The Swedish Squad Support Weapon Program

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Agenda

- Sweden and FMV
- Current Swedish SA Programs
- Some statistics from the NATO IWMP
- 40mm ballistics
- Background on SSW
- Industry Feasibility Study
Sweden is a high tech, large, cold country with low population...

**Area:** 450,000 km²  
**Population:** 8.8 million  
**Temperature:** +5°C (41°F) average over area and year.

Sweden has the same area as Germany, Switzerland, and Austria combined, but with only 1/10 of the population!
Sweden has a long history of international missions!

Sweden has been participating in most of the missions since we joined the UN in 1946.
Försvarets Materielverk (FMV)

FMV is the technical and procuring agency for the Swedish armed forces.

FMV receives assignments from the armed forces for the development, procurement, upkeep and subsequent de-mil of all defense materiel.

We date back to 1630!
The Vasa ship was the reason...

After the Vasa sunk on her maiden trip in 1628, king Gustavus Adolphus ordered that FMV’s predecessor should be founded.
Current Swedish small arms

- 5.56 mm Ak 5
- 7.62 mm PSG 90
- 9 mm Glock 17
- 5.56 mm Minimi
- 12.7 mm Barrett
- 12.7 mm HMG M2HB QCB
- 40 mm AGL Mk 19
- 40 mm GL M203
Some of our current Swedish programs

- Red-dot sight
- New ammo: "green", dim tracer and AP
- Upgrade program for:
  - Ak 5
  - MAG
  - Minimi
  - Barrett
- Non Lethal Weapons
- PDW
- FLSW
What is FLSW?

The *Future Light Support Weapon* program are two parallel programs:

- **AGL tests**: Replace the 40 mm HV Mk19 crew served automatic grenade launcher at the platoon level.
- **SSW study**: Replace the 40 mm LV M203 add-on single shot grenade launcher on the ak 5 rifle at the squad level.
History

- Swedish FLSW Program
- SWE/FIN AGL Program
- Nordic AGL Program
- SWE/US Information exchange agreement

New Observers:
- CA
- UK
- US SOCOM
Ranges are short!

Urban
Jungle
Rural
Desert

Legend
Desert: Arab Israeli War
Rural: WW II, Korea
Jungle: WW II, Vietnam
Urban: Street & Bldg Survey

Statistics from JSSAP, USA

Information taken from the NATO Infantry Weaponry Master Plan
Future infantry combat ranges

- Today 45% of the world's population live in cities.
- 70-85% are expected to live in cities by 2025.
- MOUT will most probably be more common.
- Combat ranges for low level units will not increase!
- Short ranges however often mean quick engagements. Future weapons must therefore be able to quickly engage targets.

Information taken from the NATO Infantry Weaponry Master Plan
Engagements conducted with small arms occurred in the 20-30 meter range.

- Shots over 100 m were rare.
- The maximum range was less than 300 m.

Information taken from the NATO Infantry Weaponry Master Plan
Swedish ballistic study on 40mm ammo

Different muzzle velocities:
- 75-80 m/s (40 LV)
- 95-130 m/s
- 240 m/s (40 HV)

Different projectile masses:
- 180-200 g (40 LV)
- 240-250 g (40 HV)
Trajectories

- 75m/s
- 100m/s
- 130m/s
## Summary

<table>
<thead>
<tr>
<th>MV (m/s)</th>
<th>Mass (g)</th>
<th>Range (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>75</td>
<td>180</td>
<td>400</td>
</tr>
<tr>
<td>75</td>
<td>250</td>
<td>430</td>
</tr>
<tr>
<td>100</td>
<td>180</td>
<td>590</td>
</tr>
<tr>
<td>100</td>
<td>250</td>
<td>660</td>
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</table>
The 40mm Medium Velocity

Benefits are:

- Shorter Time of flight
- Flatter trajectory
- Longer range
Current system (FNC/M203)

The soldier carries 12 HE rounds.

+ Simple
+ Reliable
+ Light weight add-on weapon (1.5 kg)

- Low rate of fire (>6 s)
- Low hit probability
- No night capability
Proposal from Bofors Carl Gustaf 1996

CG AGR
Carl Gustaf Air-bursting Grenade Rifle

Data

- **Design:** Bull pug, pump action, locked bolt.
  Tubular 5-round magazine on top
  Case ejection downwards behind pistol grip.
  Short recoil with muzzle brake, side-mounted sight.

- **Weight:**
  Total max 5.5 kg.
  Sight max 1.0 kg.
  Magazine with 5 rounds max 1.5 kg.

- **Performance:**
  Distance up to 500 m.
  Vq < 150 msec.
  Tof max 4 sec to 500 m.

- **Ammunition:** Air-bursting HEDP.

- **Sight:**
  Magnification ≥ 3x, field of view ≥ 10°.
  Field of elevation 0° to 25°.
  Laser distance measurement ± 1 m.

- **Ammo load:** 5 rounds in weapon, 2 x 5 rounds in carried magazines.

- **Accessories:** Bipod, night vision device, rifle sling, magazine bag, sight cover, cleaning kit, spare parts, repair tools.

Celsius
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What to do at short ranges?

- MOUT will be more common in the future.
- At short ranges you should not fire HE rounds!
- An integrated PDW saves weight compared to a modular 5.56 mm rifle.
Basic requirements for the SSW

- **System:**
  - Weight: Less than 6 kg.
  - Range: Up to at least 400 (700) meters.
  - Easy to handle.
  - Maximum four hours of class room training.

- **Weapon:**
  - 40 mm semi automatic grenade launcher.
  - Integrated NATO PDW (5.7 x 28mm).
  - Magazine: Minimum 4 rounds, and being able to be "toped up" during firing.

- **Fire control system**
  - Red dot aiming reticle w/o magnification.
  - Battery life should at least be 168 h (=one week).
  - Should be able to sense which type of ammo is in the chamber.

- **Ammunition:**
  - Programmable ammunition.
  - Reduced ToF to 250 meters.
Nothing new…

US SPIW
Project 1964

Dual caliber weapon: 5.56 mm rifle and 40 mm grenade launcher.
Swedish FFV "NIVA" 1970

Even we tried...

Dual caliber weapon: 5.56 mm rifle and 45 mm recoilless gun.
Weight, loaded: 5.4 kg (20 rounds of 5.56 and one 45 mm HEDP)
Industry Feasibility Study 2002-2003

- Is it possible to develop a weapon according to the technical specifications?
- Are there requirements that are especially cost driving?
- Is it possible to shorten the time of flight, flatten the trajectory and optimize the warhead lethality?
- Submit a technical solution.
- Submit a project plan for the development and delivery of test equipment and series production of systems.
Industry Feasibility Study 2002-2003

- Four manufactures:
  - Saab Bofors Dynamics, Sweden
  - Nammo Raufoss, Norway
  - Alliant Tech Systems, USA
  - STK, Singapore

- Orders were placed with Nammo and STK.
- Deliveries by June 2003.
Industry has studied:

- MV = 75 and 100 m/s.
- Mass = 180 and 250 g.
- Steel and tungsten fragments.
- Nose and rear mounted fuzes.

Level of protection:

- All enemies are carrying body armor according to STANAG 4512.
- Half of them are carrying body armor.
- No one is carrying body armor.
Nammo is the system integrator for the Striker AGL and for this study.

Sub contractors for this study are:
- Weapon: Fabrique Nationale, Belgium
- FCS: Noptel, Finland
- Propulsion system: Nico, Germany
- Analysis: SDE, United Kingdom
Nammo SSW

- Weapon:
  - Pump-action
  - 4 round box magazine
  - Weight: 6.3 kg (5+20)
  - Length: 690 mm
- FCS
- Ammunition
**Nammo SSW features**

- Select First/last Echo
  - Default = Last echo
  - Depress Button to toggle between first/last echo

- Select Detonation mode:
  - AIRBURSTING / IMPACT

- One lethal radius
  - + One lethal radius
  - - One lethal radius

- Selector 4 positions
  - S Safe
  - E PDW Semi-auto
  - A PDW Auto
  - GR Grenade launcher

- RANGE FINDER
Nammo SSW features

- Protective EYEPiece
- FCS ON / ON Switch
  Red dot and range finder
- NIGHT VISION Switch
  Toggle between Night vision / Day brightness.
- Red dot brightness controls
  + Increase brightness
  - Decrease brightness
- DAMPING BUTTSTOCK
- PDW ejection port
- Grenade ejection port
Noptel FCS

- Movable red-dot
- No magnification
- FOV=11°
- L=134 mm
- H=90 mm
- W=67 mm
- Weight=550 g
Nammo ammunition

Nammo recommends:
- MV=100 m/s.
- Mass=250 g.
- Steel fragments (1450).
- Nose mounted fuze.

Probability of Incapacitation Map

- Battery
- Electronic fuze with mechanical S&A unit and detonator
- Primary Charge
- Steel coil
- Main Charge
- Steel pellets
- Optional tracer

Nose fuse - Steel Fragments - Unprotected – 250g
STK

- STK is the system integrator for the Tiger AGL and for this study.
- Sub contractors are:
  - Oerlikon Contraves, Switzerland
STK SSW

- **Weapon:**
  - Semi automatic
  - Three shot tube magazine
  - Weight: 6.2 kg (4+20)
  - Length: 704 mm
- **FCS**
- **Ammunition**

SAGL 1  SAGL 2  SAGL 3  SAGL 4  SAGL 5
STK SSW features

- SAGL ejection Port
- Optical Tube
- Laser Range Finder
- Muzzle Cover
- Deflector
- Pistol Grip
- Handguard with muzzle guard
- 20 rounds 5.7mm Box Magazine
STK recommends:

- MV=100 m/s.
- Mass=185 g.
- Tungsten balls (400).
- Rear mounted fuze.
SSW project schedule

- Development 2006-2008
- Deliveries 2009-2010

Because we use standard 40mm components, the MV ammo and FCS will be COTS!
Is it possible?

- Is it possible to develop a weapon according to the technical specifications? **Yes!**
- Are there requirements that are especially cost driving? **No!**
- Is it possible to shorten the time of flight, flatten the trajectory and optimize the warhead lethality? **Yes!**
- Submit a technical solution. **Done, including mock-ups!**
- Submit a project plan for the development and delivery of test equipment and series production of systems. **Done!**
The next step

- Update SWE requirements after the study.
- Get other nations "on board".
Questions?

More information will be available at www.fmv.se