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Malcolm Baldrige National Quality Award 2007 Award Recipient

J·S·S·A·P JOINT SERVICE SMALL ARMS PROGRAM

ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING CENTER PICATINNY ARSENAL, NJ

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# Advances In Recoil Mitigation Technology For Small Arms

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# Advances in Recoil Mitigation Technology for Small Arms

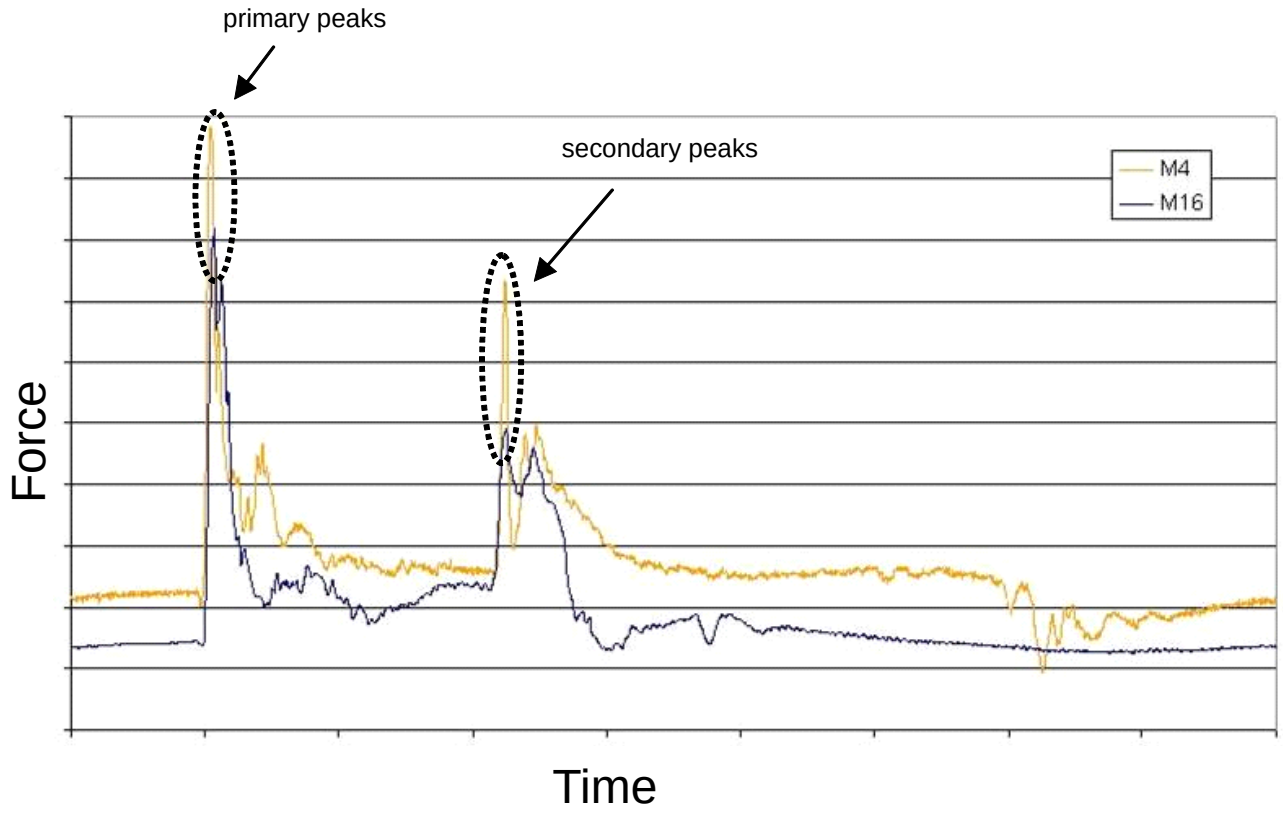
## Agenda:

- Recoil Overview
- Existing Recoil Mitigation Technology
- Project Background
- Single-Shot Concept Demonstrator
- Use of Modeling & Simulation
- Testing
- Summary & Takeaway

# Recoil & Prior Art

# Recoil Peaks

## Forces Acting on the Shooter



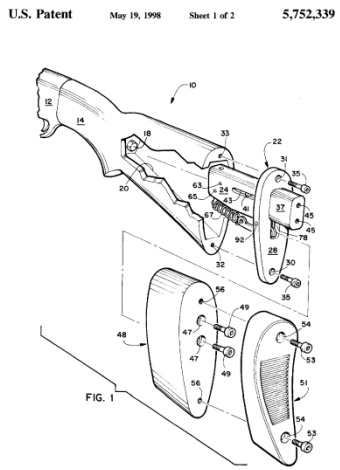

1st peak: propellant gases

2nd peak: operating group

*Source: D. Allsop et al. "Brassey's Essential Guide to Military Small Arms"*

# Existing Recoil Mitigation Technology

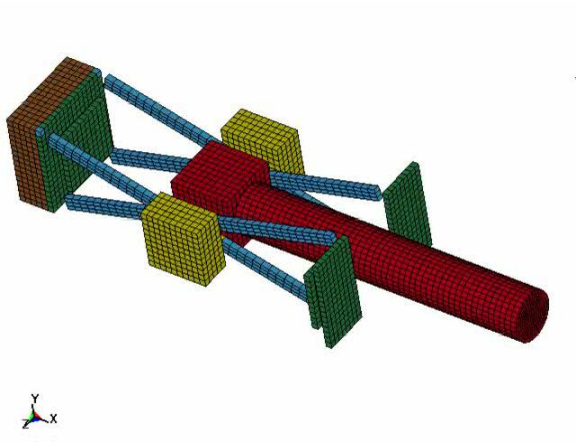
- Buffers
- Recoil Pad
- Muzzle Brake
- Vented Barrel/Gas Bleeding
- Recoil/Energy Absorbing Buttstock
- Operating-Group specific Recoil Reduction
  - XM806 (Impulse Averaging)

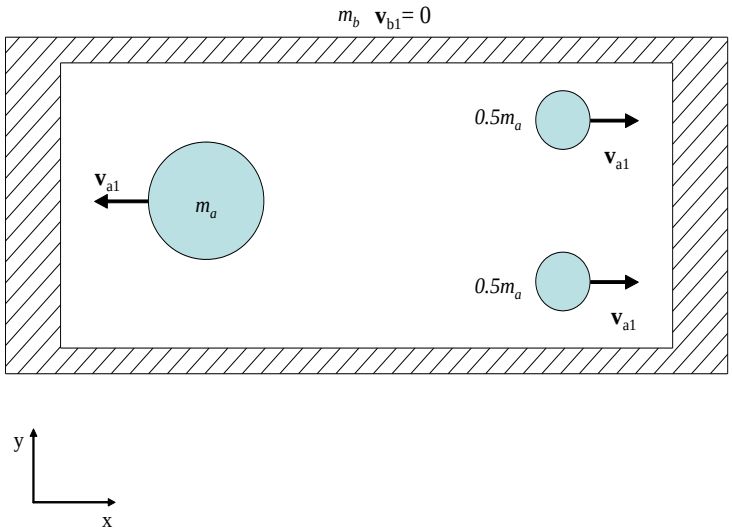



# Project Background

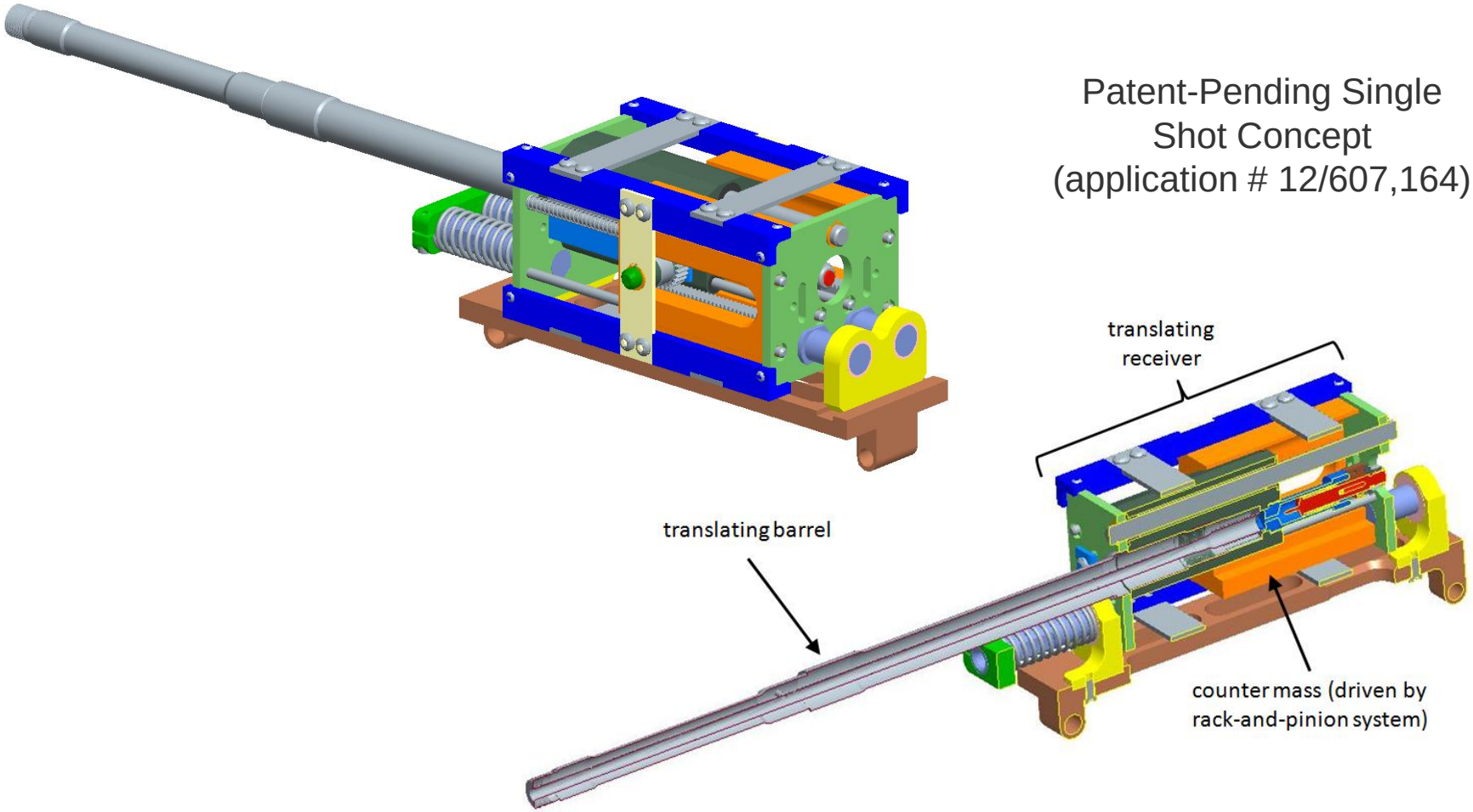
Advance Lethal Armament Technology for Small Arms ATO

- JSSAP funded effort to explore **MECHANISM** based recoil mitigation
- Concept based on patent-pending design



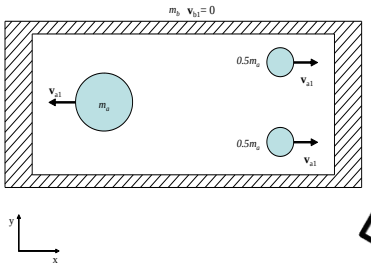


# Concept Demonstrator

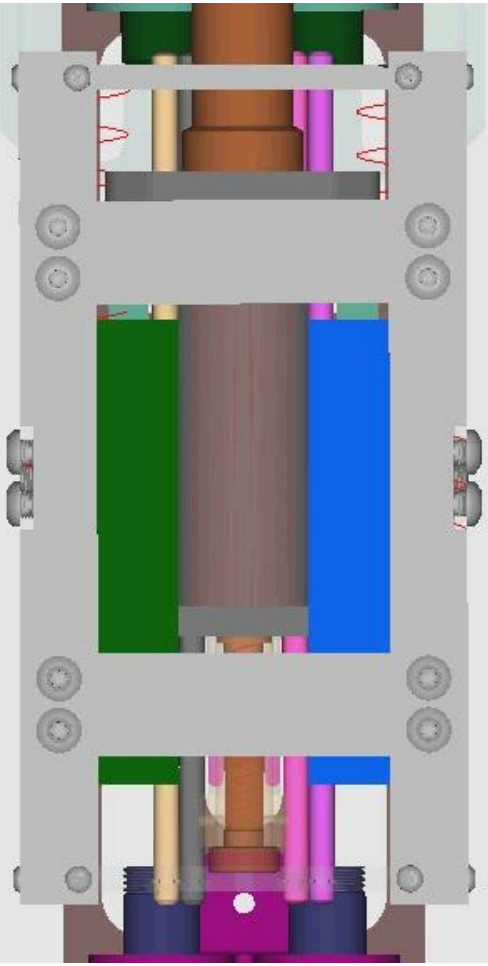


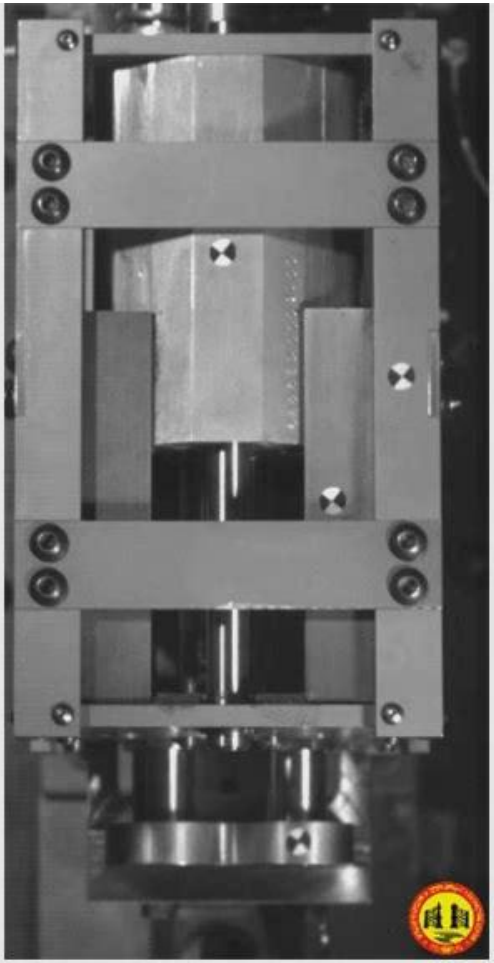

Patent-Pending Single Shot Concept
(application # 12/607,164)

# Modeling & Simulation

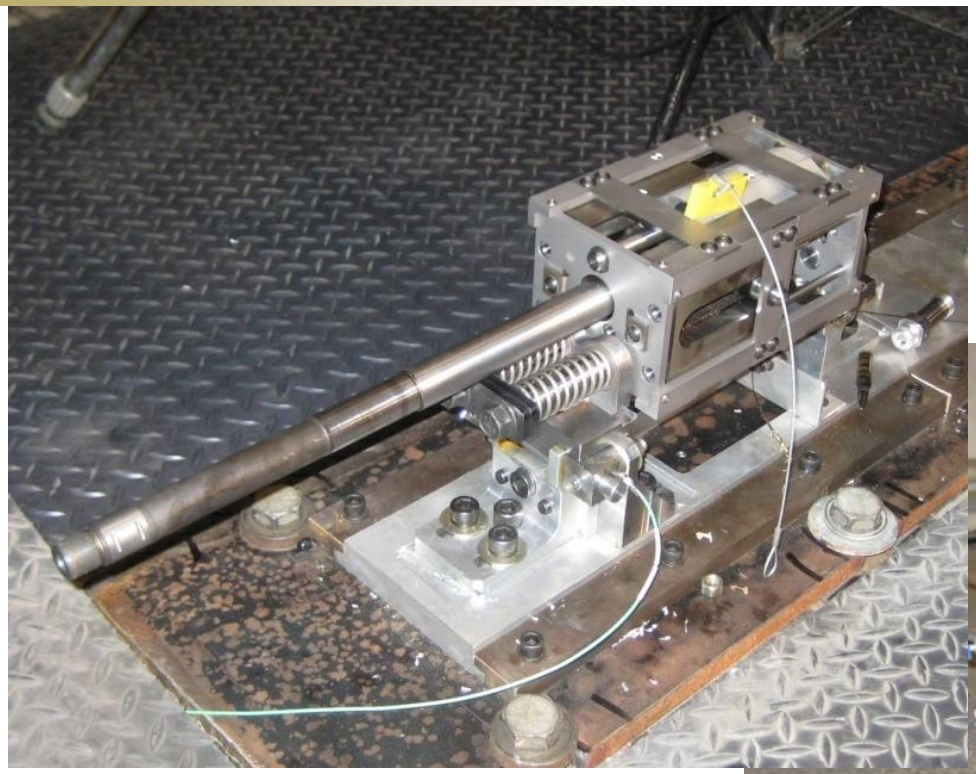


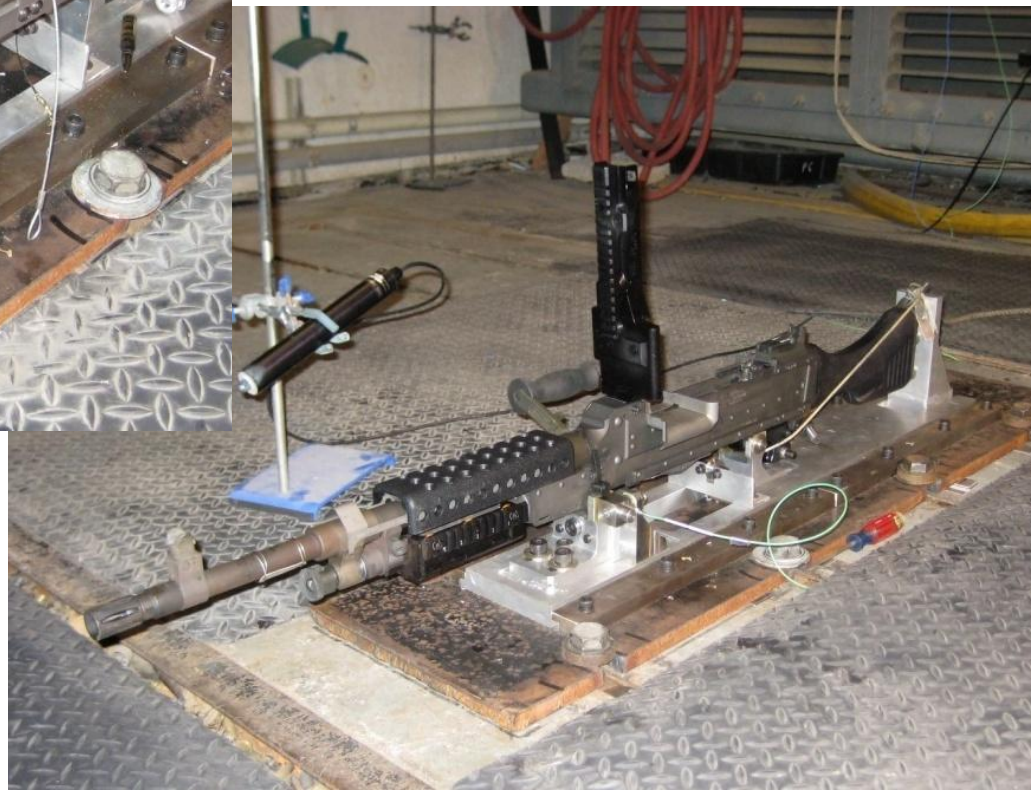
# Validation





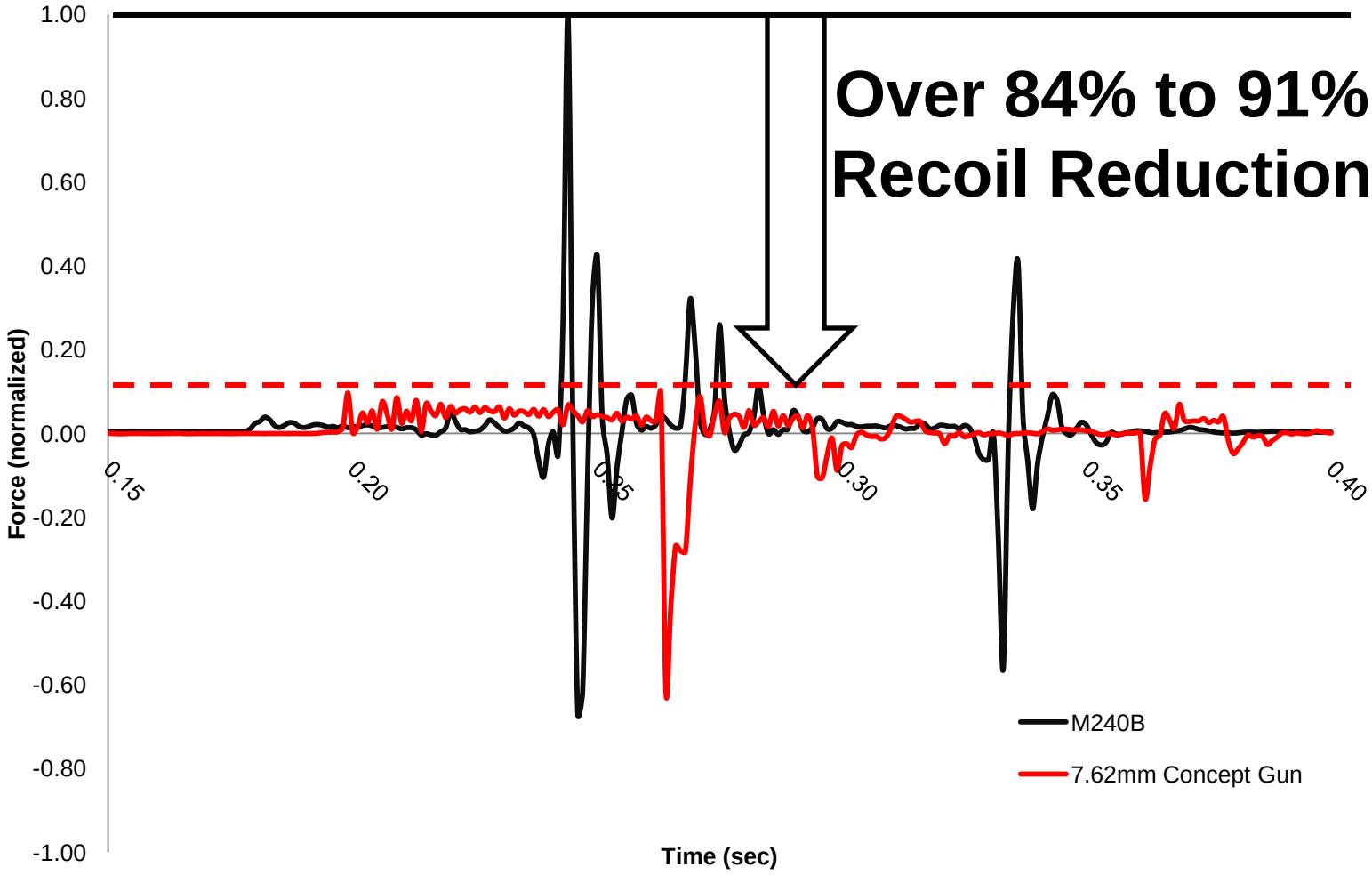
# Testing





# Testing

## Reaction Force: Single Shot, M80 Ball



# Summary & Takeaway

- Significant recoil mitigation
- Adding Counterweight – Counterproductive?
  - Minimize mass of rearward moving group
- Fire higher muzzle velocity cartridges
  - Extend a weapon's range
- Concept is weight and caliber independent
  - Applicable to ANY caliber
- Other recoil mitigation devices can apply

# Questions?

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