# IM Response for Army Engineering Charges filled with FPX V40

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# IM Response for Army Engineering Charges filled with FPX V40

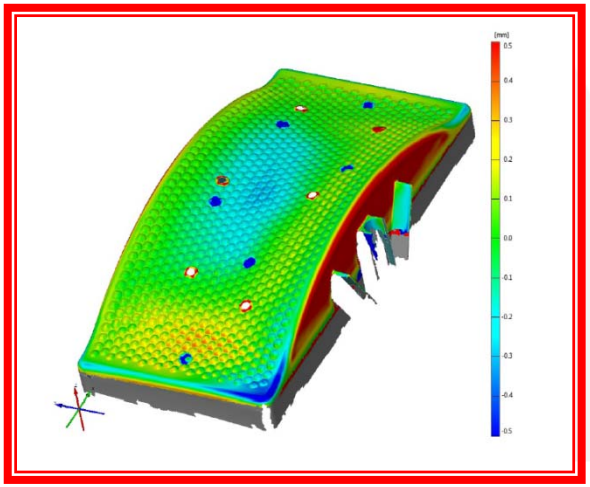
- Background
- Qualification of FPX V40 according to STANAG 4170
- IM testing
  - BI, SH, FH, SR, FI (mod)
- CBAM calculation for Forcit DFC 2010 System and comparison with conventional non-IM-system

# Background

- Replacement of infantry mines and old army engineering equipment in FDF
- Forcit In-house development of IM products
- A new FPX development to replace e.g. hexotol in army engineering charges
- FPX V40 suitable for e.g. Directed Fragmentation Charges and Mine Clearance Charges

# Background

- Forcit DFC 2010 is based on the FPX V40 main charge and FPX R1 booster charge
- For the best performance of the product a suitable combination of bubble- and shock energy was developed
- In-house development included field testing and 3 D-modelling of the charge



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# General information FPX V40

| FPX V40 | |
|---|---|
| Type: | General purpose, army engineering charges |
| Components: | RS-RDX, AP, Al, binder |
| Density: | 1,72 |
| Velocity of detonation | 6600 m/s |
| UN test series 7 | Pass (except EIDS Gap) |
| STANAG qualified | Yes |
| IM-tested | Yes |

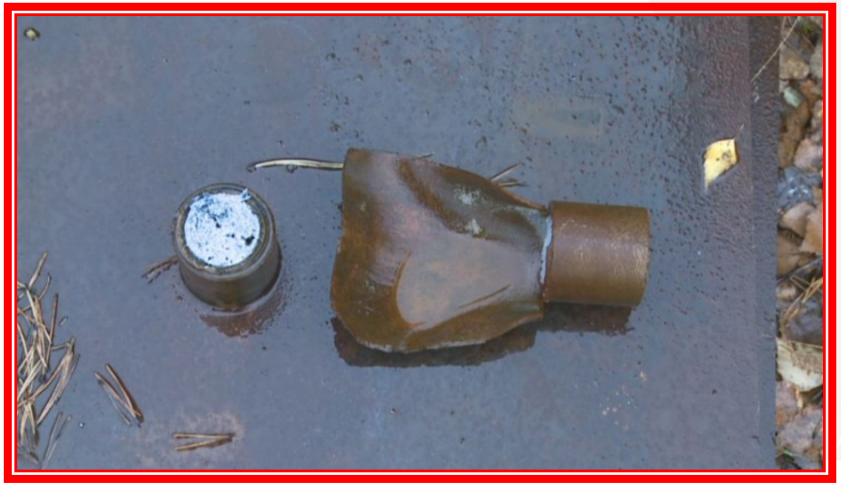
# Qualification of FPX V40 according to STANAG 4170 and the effect of ageing (1/2)

| TEST | FRESH | 3 MONTHS | 6 MONTHS | Note |
|---|---|---|---|---|
| Impact sensitivity, BAM (cm) STANAG 4489 | 39 | 41 | 58 | |
| Friction sensitivity (N) STANAG 4487 | 252 | 168 | 160 | |
| LSGT (NOL) (mm/kbar) | 31 / 41 | 31 / 41 | 31 / 41 | |
| Deflagration point (° C) STANAG 4491 B1 | 211 | 213 | 213 | |
| DSC (° C) STANAG 4515 | 227,3 | 226,3 | 223,5 | |
| Thermal expansion coefficient α (1/° C) STANAG 4525 | 9,4E-05 | 10,3E-05 | 10,7E-05 | |
| Slow Cook Off (° C) STANAG 4491 Annex C-3 | 168/explosion | 172/expl. | 172/expl. | Acc. UN EIDS SCO pass |
| Fast Cook Off (° C) STANAG 4491 FCO-tube | Deflagration | | | |
| Koenen test (mm) | No det./2 mm | | | |

- Sensitivity properties and thermal stability as well as mechanical properties not significantly changed during ageing

# Qualification of FPX V40 according to STANAG 4170 and the effect of ageing (2/2)

- Slow Cook Off –reaction
  - According to STANAG 4491 Annex C : explosion
  - According to UN EIDS Slow Cook Off : pass



# IM testing:
# Bullet Impact STANAG 4241 ed 2 (1/2)

# IM testing:
# Bullet Impact STANAG 4241 ed 2 (2/2)

- Impact on the front side of the charge and direct on the booster
- Reaction level : Type V, no reaction

# IM testing:
# Slow Heating STANAG 4382 ed 2


- Reaction level :
  Type V, burning

# IM testing:
# Fast Heating STANAG 4240 ed 2

- Reaction level :
  Type V, burning

# IM testing:
# Sympathetic Reaction STANAG 4396 ed 2

- Reaction level :

  Type V-IV, burning-deflagration

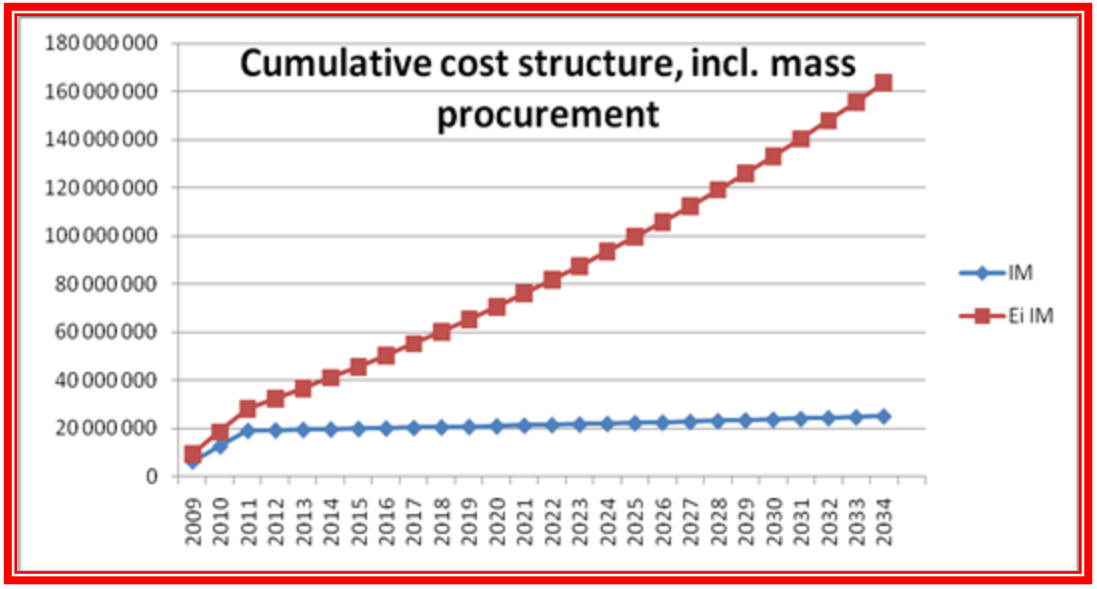
# Sensitivity to Fragment Impact

- Another DFC was fired towards the acceptor charge with differen distances between the charges (80 cm – 0 cm)
- Reaction level :

  Type V, burning

# CBAM calculation

- Cost Benefit Analysis Model based on the IM testing of the Forcit DFC 2010
- Calculated for  25 years lifecycle and compared to a conventional DFC
- The cost for Forcit DFC 2010 was 15 % of the total lifecycle cost of the conventional DFC.



# Summary

- The replacement of infantry mines and obsolete army engineering charges have given cause to a development of new army engineering charges with IM properties
- FPX V40 and FPX R1 are suitable explosive fills e.g. army engineering charges and give excellent performance and IM properties.
- There is a huge potential of storaging cost savings with Forcit DFC 2010 if the potential would be fully utilized (UN Test series 7 renewal)

# Acknowledgements

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