Technical Overview of the K11 Dual-Barrel Air-Burst Weapon

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Eui-Jung Choe, In-Woo Kim, Dong-Hyun Kim,
Joon-Ho Lee*, Hyun-Jun Kim
Agency for Defense Development, Korea
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- Background & Introduction
- Key Technologies
- Conclusions
To Maximize Combat Effectiveness

• Automation
• Small/Lightweight
• Modularity

Limits of Current Rifles

- Low accuracy in real combat situation
- Inefficiency in taking out defilade targets
- Necessity of supplementary night vision at night time
### New attempts in the world (1994~2004)

<table>
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<tr>
<th>Rifles</th>
<th>Characteristics</th>
<th>Configuration</th>
<th>Conclusion</th>
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<tbody>
<tr>
<td>4.7 mm G11 Caseless (Germany)</td>
<td>3 rds. Burst, High rate of fire</td>
<td><img src="image1.png" alt="Image" /></td>
<td></td>
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<tr>
<td>5.45 mm AN94 (Russia)</td>
<td>2 rds. Burst, High rate of fire</td>
<td><img src="image2.png" alt="Image" /></td>
<td>Fail to double up the combat effectiveness</td>
</tr>
<tr>
<td>5.56 mm Double Bullet (USA)</td>
<td>Shot gun</td>
<td><img src="image3.png" alt="Image" /></td>
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<tr>
<td>5.56 mm Flechette (USA)</td>
<td>Flat Ballistics</td>
<td><img src="image4.png" alt="Image" /></td>
<td></td>
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<tr>
<td>OICW (USA) PAPOP (France)</td>
<td>Dual Barrel, Air Bursting</td>
<td><img src="image5.png" alt="Image" /></td>
<td></td>
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</tbody>
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- To maximize combat effectiveness by considering new concept and technology
  - Precise air bursting against defilade targets
  - Fire control system at day & night
  - Lightweight rifle system
Limit of Current Weapons
ADD Solution for Next-Generation Rifle

- Increase in Lethality and Precision Firing at Day & Night under All-Weather Conditions
- Effective on Defilade Targets

Field Operation

Urban Operation
Trade-off Parameters of System

- Weight of System
- Muzzle Velocity
- Field of View
- Effective Range
- Firing Mode
- Recoil
- Combat Effectiveness
Key technology

Lightweight Fire Control System

- Apply Functions of Tank FCS (Day and Night Target Detection, Range Finding and Ballistic Trajectory Calculation) to Firearm
- Instantaneous High Power Supply by Optimal Power Control
- Improved Ballistic Trajectory Calculation by Cant/Tilt and Temperature Sensors
Key technology

Ultra Precision Electronic Fuse

- MEMS-Based Smart Multi-Option Fuse
- Turns Count Sensor by Using Geomagnetism
Communication of Air-bursting Data

- Maximizing the transfer efficiency of the power energy and turns
- Algorithm to figure out the transferring error

Key technology

Diagram:
- Transmitter Coil
- Receiver Coil
- FCS
- Battery
- Brain Unit

Equations:
- $i_t$
- $i_r$
Fuse Function

- **PD Mode**: PD / Point Detonation
  - Target Impact by Inertia Type Impact Switch
- **PDD Mode**: PDD / Point Detonation Delayed
  - Constant Delay Functioning after Target Impact
- **AB Mode**: AB / Air-Bursting
  - Function when Revolution Number of Projectile is Met to the Received Data from FCS
Key technology
Fragmentations of HEAB Ammunition

- High Performance and Low Vulnerable Propellant
- Applied to Small Ammunition under Volume and Weight Limitations
- Controlled Dual Fragmentation Structure → Epochal Increase of Lethality
  (Increased Effective Fragmentations)
Lightweight Triggering Mechanism

- Lightweight Material Developed by Korean Science and Technology
  - Weight Reduction of More than 20% by Using Ti Alloy (for 20 mm Barrel) and High Strength Al Alloy Containing Scandium (for Upper Receiver).
- 2.5 Times Increase of 20 mm Barrel Life by Developing TiN Surface Treatment Method
- Highly Reliable Creative Mechanisms: Complex Trigger System, Link Type Percussion Lock
Operation Procedure

- Target Detection
- Range Measurement and Aiming
- Firing → Detonation above Target

REAL TIME

Day Sight View
Night Sight View
Effective Range Test (5.56 mm @ 000 m)

0.0 mm NATO Mild Steel Plate
Effective Range Test (20 mm @ 000 m)

- Both in-plane accuracy (PDD/PD mode) and longitudinal (range)-directional accuracy (AB mode) were satisfied at the effective range.
Lethality Test (20 mm)

0.0 mm Mild Steel Plate
5.56 mm Flash Hider

- 5.56 mm: a very small muzzle flash due to an effective flash hider, regardless of a short barrel length
- 20 mm: nearly no muzzle flash
Conclusions

- Development of K11 dual-barrel air-burst weapon with our own technology
  - Provide full solution for next-generation rifles
  - Give flexibility for urban engagement
  - Proven to be very accurate
Contact Information

Name: Dr. Joon-Ho Lee

Phone Number: +82-42-821-2769

Company: ADD, Korea

   (Agency for Defense Development)

Email: justinlee@add.re.kr, justinlee@kaist.ac.kr