Ballistic Products, Inc.
12 Gauge, 20 Gauge and 410 Bore Shotgun Ammunition Terminal Performance
In March of 2014, Ballistic Products, Inc. completed the terminal ballistic testing of some of our shotshell products and the ultra slow motion recording of the interaction of the shot pellets with ballistic gelatin blocks. Given the technical acuity of our customer base and the need to provide results that are relatable to test data otherwise publically available, the test medium of ten percent ballistic gelatin was chosen for the testing. This media (10% concentration 250A porcine gelatin) is particularly suited for this task as it has been the domestic law enforcement and de facto commercial standard for three decades.

The ammunition tested during this test event is listed below:

<table>
<thead>
<tr>
<th>Gauge</th>
<th>Shell Length</th>
<th>Projectile</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>2.75</td>
<td>00 Buckshot</td>
</tr>
<tr>
<td>12</td>
<td>2.75</td>
<td>High Velocity Steel (BBB)</td>
</tr>
<tr>
<td>12</td>
<td>2.75</td>
<td>ITX-10 Duck #4</td>
</tr>
<tr>
<td>12</td>
<td>3.0</td>
<td>Nickel Plated Lead #5</td>
</tr>
<tr>
<td>12</td>
<td>2.75</td>
<td>1 ounce Thug Slug</td>
</tr>
<tr>
<td>12</td>
<td>3.0</td>
<td>ITX-13 Goose #2</td>
</tr>
<tr>
<td>20</td>
<td>2.75</td>
<td>7/8 ounce Thug Slug</td>
</tr>
<tr>
<td>410</td>
<td>2.5</td>
<td>125gr Thug Slug</td>
</tr>
</tbody>
</table>

The test site was configured as below:

With the ultra slow motion camera in use being the Photron SA-5 Color. Atmospheric conditions at the test site were 76°F and 80% relative humidity and took place on 04 April 2014.
## Results

### 12 gauge 00 Buckshot

<table>
<thead>
<tr>
<th>Shot Number</th>
<th>Impact Velocity (ft/sec)</th>
<th>Average Penetration Depth (inch)</th>
<th>Pellet Surface Area (in²)</th>
<th>Kinetic Energy Transfer up to 12” depth (ft-lbf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1325</td>
<td>14.0 +</td>
<td>0.770</td>
<td>1633</td>
</tr>
<tr>
<td>2</td>
<td>1382</td>
<td>14.0 +</td>
<td>0.770</td>
<td>1786</td>
</tr>
<tr>
<td>3</td>
<td>1314</td>
<td>17.1</td>
<td>0.770</td>
<td>1641</td>
</tr>
</tbody>
</table>

Penetration depth is the maximum straight-line distance traveled by the pellet into the gelatin block. Pellet surface area is conceptually the same as ‘expanded diameter’ for measuring hollowpoint expansion but the scientifically-relevant units of surface area are used in place of linear inches. KE Transfer up to 12” depth is a measure of the potential for causing damage up to and including the FBI required penetration depth for defensive ammunition.
12 gauge 00 Buckshot Kinetic Energy Transfer

12 Gauge Shotgun
Ballistic Products 00 Buckshot
Kinetic Energy Transfer - Penetration Depth (10% gelatin) All Pellets combined

12 Gauge Shotgun
Ballistic Products 00 Buckshot
Kinetic Energy Transfer - Penetration Depth (10% gelatin) Individual Pellet
12 gauge 00 Buckshot static gelatin pictures

Shot 1

Shot 2

Shot 3
NOTE: THESE ARE DESTRUCTIVE (ONE-TIME) TESTS AS OBSERVED UNDER LABORATORY CONDITIONS FOR THE PURPOSE OF OBSERVATION. NO LOAD DATA OR LOAD INSTRUCTION MAY BE EXTRACTED FROM THE TEST RESULTS AND IMAGES HEREIN. ANALYZING AND DOCUMENTING THE DESTRUCTIVE FAILURE MODE IS ACCOMPLISHED USING HIGH-SPEED VIDEO CAMERA RECORDING CONTINUOUSLY (MOVIE-LOOP) UNTIL THE IMPACT IS COMPLETED.
### 12 gauge High Velocity Steel

<table>
<thead>
<tr>
<th>Shot Number</th>
<th>Impact Velocity (ft/sec)</th>
<th>Average Penetration Depth (inch)</th>
<th>Pellet Surface Area (in²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1482</td>
<td>10.2</td>
<td>1.758</td>
</tr>
<tr>
<td>2</td>
<td>1405</td>
<td>10.5</td>
<td>1.758</td>
</tr>
<tr>
<td>3</td>
<td>1366</td>
<td>9.1</td>
<td>1.758</td>
</tr>
</tbody>
</table>
12 gauge High Velocity Steel Kinetic Energy Transfer

12 Gauge Shotgun
Ballistic Products High Velocity Steel
Kinetic Energy Transfer - Penetration Depth (10% gelatin) All Pellets combined

12 Gauge Shotgun
Ballistic Products High Velocity Steel
Kinetic Energy Transfer - Penetration Depth (10% gelatin) Individual Pellet
12 gauge High Velocity Steel static gelatin pictures

Shot 1

Shot 2

Shot 3
12 gauge High Velocity Steel Recovered Fragments

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### 12 gauge ITX-10 Duck #4

<table>
<thead>
<tr>
<th>Shot Number</th>
<th>Impact Velocity (ft/sec)</th>
<th>Average Penetration Depth (inch)</th>
<th>Pellet Surface Area (in²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1573</td>
<td>7.6</td>
<td>2.128</td>
</tr>
<tr>
<td>2</td>
<td>1530</td>
<td>7.5</td>
<td>2.128</td>
</tr>
<tr>
<td>3</td>
<td>1503</td>
<td>7.8</td>
<td>2.128</td>
</tr>
</tbody>
</table>
12 gauge ITX-10 Duck #4 Kinetic Energy Transfer

12 Gauge Shotgun
Ballistic Products ITX-10 #4 Duck
Kinetic Energy Transfer - Penetration Depth (10% gelatin) All Pellets combined

12 Gauge Shotgun
Ballistic Products ITX-10 #4 Duck
Kinetic Energy Transfer - Penetration Depth (10% gelatin) Individual Pellet
12 gauge ITX-10 Duck #4 static gelatin pictures

Shot 1

Shot 2

Shot 3
12 gauge ITX-10 Duck #4 Recovered Fragments

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OBSERVATION. NO LOAD DATA OR LOAD INSTRUCTION MAY BE EXTRACTED FROM THE TEST RESULTS AND IMAGES HEREIN.
ANALYZING AND DOCUMENTING THE DESTRUCTIVE FAILURE MODE IS ACCOMPLISHED USING HIGH-SPEED VIDEO CAMERA
RECORDING CONTINUOUSLY (MOVIE-LOOP) UNTIL THE IMPACT IS COMPLETED.
12 gauge Nickel Plated Lead #5

<table>
<thead>
<tr>
<th>Shot Number</th>
<th>Impact Velocity (ft/sec)</th>
<th>Average Penetration Depth (inch)</th>
<th>Pellet Surface Area (in²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1501</td>
<td>8.0</td>
<td>2.28</td>
</tr>
<tr>
<td>2</td>
<td>1471</td>
<td>8.2</td>
<td>2.28</td>
</tr>
<tr>
<td>3</td>
<td>1476</td>
<td>8.1</td>
<td>2.28</td>
</tr>
</tbody>
</table>
12 gauge Nickel Plated Lead #5 Kinetic Energy Transfer

12 Gauge Shotgun
Ballistic Products Nickel Plated Pheasant #5 Kinetic Energy Transfer - Penetration Depth (10% gelatin) All Pellets combined

12 Gauge Shotgun
Ballistic Products Nickel Plated Pheasant #5 Kinetic Energy Transfer - Penetration Depth (10% gelatin) Individual Pellet
12 gauge Nickel Plated Lead #5 static gelatin pictures

Shot 1

Shot 2

Shot 3
12 gauge Nickel Plated Lead #5 Recovered Fragments

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### 12 gauge 1 ounce Thug Slug

<table>
<thead>
<tr>
<th>Shot Number</th>
<th>Impact Velocity (ft/sec)</th>
<th>Average Penetration Depth (inch)</th>
<th>Pellet Surface Area (in²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1521</td>
<td>8.4</td>
<td>EST 1.761</td>
</tr>
<tr>
<td>2</td>
<td>1536</td>
<td>8.4</td>
<td>EST 1.761</td>
</tr>
<tr>
<td>3</td>
<td>1598</td>
<td>9.8</td>
<td>EST 1.761</td>
</tr>
</tbody>
</table>
12 gauge 1 ounce Thug Slug Kinetic Energy Transfer

[Graph showing 12 Gauge Shotgun Ballistic Products 1 ounce Thug Slug Kinetic Energy Transfer - Penetration Depth (10% gelatin) All Pellets combined]

[Graph showing 12 Gauge Shotgun Ballistic Products 1 ounce Thug Slug Kinetic Energy Transfer - Penetration Depth (10% gelatin) Individual Pellet]
12 gauge 1 ounce Thug Slug static gelatin pictures

Shot 1

Shot 2

Shot 3
12 gauge 1 ounce Thug Slug Recovered Fragments

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### 12 gauge ITX-13 Goose #2

<table>
<thead>
<tr>
<th>Shot Number</th>
<th>Impact Velocity (ft/sec)</th>
<th>Average Penetration Depth (inch)</th>
<th>Pellet Surface Area (in²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1250</td>
<td>10.0</td>
<td>1.900</td>
</tr>
<tr>
<td>2</td>
<td>1402</td>
<td>10.3</td>
<td>1.900</td>
</tr>
<tr>
<td>3</td>
<td>1219</td>
<td>9.5</td>
<td>1.900</td>
</tr>
</tbody>
</table>
12 gauge ITX-13 Goose #2 Kinetic Energy Transfer

12 Gauge Shotgun
Ballistic Products ITX-13 #2 Goose load
Kinetic Energy Transfer - Penetration Depth (10% gelatin) All Pellets combined

12 Gauge Shotgun
Ballistic Products ITX-13 #2 Goose load
Kinetic Energy Transfer - Penetration Depth (10% gelatin) Individual Pellet
12 gauge ITX-13 Goose #2 static gelatin pictures

Shot 1

Shot 2

Shot 3
12 gauge ITX-13 Goose #2 Recovered Fragments

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### 20 gauge 7/8 ounce Thug Slug

<table>
<thead>
<tr>
<th>Shot Number</th>
<th>Impact Velocity (ft/sec)</th>
<th>Average Penetration Depth (inch)</th>
<th>Pellet Surface Area (in²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1398</td>
<td>10.0</td>
<td>EST 1.311</td>
</tr>
<tr>
<td>2</td>
<td>1440</td>
<td>8.9</td>
<td>EST 1.311</td>
</tr>
<tr>
<td>3</td>
<td>1412</td>
<td>11.0</td>
<td>EST 1.311</td>
</tr>
</tbody>
</table>
20 gauge 7/8 ounce Thug Slug Kinetic Energy Transfer

20 Gauge Shotgun
Ballistic Products 7/8 ounce Thug Slug
Kinetic Energy Transfer - Penetration Depth (10% gelatin) All Pellets combined

20 Gauge Shotgun
Ballistic Products 7/8 ounce Thug Slug
Kinetic Energy Transfer - Penetration Depth (10% gelatin) Individual Pellet
20 gauge 7/8 ounce Thug Slug static gelatin pictures

Shot 1

Shot 2

Shot 3
20 gauge 7/8 ounce Thug Slug Recovered Fragments

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### 410 Bore 125gr Thug Slug

<table>
<thead>
<tr>
<th>Shot Number</th>
<th>Impact Velocity (ft/sec)</th>
<th>Average Penetration Depth (inch)</th>
<th>Pellet Surface Area (in²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1518</td>
<td>4.8</td>
<td>EST 0.105</td>
</tr>
<tr>
<td>2</td>
<td>1660</td>
<td>5.3</td>
<td>EST 0.105</td>
</tr>
<tr>
<td>3</td>
<td>1577</td>
<td>5.2</td>
<td>EST 0.105</td>
</tr>
</tbody>
</table>
410 Bore 125gr Thug Slug Kinetic Energy Transfer

410 Bore Shotgun
Ballistic Products 125gr Thug Slug
Kinetic Energy Transfer - Penetration Depth (10% gelatin) All Pellets combined

Kinetic Energy Transfer (ft-lbf)
Penetration Depth (inch)

410 Bore Shotgun
Ballistic Products 125gr Thug Slug
Kinetic Energy Transfer - Penetration Depth (10% gelatin) Individual Pellet

Kinetic Energy Transfer (ft-lbf)
Penetration Depth (inch)
410 Bore 125gr Thug Slug static gelatin pictures

Shot 1

Shot 2

Shot 3
NOTE: THESE ARE DESTRUCTIVE (ONE-TIME) TESTS AS OBSERVED UNDER LABORATORY CONDITIONS FOR THE PURPOSE OF OBSERVATION. NO LOAD DATA OR LOAD INSTRUCTION MAY BE EXTRACTED FROM THE TEST RESULTS AND IMAGES HEREIN. ANALYZING AND DOCUMENTING THE DESTRUCTIVE FAILURE MODE IS ACCOMPLISHED USING HIGH-SPEED VIDEO CAMERA RECORDING CONTINUOUSLY (MOVIE-LOOP) UNTIL THE IMPACT IS COMPLETED.