

A photograph of a person in a blue jacket aiming a rifle at a target. The target is a black board with a white bullseye. The background is a brick building and greenery.

# *AIRCARTRIDGE TECHNOLOGY*

*By*

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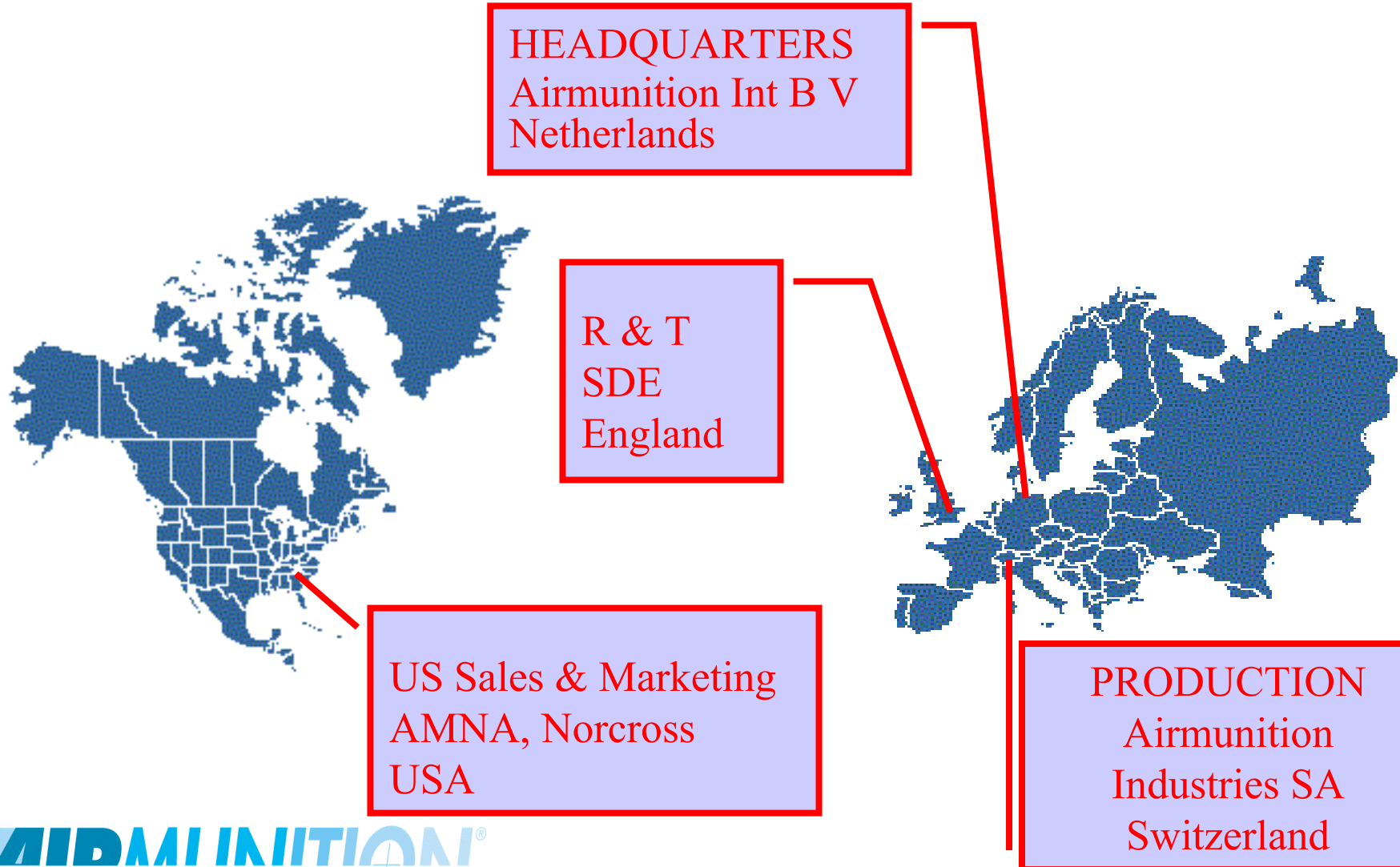
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- Who are we & where are we based?
- Airmunition concept.
- Product range & benefits.
- Energy comparison.
- AirCartridge technology & kinematic model.
  - Methodology.
  - Trials.
  - Results & Validation.
- System Modelling.
- Conclusions.

# Organisation

SDE



# *Mission*



To provide **safe, realistic & cost effective** weapon training systems, using the patented concept of compressed air as an energy source.



# *The Concept*



# *Small Calibre*

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# *Product Range*

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# Benefits

- **Cost Effective**
  - Each cartridge can be reloaded in excess of 500/2000 times.
- **Environmentally Friendly**
  - Uses only air.
  - Can be used indoors without a need for ventilation.
- **Safe**
  - No energetic materials are used.
  - Patented vent hole in the side of the chamber.
- **Reliable**
- **Variable Velocity**
  - For special applications, the muzzle velocity can be varied by varying the pressure.

# *Energy Comparison*

## *9mm*

SDE

	Pyrotechnic Cartridge	AirCartridge
Maximum Pressure	3200 (bar) 46,400 (psi)	250 (bar) 3,625 (psi)
Total Energy (J)	1840	9
Muzzle Energy (J)	580	2.5

# *AirCartridge Technology*

## *Objectives*

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- To allow a wider application of the technology.
- To assist production by identifying critical areas of the design.
- To reduce development time and cost of future products.

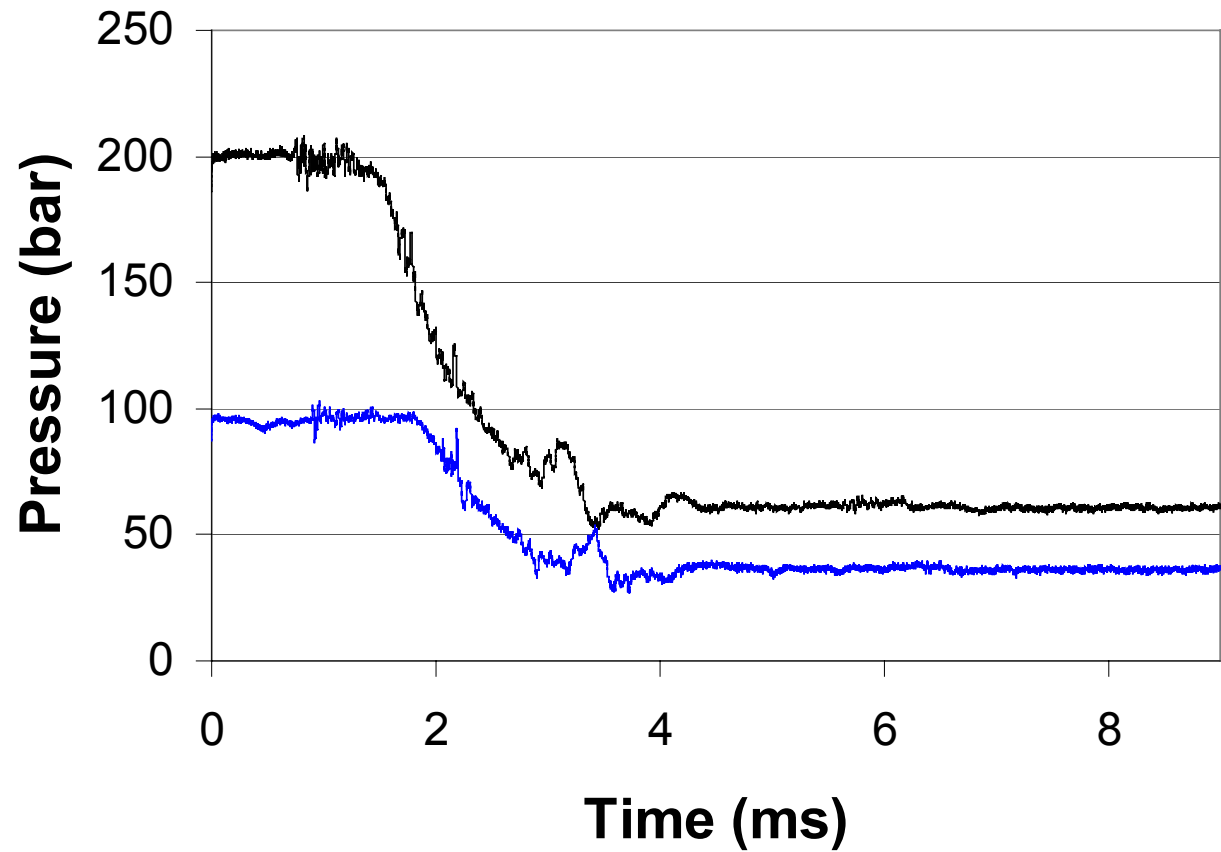
- Produce a Kinematic Model of the AirCartridge.
- Conduct laboratory tests, to obtain pressure & time data within the AirCartridge, using both standard & non-standard components.
- Produce algorithms to predict the flow of air through the valves.
- Insert the data into the Kinematic Model.
- Validate the model.

# *Trial Programme*

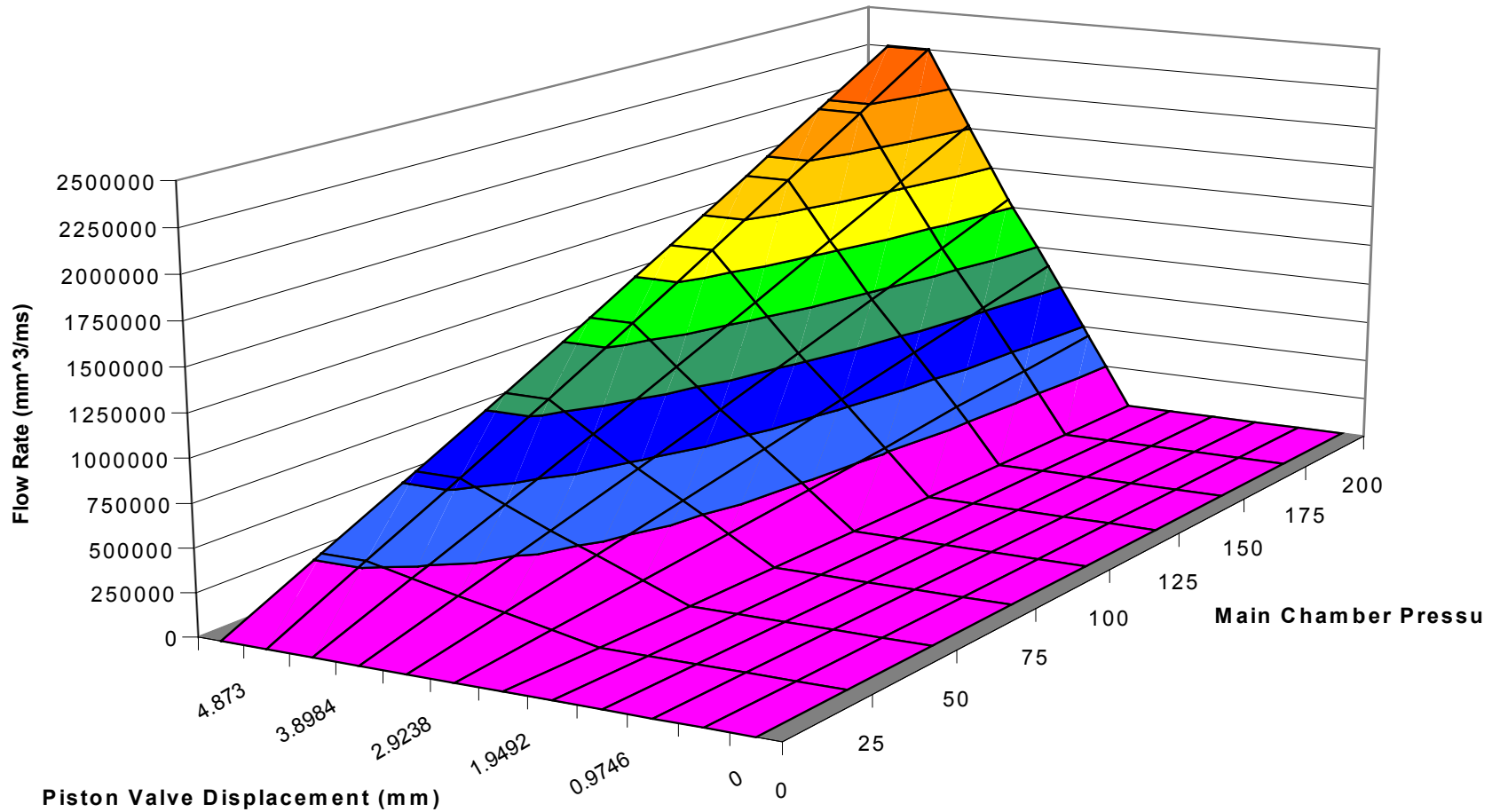


- **Build Standard Variations**
  - Piston (main) valve travel.
  - Flow restriction from main to rear chamber.
- **Initial Charge Pressure**
  - Pressures at 200 bar (2900 psi) & 100 bar (1450 psi).
- **Trials**
  - Determination of Spool Valve activation energy.
  - Record pressure/time data.

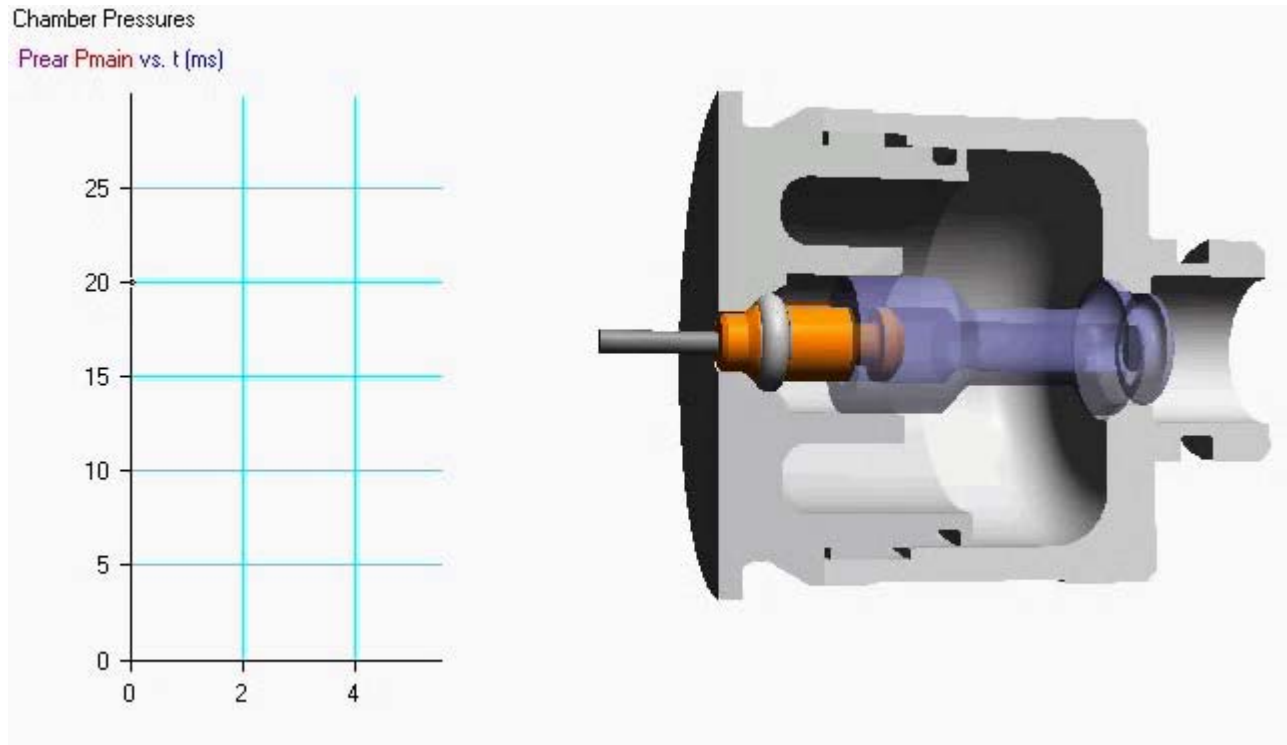
# *Trial Results*



# Air Flow Algorithms

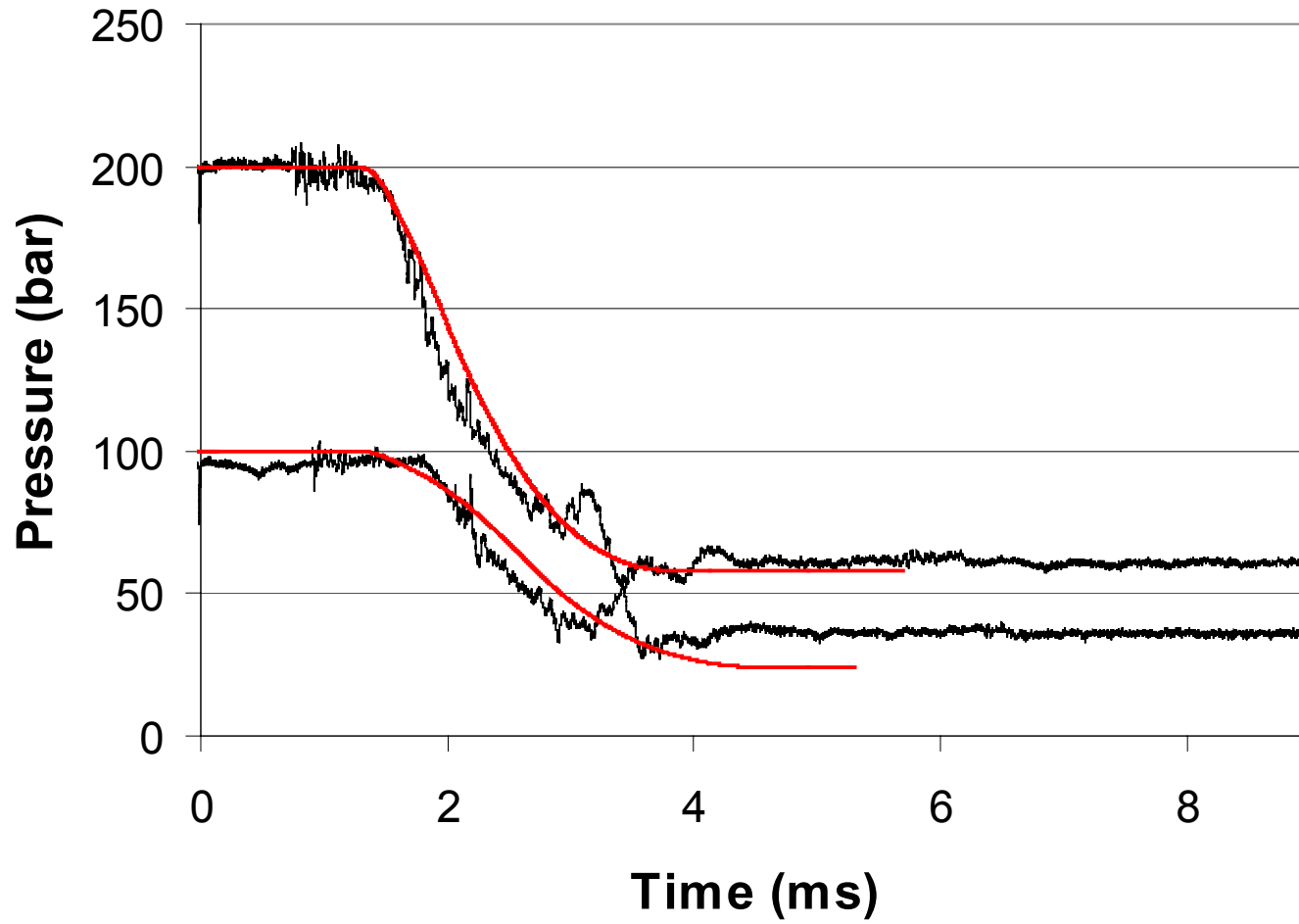


# Model Results





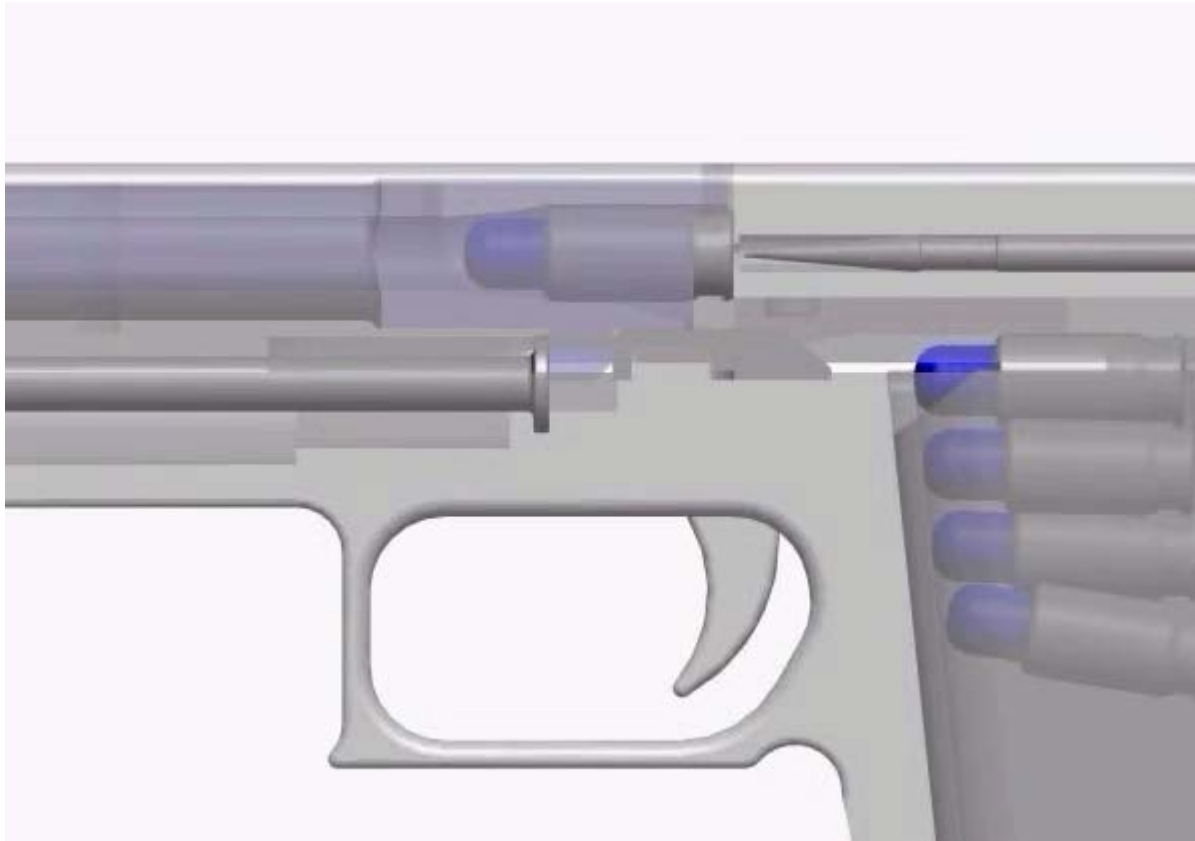
# Model Results



# *System Modeling*



# *System Modeling*



# *Model Conclusions*

- A Kinematic Model has been developed which accurately represents the action of the AirCartridge, which allows us to:
  - Identify & quantify critical design features.
  - Develop new products more efficiently.
- This model can be extended to include the complete weapon system, further reducing development time and costs.

*QUESTIONS?*

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