RR 7.62
Reduced Range
SMALL ARMS AMMUNITION

REDUCED RANGE (RR)
AMMUNITION

2010
MAY 19

FOR TRAINING AND URBAN COMBAT

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NAMMO VANÄSVERKEN AB

LOCATION

Nammo
Vanäsverken AB

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TOPICS

DEVELOPMENT OF 7.62 RR

[Reduced Range Ball Ammunition]

- Customer Requirements
- Projectile Development
- Tuning Characteristics
- Summary

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7.62 **RR**

- CUSTOMER REQUIREMENTS

- **Need for ammunition with reduced safety template**
  - Training
  - Combat
- **Maximum Range ≤ 1500 m** (1640 yds)
- **Trajectory match Nato reference @ 200 m** (220 yds)
- **Accuracy compared to Nato reference @ 100 m** (110 yds)
- **Meet relevant STANAG requirements**
  - Terminal effects
  - Weapon function in complete temperature intervall
- **Non Toxic (lead- and heavy metal free)**

- **Price competitive**
  - Possible to produce with standard machinary

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TRAINING & COMBAT OPERATIONS

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- **Training**
  - MOUT training
  - Firing ranges near populated areas
  - Firing from moving vehicles

- **Urban Combat Operations**
  - Typical maximum range =
    200 m (220 yds)
  - Typical average fighting distances =
    15-35 meters (~15-40 yds)
  - 360 Degree awareness, hemispherical (Convoy)

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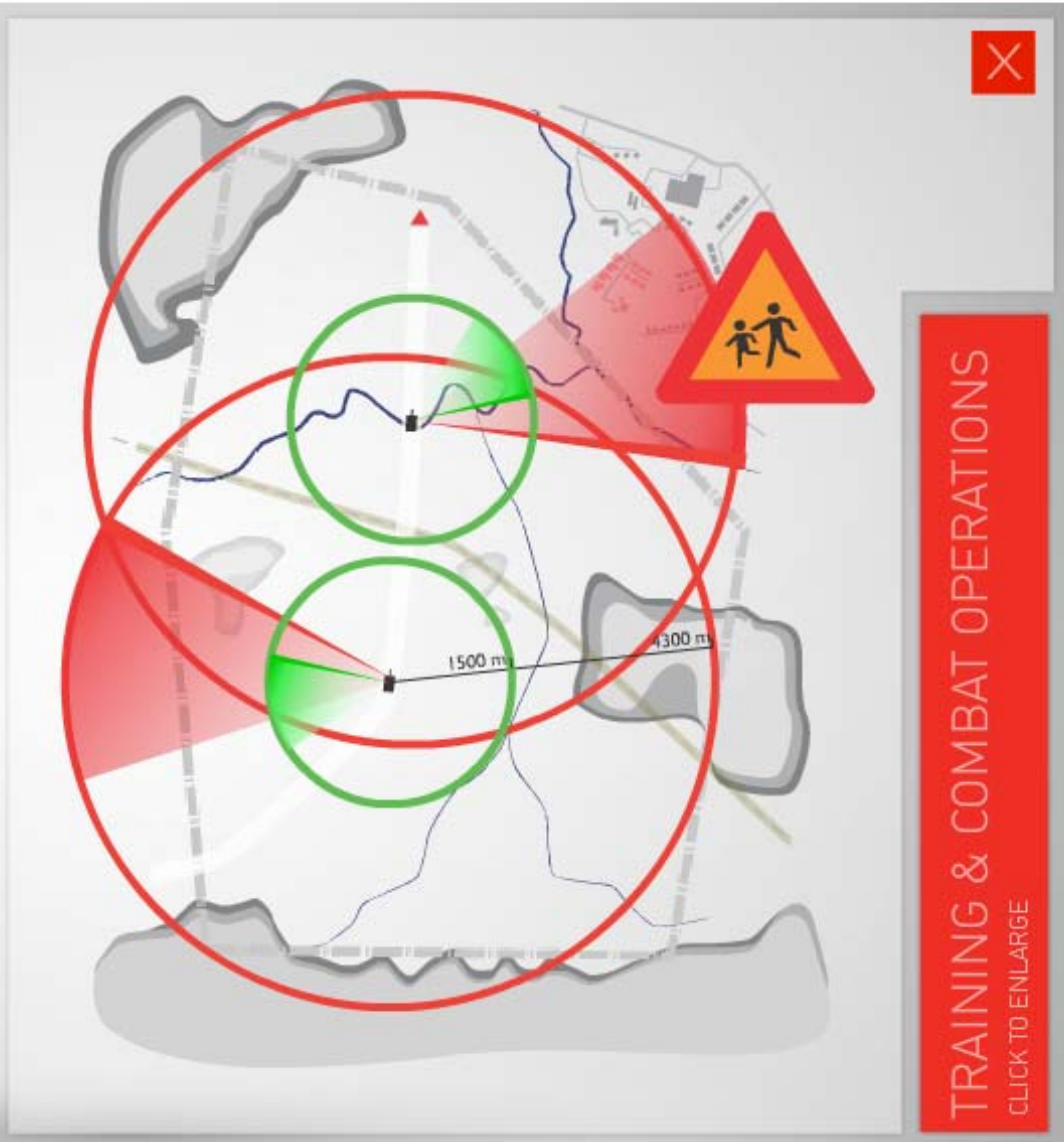

TRAINING & COMBAT OPERATIONS

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REDUCED RANGE

BASED ON NAMMO NON TOXIC DESIGN

- All Swedish and Norwegian standard ammunition is Non-Toxic
- Non-Toxic = Lead/heavy metal free (primer, propellant & projectile)
- 5.56, 7.62 and 9 mm
  - Ball & Tracer
  - Produced since 2000
- Four Non-Toxic cartridges Nato Qualified

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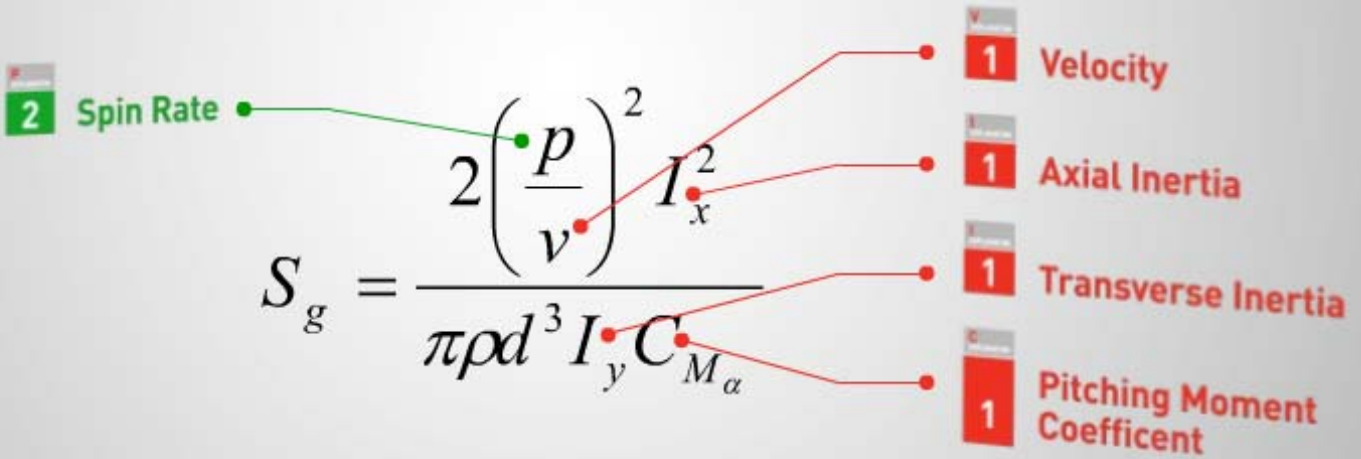
REDUCING

THE MAXIMUM FLIGHT RANGE

- Reduce the projectile stability
- S_g – Gyroscopic Stability Factor

1 Reduce muzzle exit stability compared to standard ammunition

2 Reduce stability downrange at a defined distance



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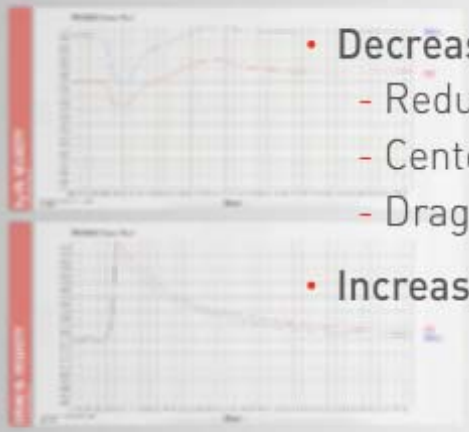
MUZZLE EXIT STABILITY

- BASIC DESIGN

- Different projectile profiles evaluated with Prodas simulation programme



- Decreased stability caused by:
  - Reduced weight & density (Transverse & Axial inertia)
  - Center of Gravity pushed towards tail
  - Drag Center of Pressure pushed forward
- Increased Drag value

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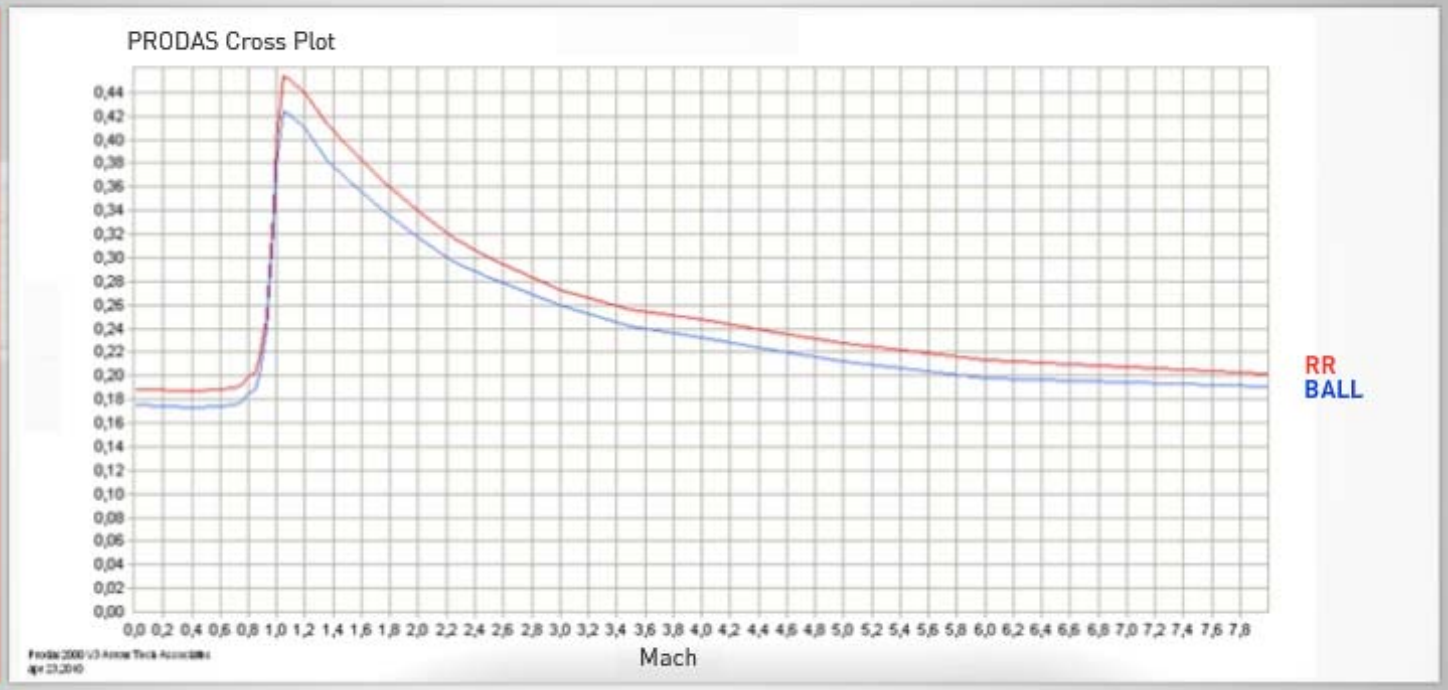
MUZZLE EXIT STABILITY

- BASIC DESIGN

DRAG VS. VELOCITY

CLICK TO ENLARGE



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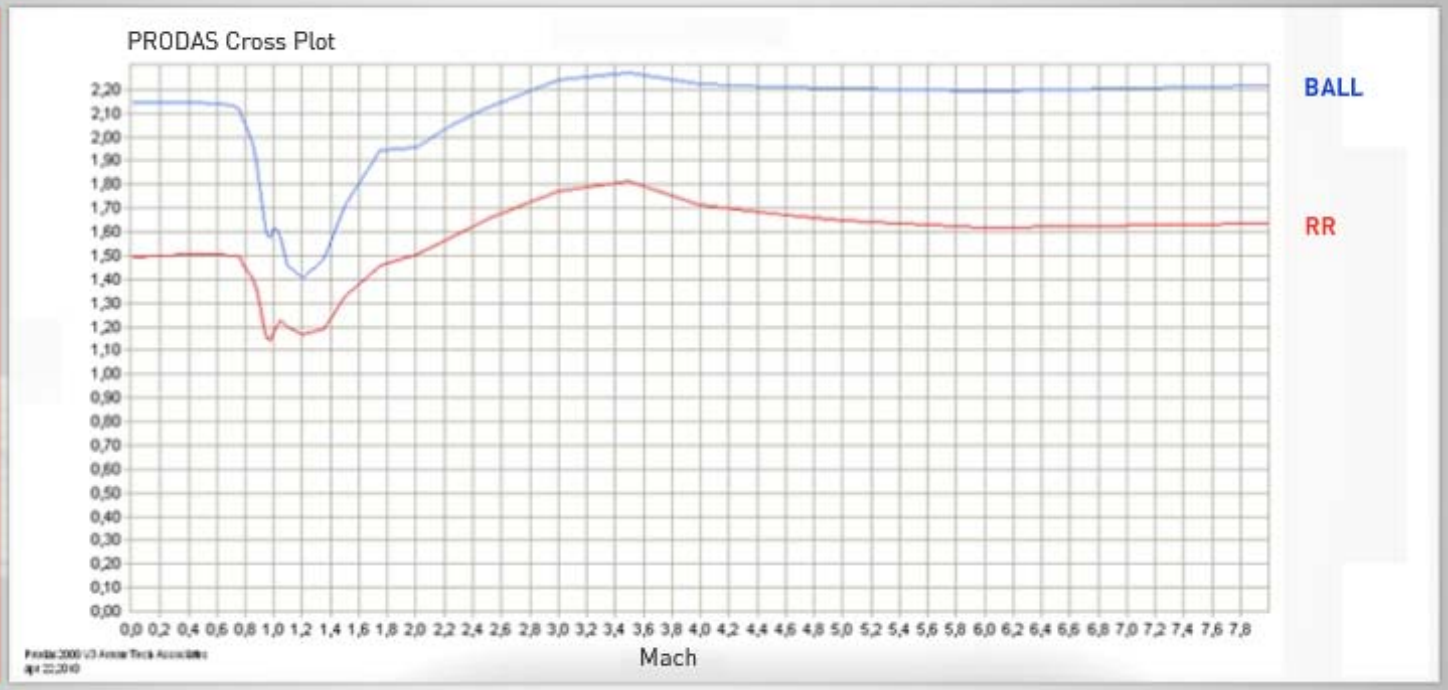
MUZZLE EXIT STABILITY

- BASIC DESIGN

Sg VS. VELOCITY

CLICK TO ENLARGE



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DOWNRANGE STABILITY

- REDUCING SPIN

- Reduce spin by air braking flutes
- Position, number and basic geometry of flutes were optimized
  - First developed with 12.7mm (.50cal)
  - Test firings with Doppler radar measurements
  - Adapted for 7.62 mm
- Design Conclusions:
  - Flutes on projectile tip
  - Three flutes more stable and manufacturable than 4 or 5
  - Flute length maximized for portion outside cartridge case

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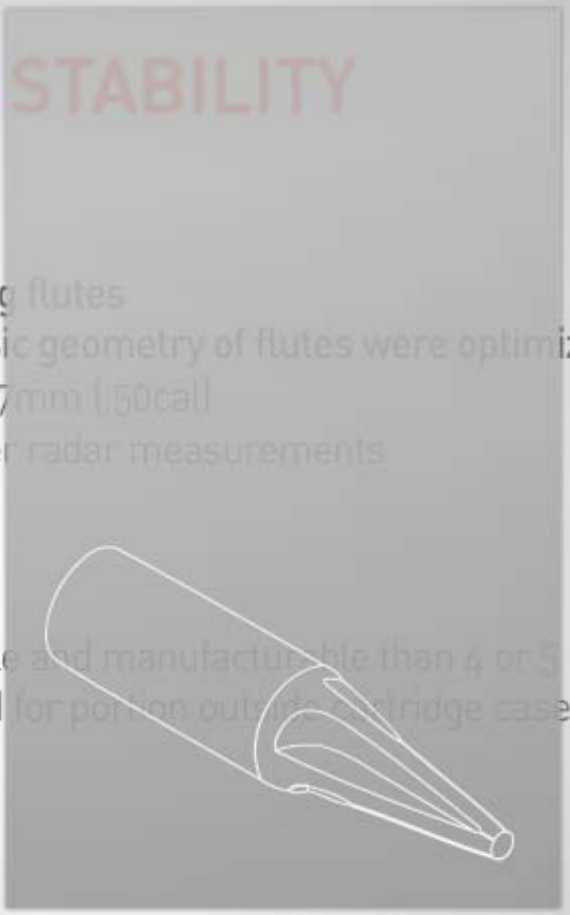

MODEL: 01

MODEL: 02

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MODEL: 03

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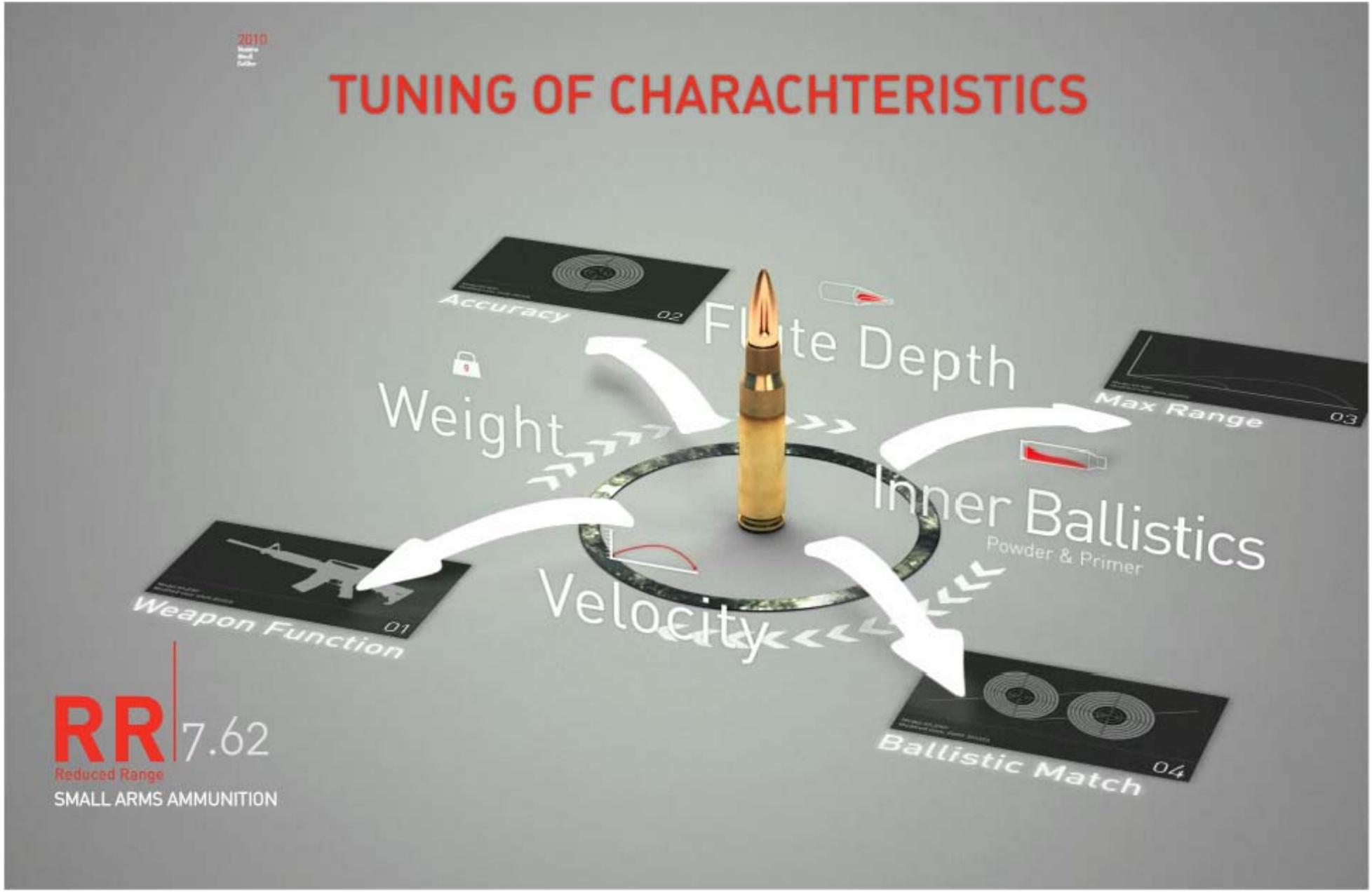
2010
TUNING OF CHARACHTERISTICS
Accuracy
02
Flute Depth
Max Range
03
Weight
Inner Ballistics
Powder & Primer
Weapon Function
01
Velocity
Ballistic Match
04
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TRAJECTORY & ACCURACY

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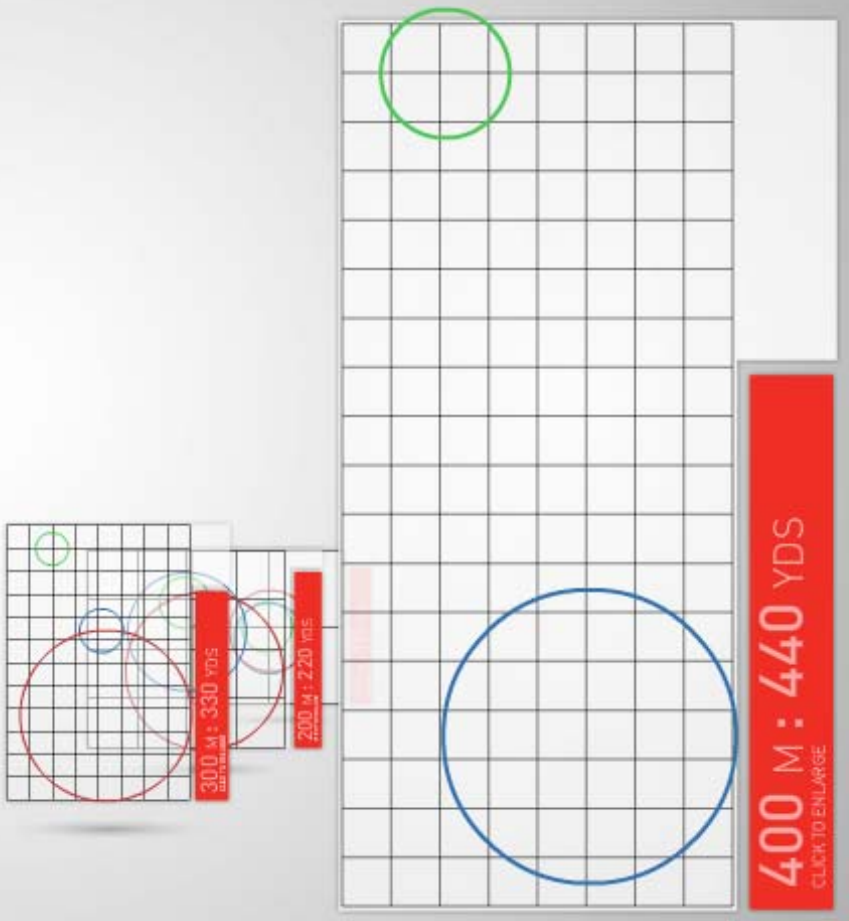
- Live Firing Tests
- Mean point of impact and Extreme spread
- The square pattern has the side 100 mm (~4 inch)

Ball [reference]
RR [1]
RR [2]



RR 7.62
Reduced Range
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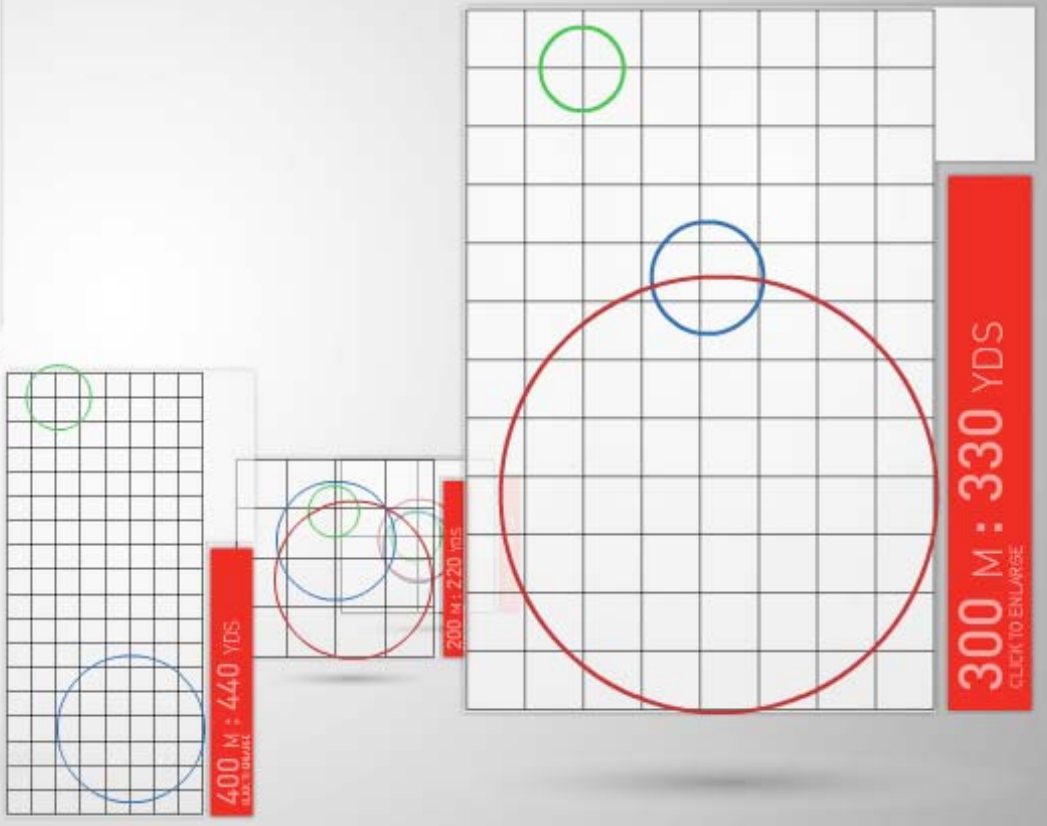

RR 7.62
Reduced Range
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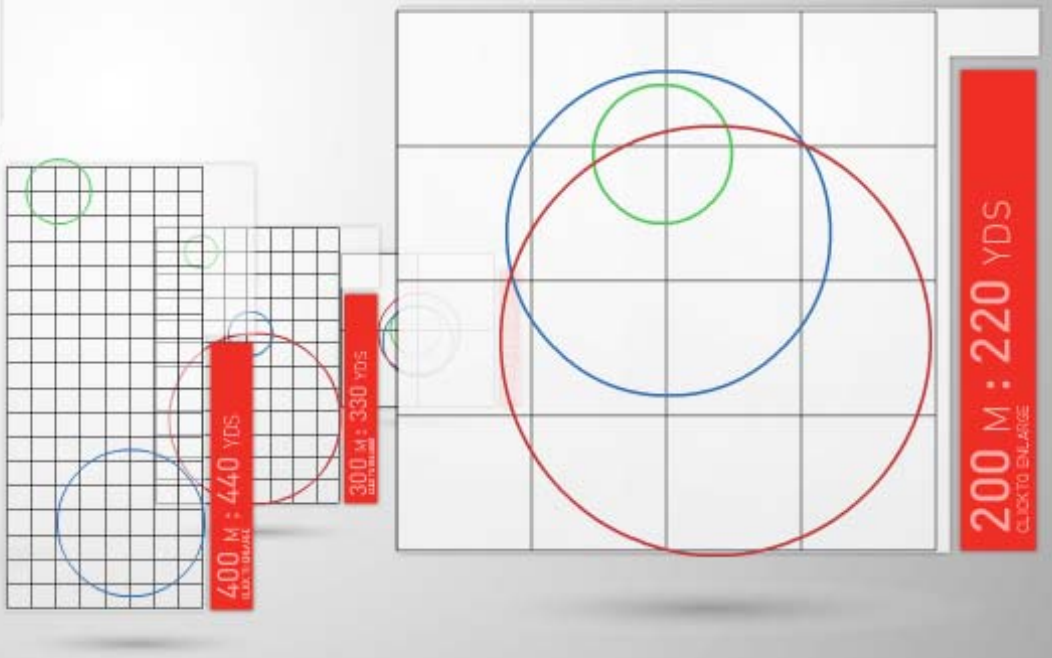

RR 7.62
Reduced Range
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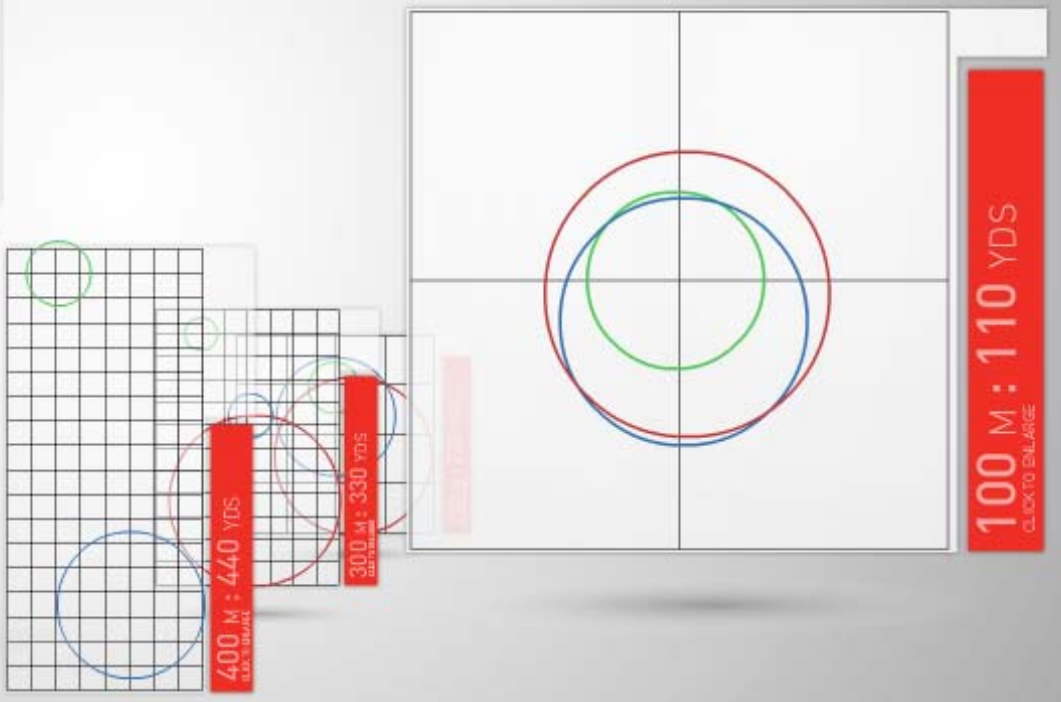

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Reduced Range
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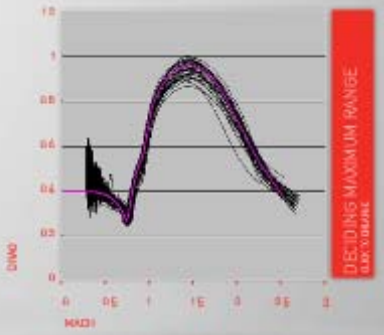
DECIDING MAXIMUM RANGE

- **Maximum Range calculated with a Prodas model**
- **Non rotation symetric geometry**
  - Physical parameters from CAD model
    - Transverse Inertia
    - Axial Inertia
    - Center of Gravity

- **Drag values from shootings with doppler radar measurements**
  - Different elevation angles (15-30°)
  - Different projectile velocities
  - Consistent drag values measured (black lines)
  - Drag value in Prodas adapted (purple line)



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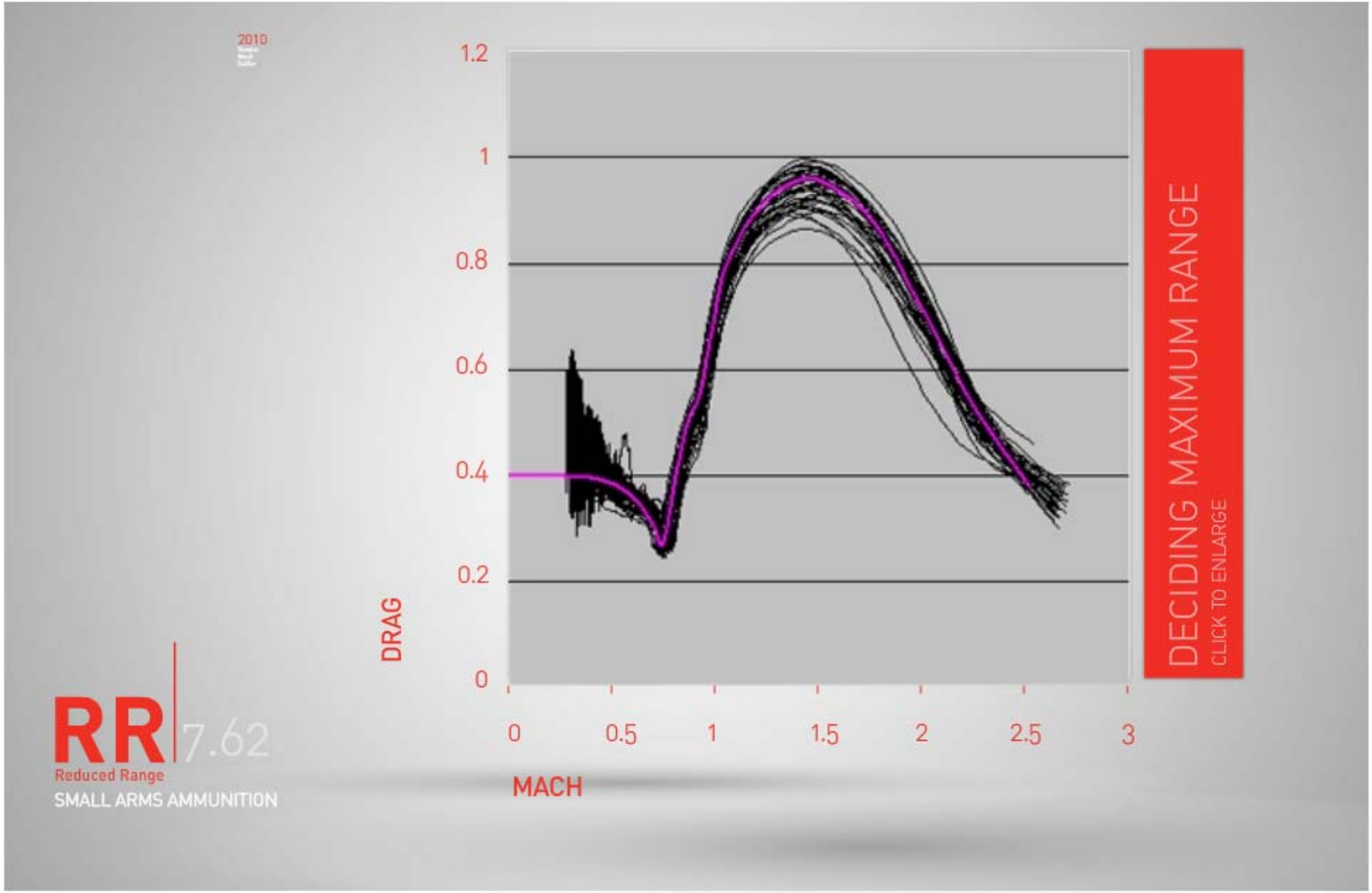
2010
1.2
1
0.8
0.6
0.4
0.2
0
DRAG
0
0.5
1
1.5
2
2.5
3
MACH
DECIDING MAXIMUM RANGE
CLICK TO ENLARGE
RR 7.62
Reduced Range
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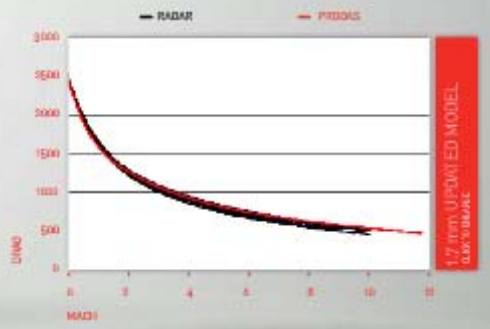
SPIN DECAY

- Evaluated by test firings with Doppler radar measurements
- V-shapen spin slot
  - Spin signals detected by radar
- Spin decay form factor added to Prodas and compared to radar data
- Pitching moment coefficient, CM_{α}, form factored



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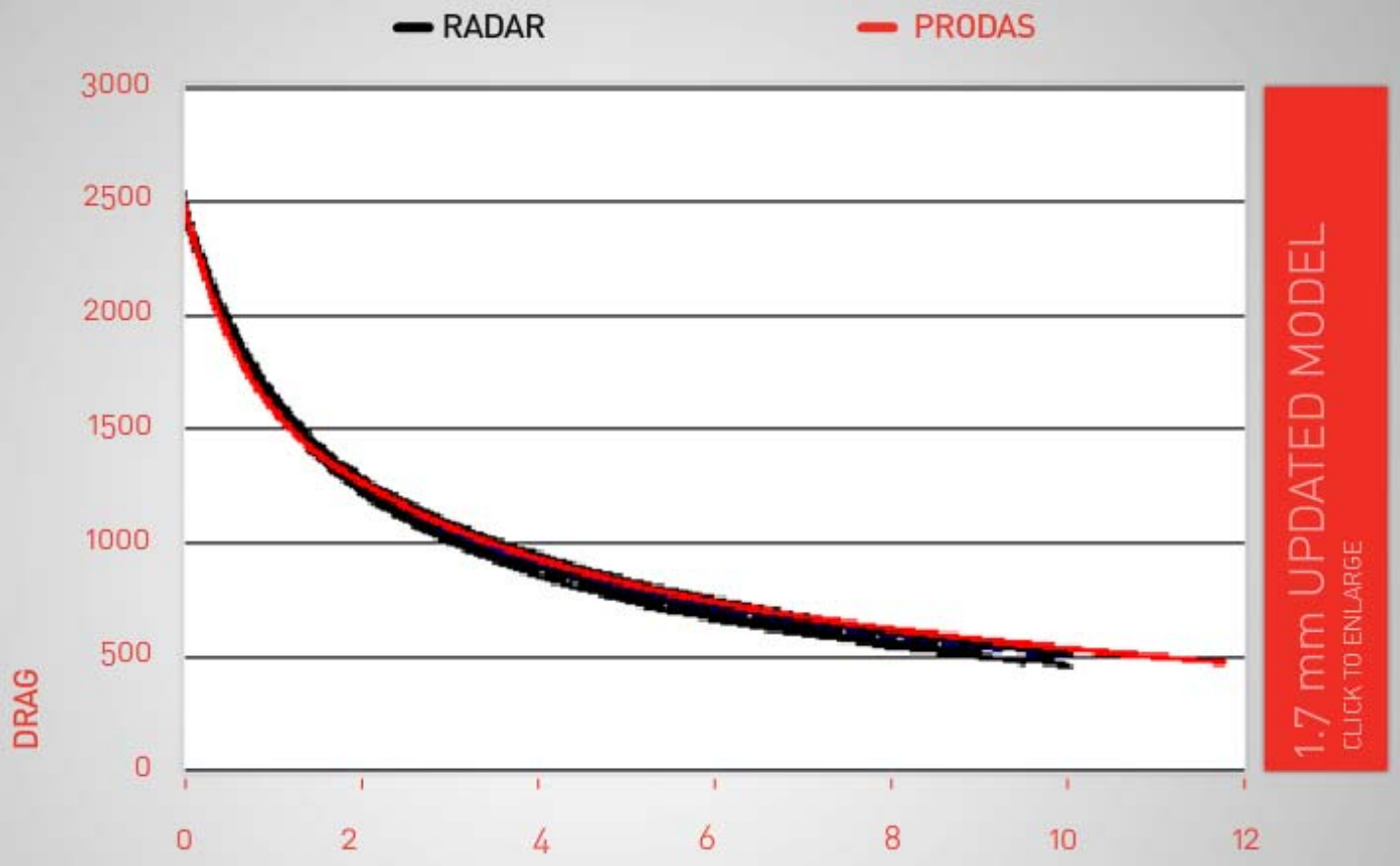

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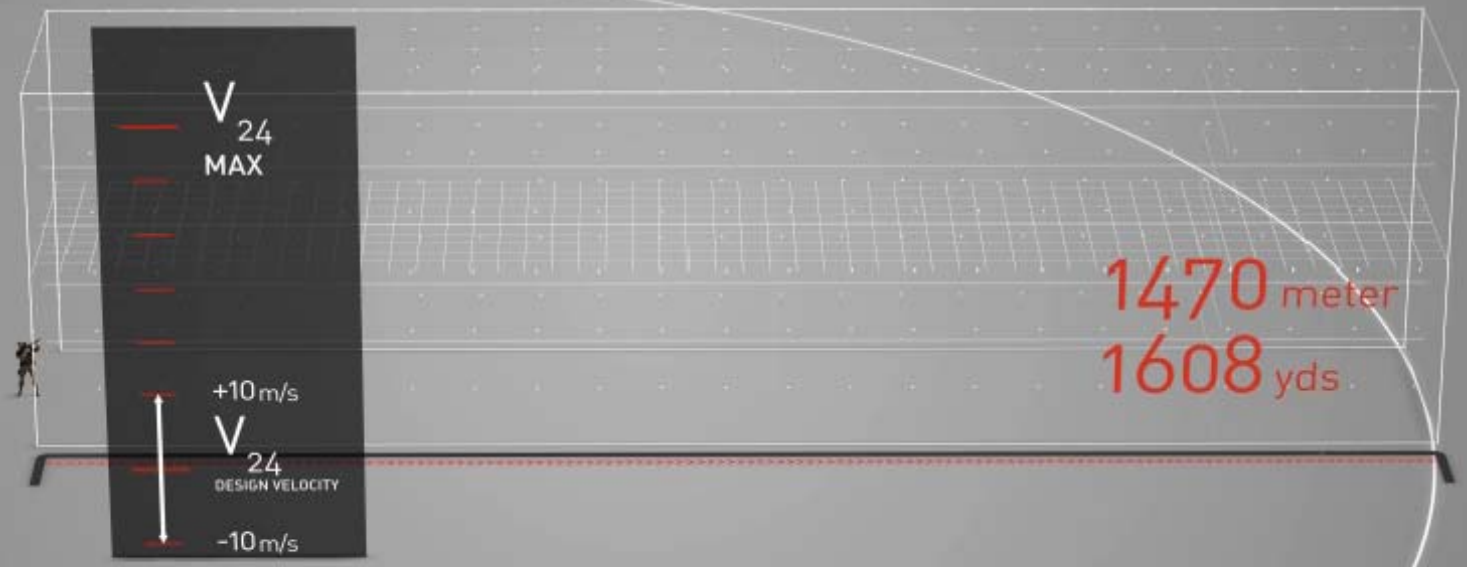
MAXIMUM RANGE CALCULATION



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STANDARD ATMOSPHERIC CONDITIONS
No wind
Temperature +15°C (+59°F) @ sea level
Air Pressure 1.013 bar @ sea level

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COMBAT USE

FAST CAM

CAM SPEED 25 000 fps

1 speed | 2 speed | 3 speed

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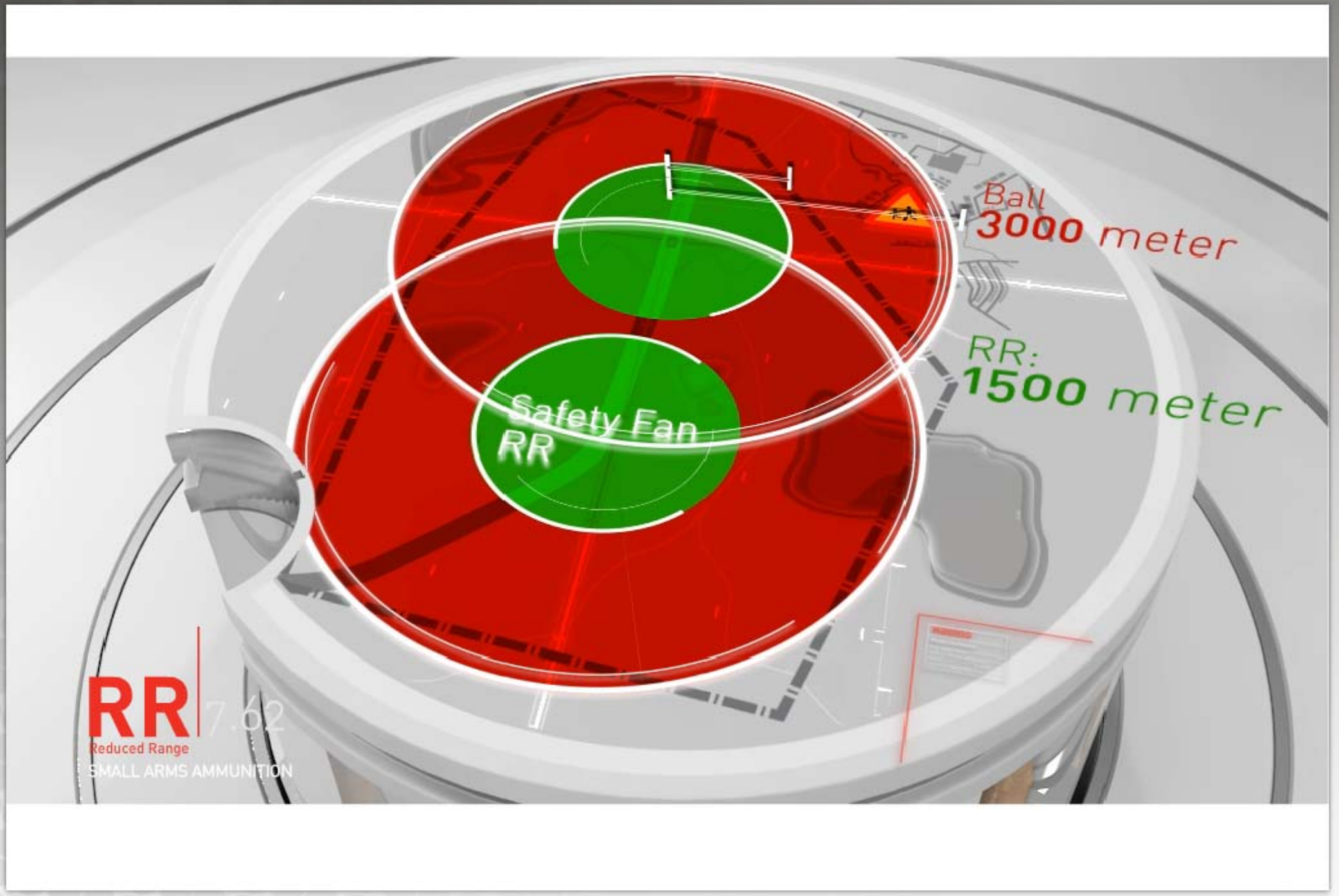
Ball
3000 meter
RR:
1500 meter
Safety Fan
RR
RR
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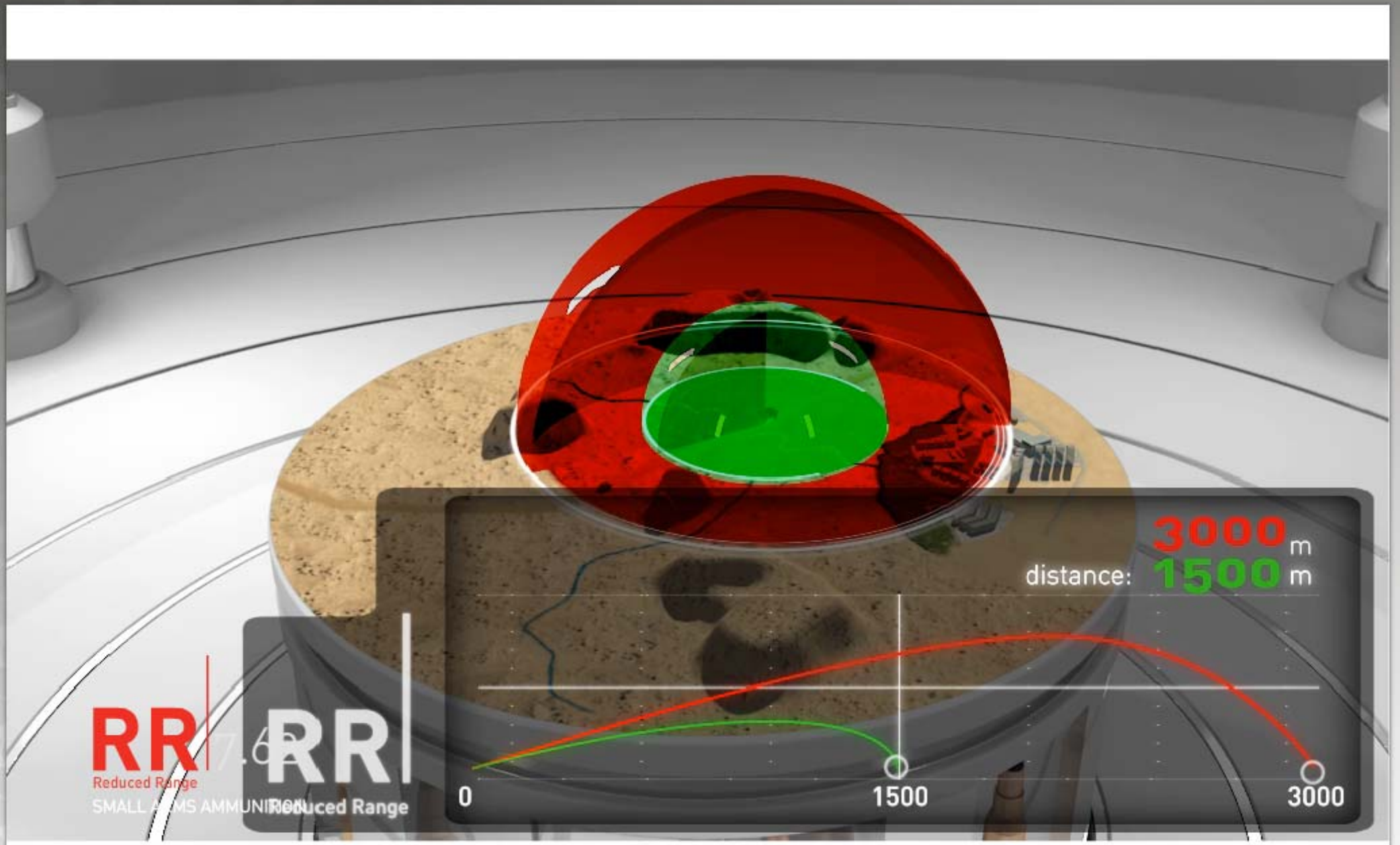
3000 m
distance: 1500 m
0
1500
3000
RR
Reduced Range
RR
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7.62 **RR**

- CORE CUSTOMER REQUIREMENTS

- **Need for ammunition with reduced safety template**
  - Training
  - Combat
- **Maximum Range ⩽ 1500 m** (1640 yds)
- **Trajectory match Nato reference @ 200 m** (220 yds)
- **Accuracy compared to Nato reference @ 100 m** (110 yds)
- **Meet relevant STANAG requirements**
  - Terminal effects
  - Weapon function in complete temperature intervall
- **Non Toxic (lead- and heavy metal free)**

- **Price competitive**
  - Possible to produce with standard machinary

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1 facts 2 facts 3 zoom

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SUMMARY

- CARTRIDGE DESIGN

- Cartridge Case: Standard Brass
- Primer: Boxer Non Toxic
- Propellant: Extruded double base Non Toxic
- Projectile: Steel plated jacket covering a steel core

- CHARACTERISTICS

- Significantly reduced safety template
  - Max range < 1500 meters (1640 yds)
- Trajectory match within 0.3 Mils to
- NATO reference @ 200 m (220 yds)
- Accuracy s < 30 mm (1.2 inch) @ 100 m (110 yds)
- Meets all relevant STANAG requirements
- Cost effective design

- A Non-Toxic alternative for training and/ or special tactical tasks

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1 facts 2 facts 3 zoom

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bullet
#X-ray# : view front
shelf
#X-ray# : view front
RR
7.62
Reduced Range
SMALL ARMS AMMUNITION
1 facts
2 facts
3 zoom


RR 7.62
Reduced Range
SMALL ARMS AMMUNITION
1 facts
2 facts
3 zoom

2010

QUALIFICATION STATUS

- .50cal Ball RR – Qualified October 2009, In production
- .50cal Tracer RR – Qualified October 2009, In production
- .50cal Dim Tracer RR – Qualified October 2009, In production

- 7.62x51 mm Ball RR – Qualification Q3 2010
- 5.56x45 mm BallL RR – Qualification Q4 2010
- 5.56 and 7.62 mm Tracer & Dim Tracer RR – Qualification 2011

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2010

QUESTIONS

AP 7.62
Armor Piercing
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RR 7.62
Reduced Range
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IR 7.62
Infrared Tracer
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BALL 7.62
Non Toxic
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