



A Flexible and Effective Beanbag Platform

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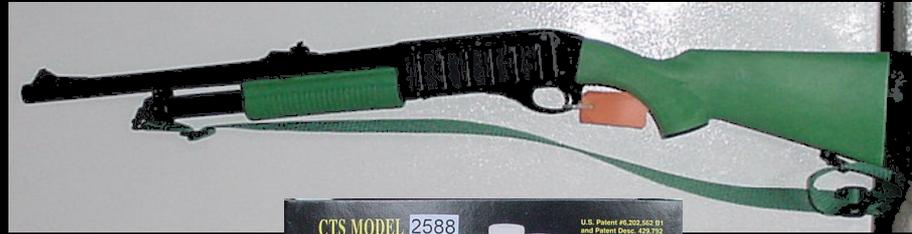
LAPD 5-45 Beanbag Platform



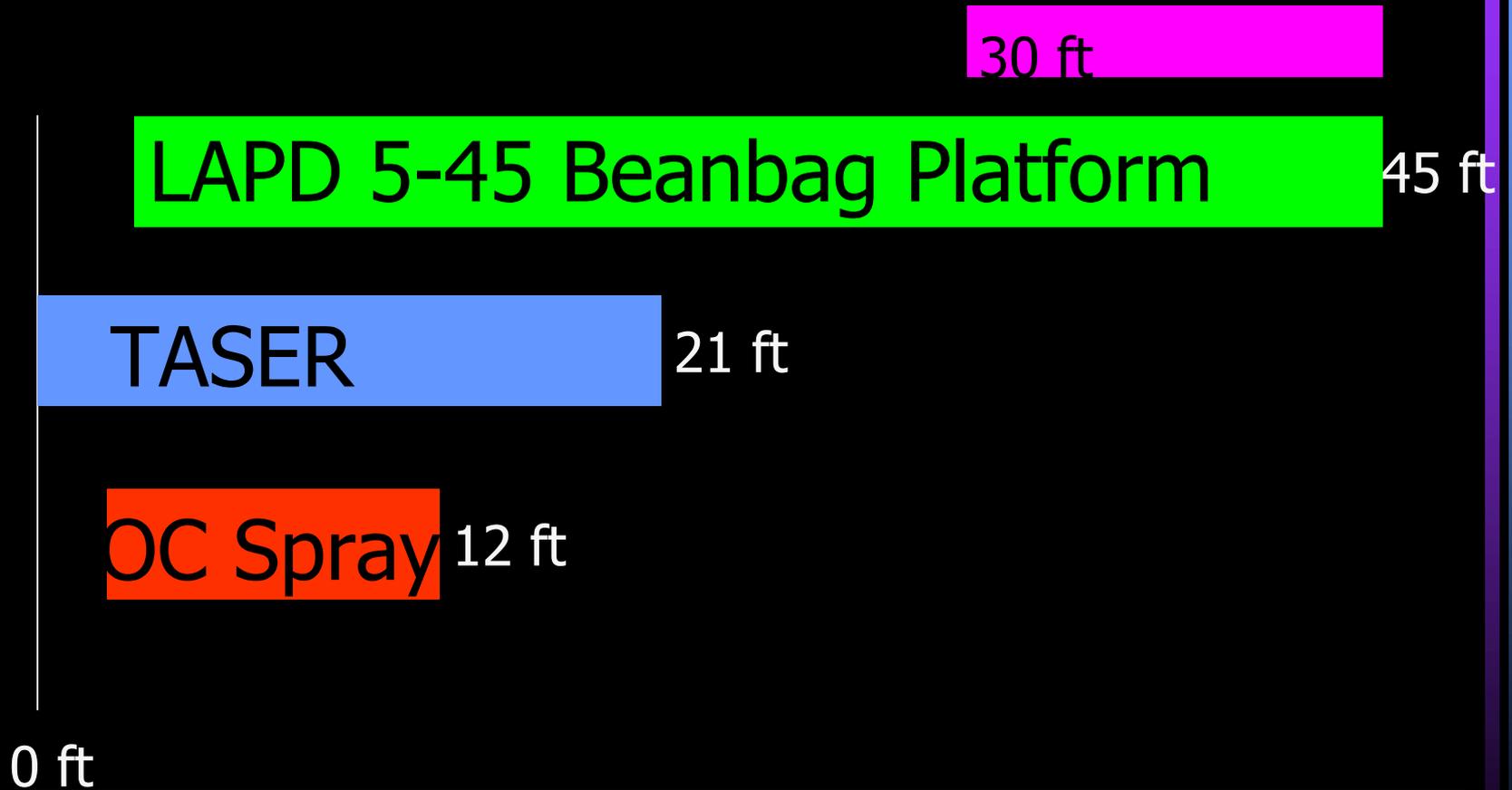
Policy

The Platform Is More Than Ammo

- Firearm
 - Remington 870 Rifled Barrel
- Ammunition
 - CTS Model LAPD 2588
- Policy
 - Bellybutton aimpoint
 - Standoff range 5 ft to 45 ft



Spanning the Less Lethal Gap



Prompted by Performance Problems

- **LAPD began using 12 gauge folded beanbags in 1995 with success and failure**
 - Low velocity projectiles didn't work – no effect
 - Some bags never cleared the barrel
 - Some penetrated
 - Performance unpredictable
 - Most bags did not open even at range

Lethal Penetrations Focused Attention

- Bean bags perforated tissue and organs at 30 ft
- Bags didn't open up in flight
 - cylinder-on point type penetration (impact area < 1 square inch, bag is unopened)
 - wafer type penetration (impact area < 1 square inch, bag is open, but impact on edge)



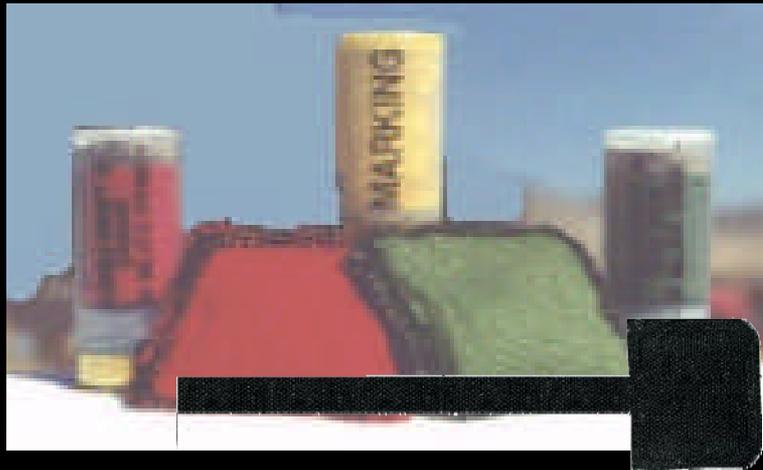
Impact Surface Area Affects Penetration

- Orientation at impact is a function of yaw. In these examples the cylinders struck on their side (impact area > 1 square inch) but were ineffective. Suspect was stopped by a 9mm.
- Bag orientation at impact affects penetration potential

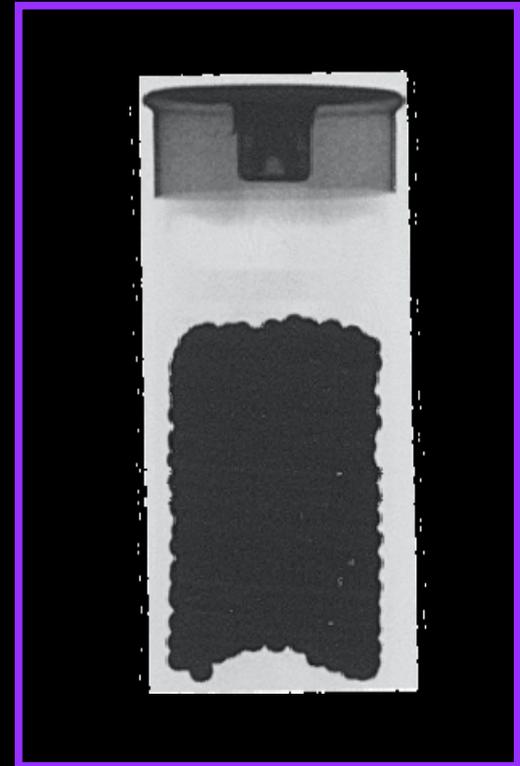


In Depth Scientific Study

- LAPD conducted detailed analysis and testing
 - Hundreds of test shots and data points
 - Too much detail for these time constraints



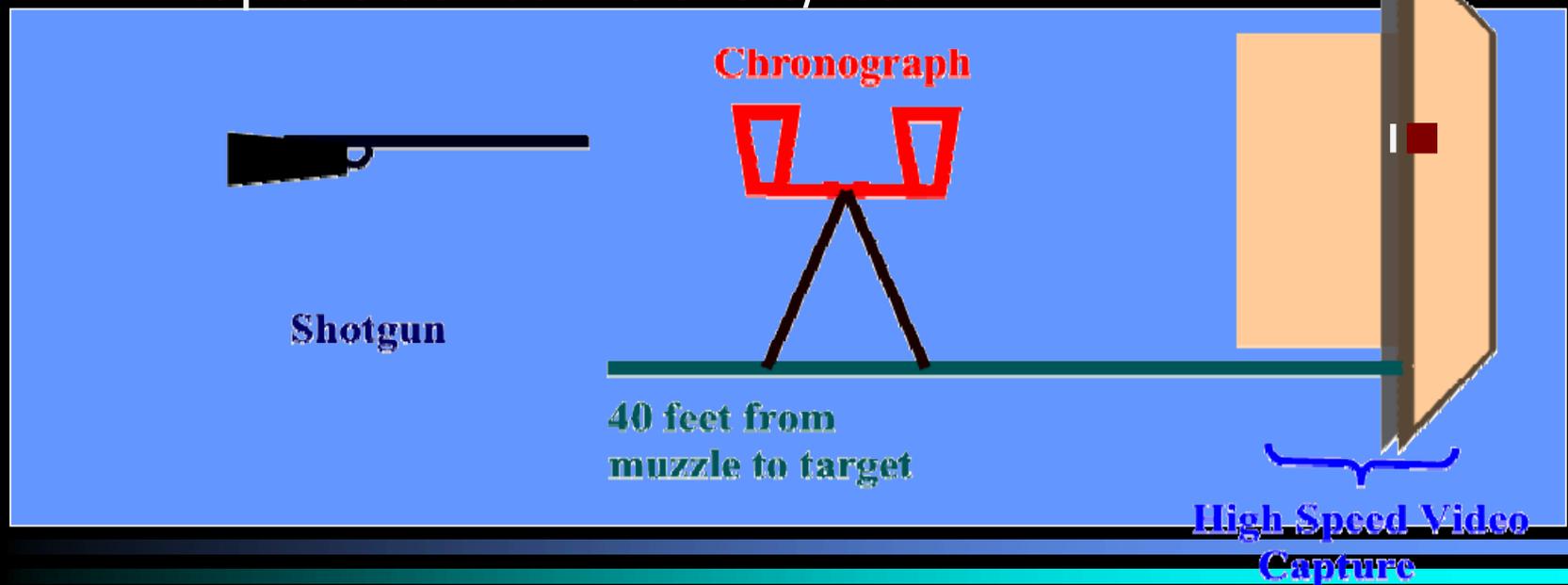
Square Bag Ammunition



Bag is folded

Scientific Tests

- Intended to capture images of bags in flight and record useful data
 - Recording devices included a chronograph, witness panels, high speed video and a Hadland image capture device. 10 shots/test.



Rifled and Paradox Barrels Tested



- Rifled barrels have conventional rifling along the length of the barrel. The twist on the test barrel is 1 revolution in 35 inches (1/35). 

- Paradox barrels have rifling in the last few inches at the muzzle end of the barrel. 

Smoothbore Square Bag at 40 Feet



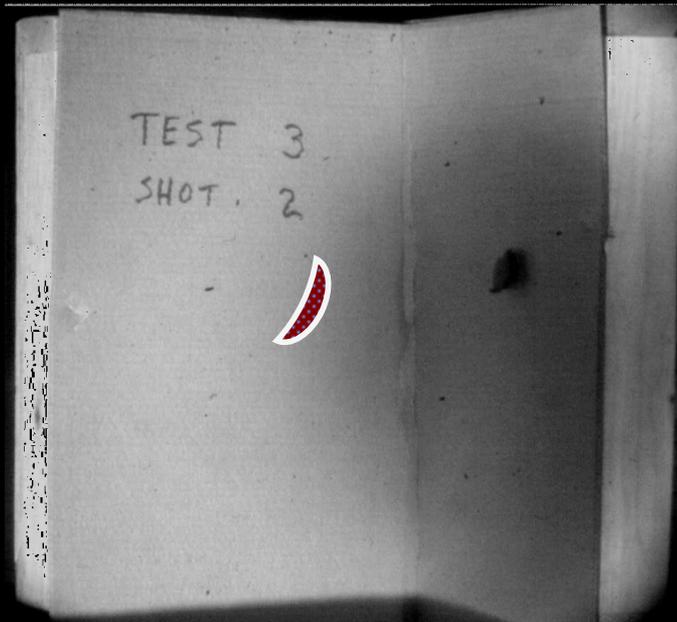
Muzzle Velocity =
304.0 ft/sec
40 feet from muzzle

Perforation 1" x 1"

Configuration =
Cy

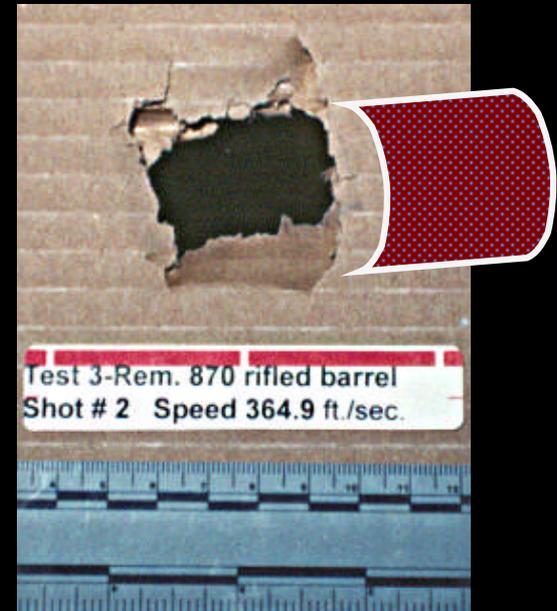


Rifled Barrel Square Bag at 40 Feet



Muzzle Velocity =
364.9 ft./sec.

40 feet from muzzle



Perforation 2" x 2"

Configuration =
Open, flat

Paradox Barrel Square Bag at 40 Feet



Muzzle Velocity =
313.8 ft./sec.

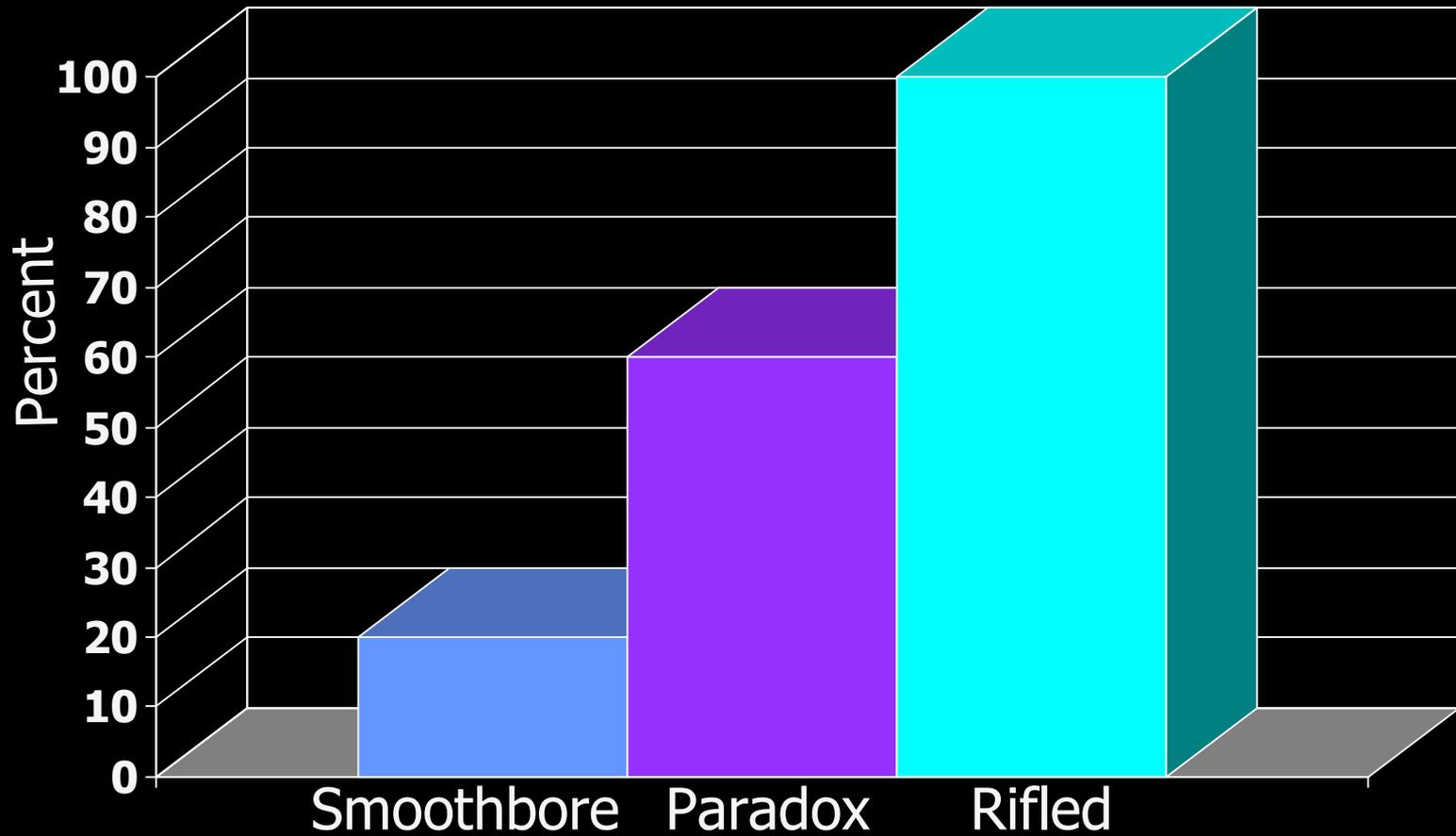
40 feet from muzzle



Perforation 2" x 2"

Configuration =
Cylinder-on point

Properly Deployed Configuration



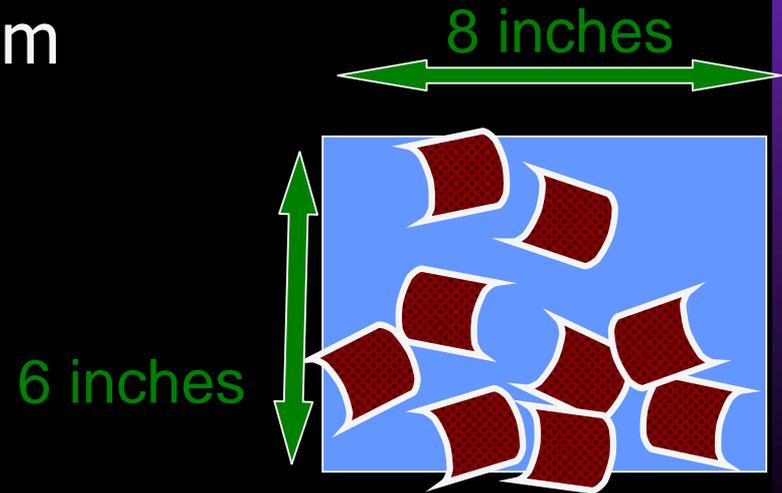
Retrofitting with Rifled Barrels

- The LAPD converted its less lethal shotguns to rifled barrels (18 ½ inch barrels with a 1/35 twist, 8 lands & grooves)



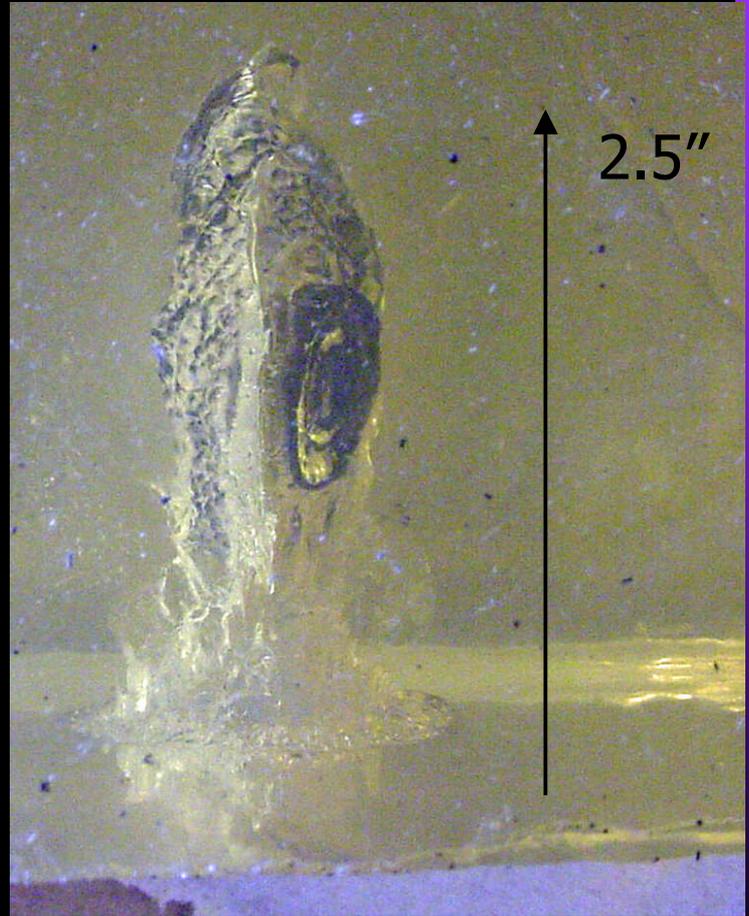
Rifled Barrel

- Rifling spins the bean bag; the resulting centrifugal force opens it reliably
- Limited testing showed very good accuracy at 40 feet
 - A ten-shot group from locked-in-place rest was 6" x 8"



Conventional Sock Rounds

- Ballistic gelatin penetration at 20 feet using conventional sock rounds and a smoothbore shotgun



LAPD Custom Sock Ammunition

This beanbag has no seams, and is elongated in the shotshell, but not folded like the square bag.



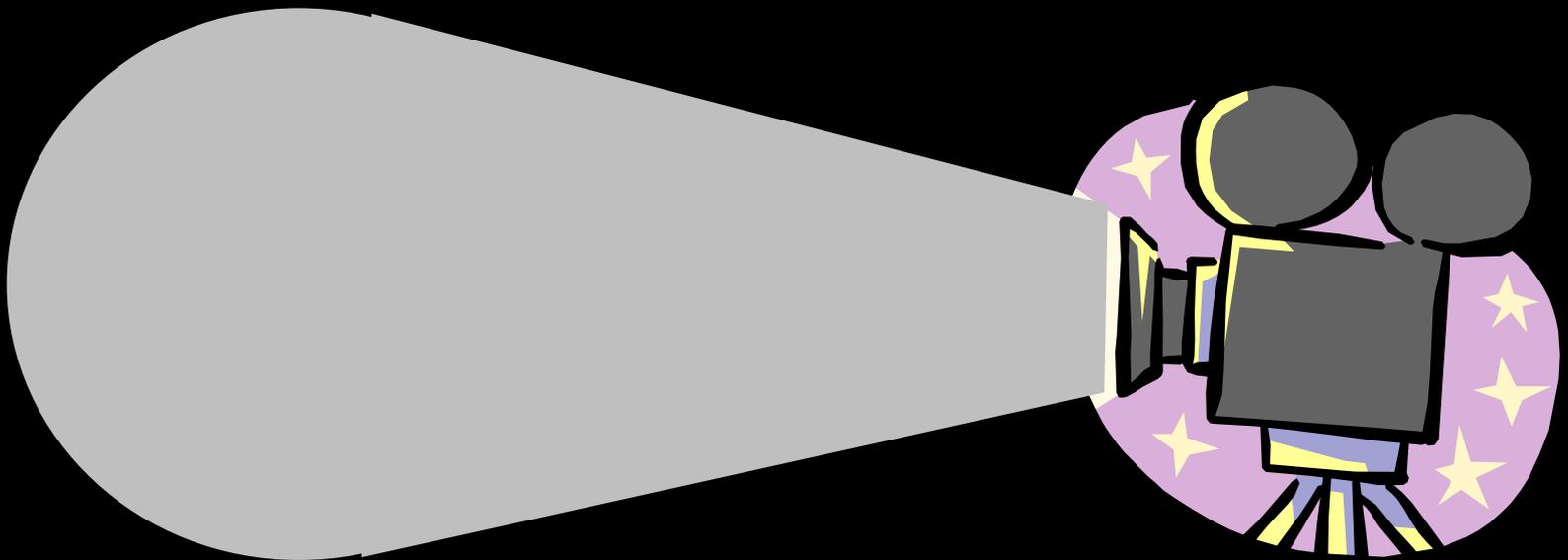
We Wrote Our Own Specification

- By 2001, we knew what we wanted
 - Sock construction
 - No tail
 - 325 f/s mean muzzle velocity
 - Max spread @ 50 ft < 12 "
 - Minimum impact diameter @ 10 ft > 3.5 cms
 - Pellet penetration < 1 cm if bag rupture occurs



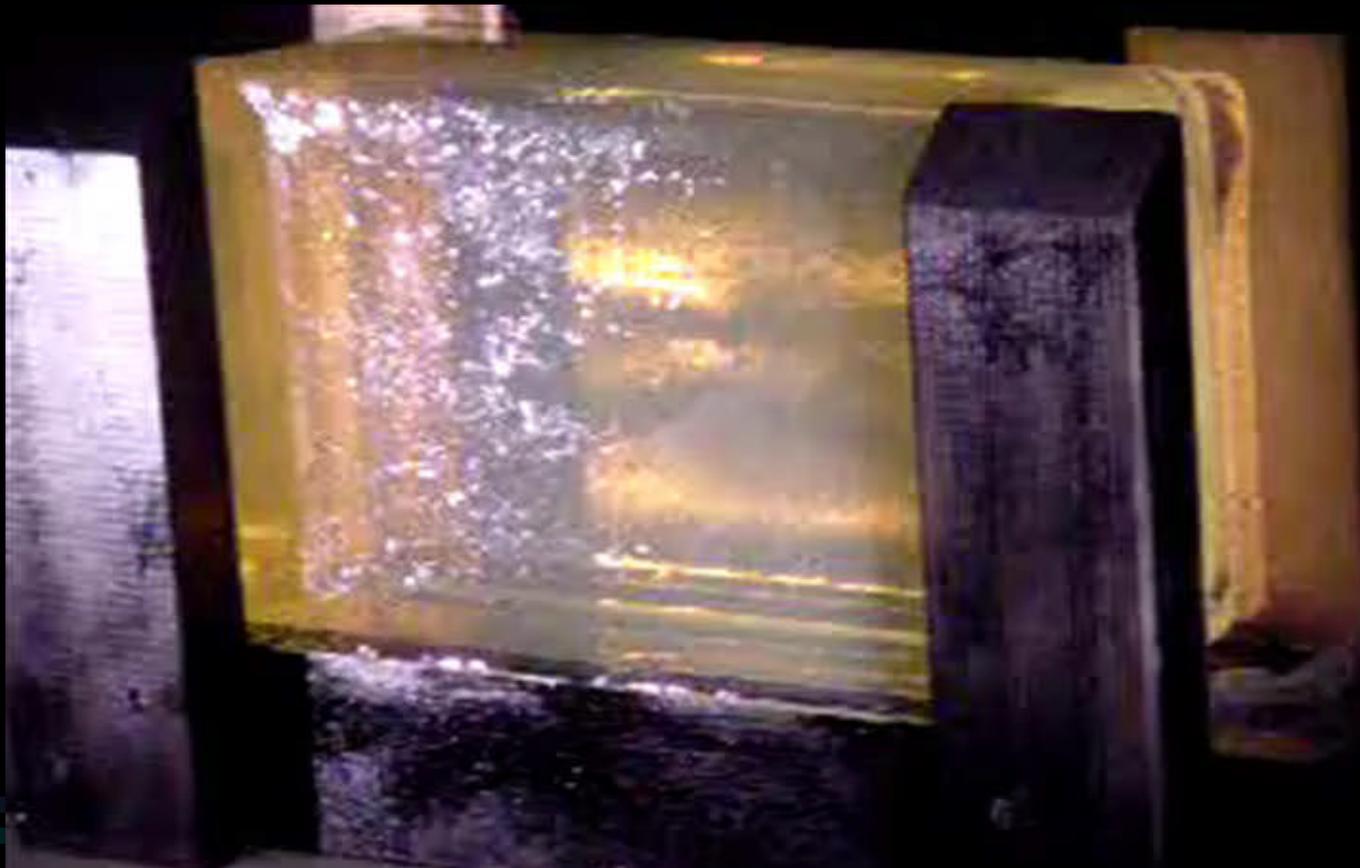
Video

- Ballistic Gelatin Impacts at 4 and 2 ft



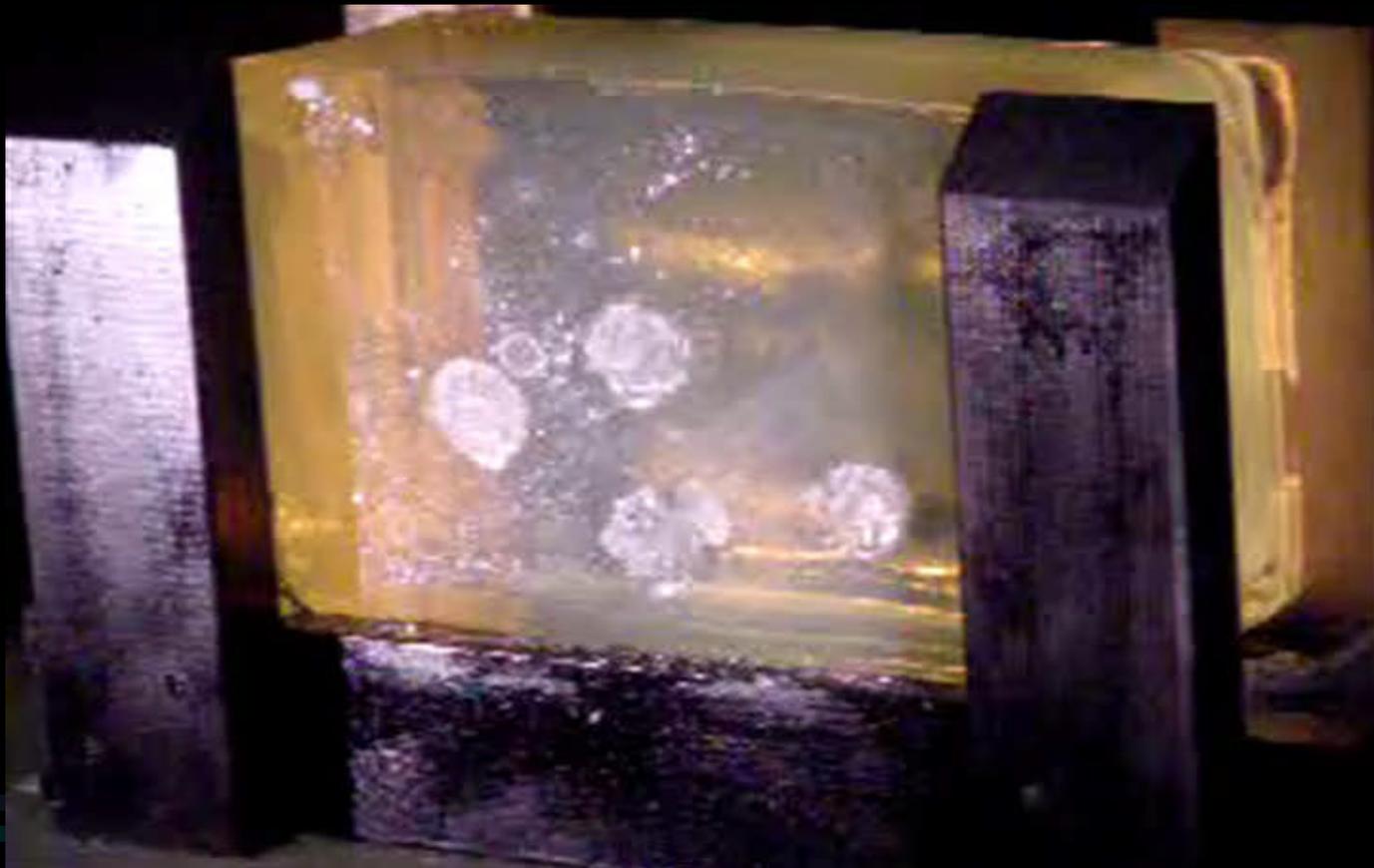
Video

- Ballistic Gelatin Impacts at 4 feet



Video

- Ballistic Gelatin Impacts at 2 feet



Standoff Distance 7 Feet



- Suspect was 5'8" 150 lbs non-compliant schizophrenic
- Suspect held hostage at knifepoint
- Suspect was wearing a thin shirt
- Incident justified lethal force

Standoff Distance 10 Feet



- Suspect was 5'6" 160 lbs non-compliant
- Suspect threatened officers with heavy object overhead
- Suspect was bare skinned
- Suspect submitted to officers

Standoff Distance 10 Feet



- Suspect was 5'9" 180 lbs non-compliant (methamphetamine and alcohol)
- Suspect sprayed officers in face with insecticide
- Suspect's arms were bare skinned
- Incident justified lethal force

Standoff Distance 12 Feet



- Suspect was 5'6" 160 lbs non-compliant
- Suspect was suicidal and still had knife
- Suspect was wearing a T-shirt and a Letterman's jacket

Standoff Distance 30 Feet



- Suspect was 5'0" 150 lbs non-compliant
- Suspect had just committed a rape and was physically combative
- Suspect was wearing a football jersey

Standoff Distance 30 Feet



- Suspect was 6'0" 160 lbs non-compliant
- Suspect was walking away from officers while slicing his wrist with a razor blade
- Unauthorized aimpoint
- Suspect was bare skinned

Recent LAPD Beanbag Cases Assessed

- Common Elements in forty cases reviewed
 - Suspects are non-compliant
 - Suspects pose threat to self, others or officers
 - 25% of cases OC or TASER were used first but were not effective
 - 25% of suspects were on drugs and/or alcohol
 - Only one incident resulted in minor injury to officers (insecticide spray)
 - No serious injuries to suspects

Questions?

- Details of study published in:

Wound Ballistics Review, Volume 4 Number 4, Fall 2000, "12 Gauge Beanbag Fatality Risk Investigation", MacPherson, D., Hudson, D., Maruoka, R.

Volume 34, No. 1, Winter 2002, AFTE Journal, Modeling Blunt Trauma from Projectile Impact, MacPherson, D.

- Details of this presentation to be submitted to Police Chief magazine in 2006