Module D for range up to 40 km



BIMODULAR CHARGE SYSTEM (BMCS)
- 2nd Generation
- Two types of modular charges
- BC-E for low-zones
- TC-F for high-zones



125mm APFSDS ammunition for MBT
- For variants of T-72 Main Battle Tanks
- International developments
- PpSv97 VETRA in Czech Army service
- P99 TAPNA in Slovak Army service
- Penetration capability more than 500 mm of steel in 2000 m



ER AMMUNITION for 152mm SPGH DANA
- Developed in 2012
- Without the modification necessity of the system of automatic loading
- Separate loading ammunition
- 152 mm OFdDV (HE ER BB) shell
- Propelling charge P740
- Range 25,500 m (25 % more than standard HE)

Test Facilities

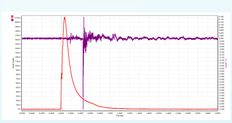
Ballistic laboratory

History:
- first shot in October 17th, 1924
- 50m rifle range
- cannon range with 1 tunnel

Present:
- rebuilding in 1988
- 50m rifle range
- 100m middle-caliber range
- cannon range with 2 tunnels
- test barrels in 100 calibers from .22LR to 125 tank barrel
- universal breech UZ 67 and UZ 2002
- piezotransducers KISTLER 6215 and 6213B
- 67 guns in ballistic laboratory's armory
  - submachine gun Z-Brno ZK 383 – 1938
  - snipers gun MOSIN 9130
- 1 221 samples and 25 000 shots per year

Tests:
- Accredited from 2001 by CAI
- Projectile velocity
- Maximum pressure
- Pressure development in the chamber
- Action time
- EPVAT
- Closed vessel tests

Standards:
- MC MOPI
- MIL, STANAG



Explosives test room

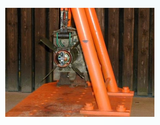
History:
- start by establish Research Institute
- 1967 – 1968 experimental mine drift for permitted explosives testing (Synthesit, Semtinit, Uhlometanit, Ostravit)

Present:
- production control
- experimental samples testing
- cooperate with Czech Police or Czech Proof House for Arms and Ammunition

Rocket range

Tests:
- measurement of generators thrust and pressure (ballistic tests of rocket motors, pyrocartridges etc.)

Products:
- aircraft rescuing systems
- pyrocartridges, rocket motors



Accredited Laboratory of safety engineering

Tests:
- BAM fall-hammer test
- Friction test
- Thermal stability test at 75°C
- Fulmination point test
- Determination of sensitivity to external thermal stimulus - Koenen test
- Determination of ability of a substance to propagate detonation - UN GAP test
- Test of mass explosion capacity - Single package test
- External fire test
- Unconfined package test
- Twelve meters drop test
- DSC, DTA
- Determination of detonation propagation

Ballistics Protection

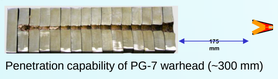
Reactive Armor DYNA

Developed in 1998 in cooperation with Military Repair Facility in Novy Jicin and with Military Technical Institute in Slavicin

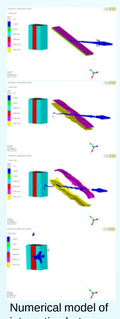
Explosive Reactive Armor designed for T-72 M4CZ MBT
In Czech Army service

Protection against shaped charges

Effective against tandem SC warheads



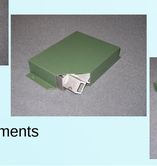
Penetration capability of PG-7 warhead (~300 mm)



Numerical model of interaction between ERA and SC jet

T-72 M4CZ with DYNA ERA

Residual penetration of PG-7 after interaction with DYNA ERA



DYNA elements

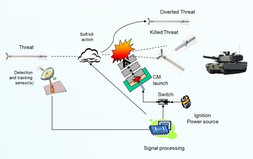
Active Protection System EFA

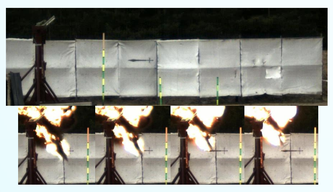
Developed from 2002 in cooperation with Military Research Institute in Brno.

Designed for light combat vehicles - OT-64, BVP-1, BVP-2, KBVP PANDUR II.

Hard-kill protection against RPGs and ATGMs.

Countermeasure charges based on direction of energy of explosion



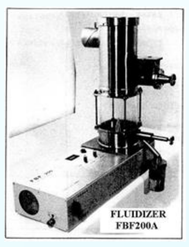


KBVP PANDUR II with test parts of APS LEFA

Mechanical Engineering

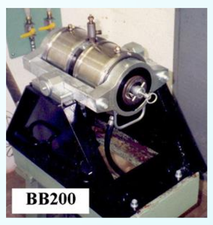
Task - Development and construction of technological devices
Cutters
Rollers
Dryers
Mixers
Engines
Pressing forms
...
- Development and construction of test devices
Ballistics simulators
Closed Vessels
...
- Special construction
Reactive armor elements
Rapid fire-extinguishing systems
...

LABORATORY FLUIDIZERS FBF
- Developed and realized in eighties of last century
- FBF200 and FBF400 models
- For drying, cooling, granulation, homogenization...



BALLISTICS SIMULATORS and CLOSED VESSELS
- Developed and realized from seventies of last century
- Closed vessels for smokeless powder production
- Different volumes
- For low and high pressures

- Special ballistics simulators
Black-box testing
Aircraft rescue systems testing



EXPRO - RAPID FIRE-EXTINGUISHING SYSTEM
- Developed and realized in nineties of last century
- For rapid fire-extinguishing and preventing of explosion in internal parts of technological installations
- Installed in Czech companies (Synthesia, ALPIQ, Vitana)

EXPLOSIA a.s., VUPCH, Semtin 107, 530 50 Pardubice, Czech Republic
vupch@explosia.cz
www.explosia.cz

Poster Editor: Zbynek Akstein, Ph.D.