

Load Velocity Data

Mehmet Arslan

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The following load velocity data was from the most recent range trip, 5/24/2021. The weather conditions were identical throughout the day, albeit with some headwinds and increasing temperatures. Weather conditions, and the equipment used to gather these data are as follows:

- Weather: $72^{\circ}F$
- Humidity: 74%
- Pressure: 30.26*inHg*.
- Barrel: 20*in*. LaRue Stealth Barrel.
- Magazine: Magpul PMAG 20*rnd*. magazine.
- BCG: PSA Premium BCG.

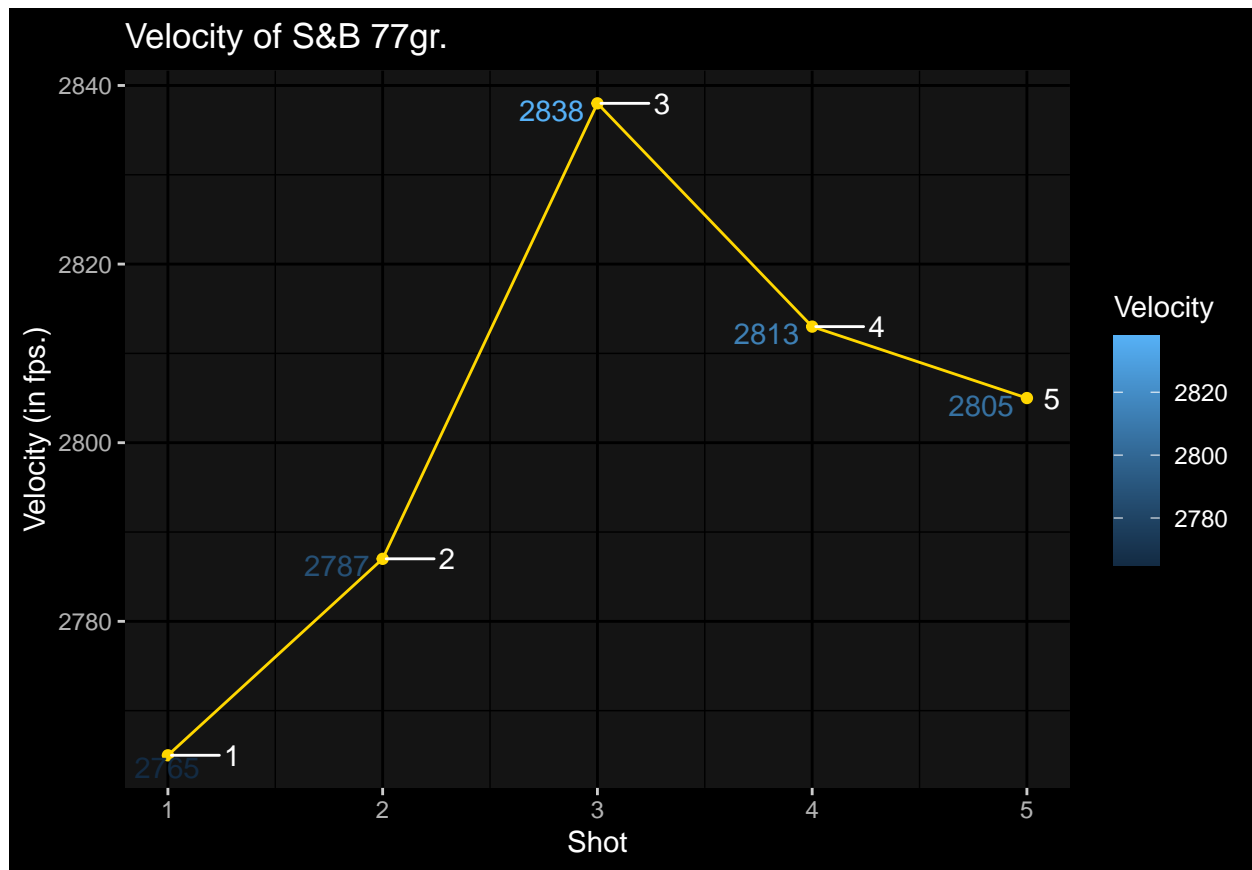
```
library(readr)
library(dplyr)
library(ggplot2)
library(ggdark)
library(ggrepel)
```

Sellier & Bellot 5.56mm 77gr. HPBT Projectiles

- BATCH: Unknown/Unable to tell
- DATE: 03/21
- LOT: 2888

```
sb_77 = read_csv("sellier & bellot 77 grain load data.csv")

sb_77 %>% ggplot(aes(Shot, Velocity)) +
  geom_point(color = "gold") +
  geom_line(color = "gold") +
  geom_text_repel(aes(label = Velocity, col = Velocity), nudge_y = -0.70, nudge_x = -0.2) +
  geom_text_repel(aes(label = Shot), nudge_x = 0.3, color = "white") +
  labs(title = "Velocity of S&B 77gr. ", y = "Velocity (in fps.)", x = "Shot") +
  dark_theme_gray()
```



```
summary(sb_77)
```

```
##      Shot      Velocity
##  Min.   :1      Min.   :2765
## 1st Qu.:2      1st Qu.:2787
##  Median:3      Median :2805
##   Mean :3      Mean   :2802
## 3rd Qu.:4      3rd Qu.:2813
##   Max. :5      Max.   :2838
```

*#The variance is so small, in terms of raw numbers, that R can not display them properly.
#As such, I will calculate the variance manually using the fastest and lowest velocities.*

```
(variance_sb77 = 2838-2765) #this readout is in fps.
```

```
## [1] 73
```

I found the easiest way to read the data more effectively. I flipped the axes to make the connections between shot numbers and velocity a little more apparent. This was also the missing link in the Saterlee Method. From the readouts above using the summary function, I noticed that the velocities ranged from 2765fps. – 2838fps. with mean velocity being 2802fps. Max variation between this particular load is 73fps. Too little raw data was collected to make more meaningful results.

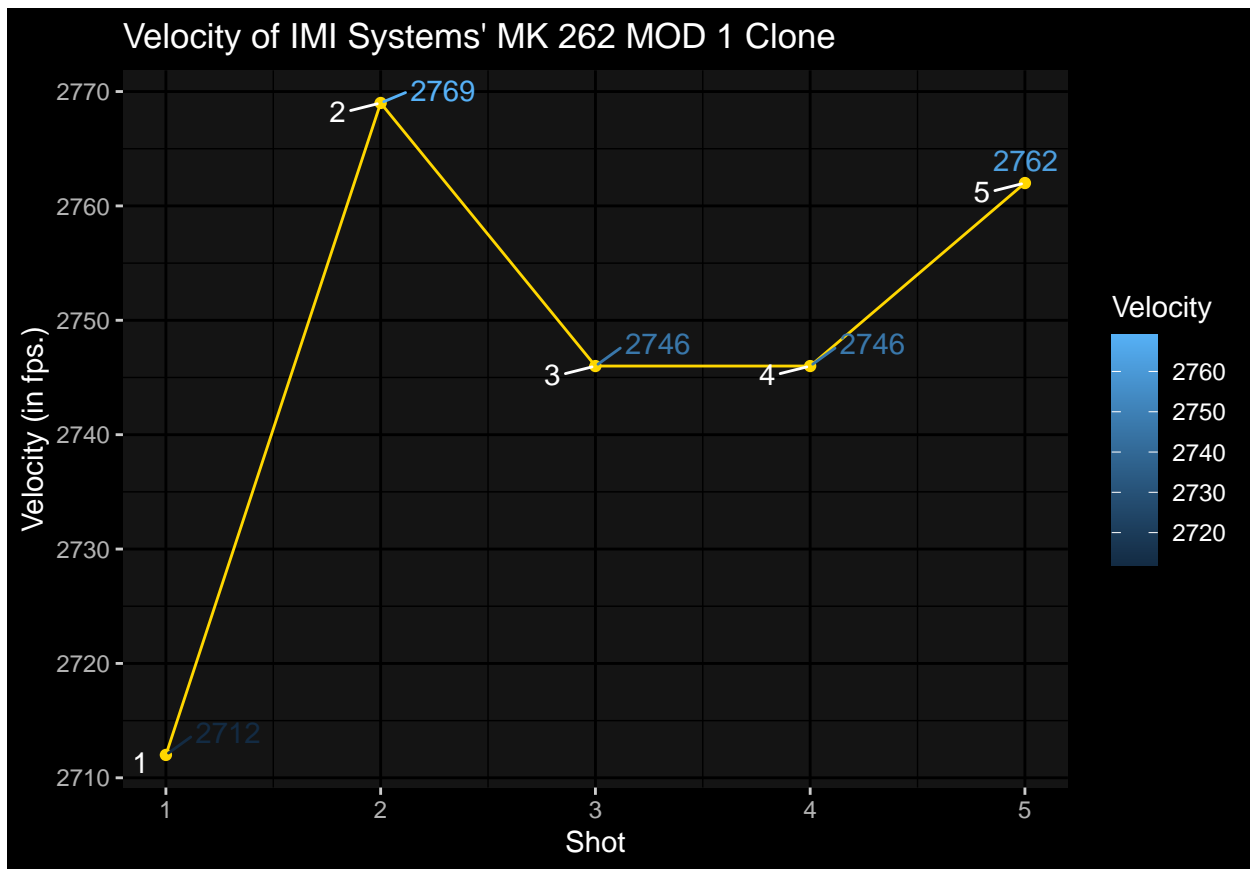
NOTE: This might have been the result of an ice cold bore.

IMI Systems MK 262 MOD 1 Clone

- BATCH: Unknown/Unable to tell.
- DATE: Unknown/Unable to tell.
- LOT: 00234/B.

```
MK_262_clone = read_csv("IMI systems MK 262 MOD 1 clone data.csv")
```

```
MK_262_clone %>% ggplot(aes(x = Shot, y = Velocity)) +  
  geom_point(color = "gold") +  
  geom_line(color = "gold") +  
  geom_text_repel(aes(label = Velocity, col = Velocity), nudge_y = 1.99, nudge_x = 0.29) +  
  geom_text_repel(aes(label = Shot), color = "white", nudge_y = -0.7, nudge_x = -0.2) +  
  labs(title = "Velocity of IMI Systems' MK 262 MOD 1 Clone", x = "Shot",  
        y = "Velocity (in fps.)") +  
  dark_theme_gray()
```



```
summary(MK_262_clone)
```

```
##      Shot      Velocity  
##  Min.    :1  Min.    :2712  
## 1st Qu.:2  1st Qu.:2746  
## Median :3  Median :2746  
## Mean   :3  Mean   :2747  
## 3rd Qu.:4  3rd Qu.:2762  
## Max.   :5  Max.   :2769
```

```
(variance_MK_262 = 2769-2712) #this readout is in fps.
```

```
## [1] 57
```

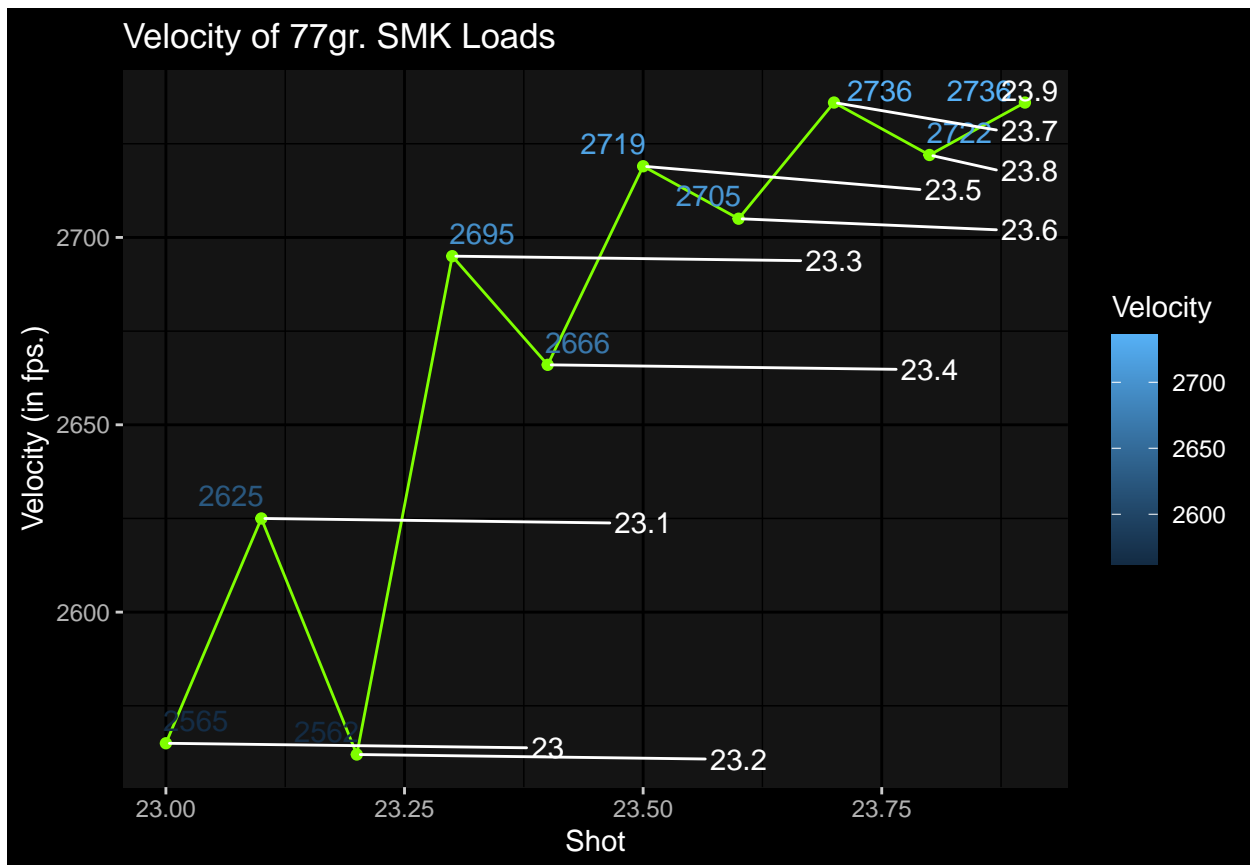
77gr. SMK Loads Utilizing the Saterlee Method

- BATCH: 1
- DATE: 05/20/21
- LOT: Unknown/unable to tell.
- Powder Charge: Varying from 23.1gr. to 24.0gr.

```
SMK_77 = read_csv("SMK 77gr Loads.csv")
```

```
names(SMK_77) = c("Shot", "Velocity")
```

```
SMK_77 %>% ggplot(aes(x = Shot, y = Velocity)) +  
  geom_point(color = "chartreuse") +  
  geom_line(color = "chartreuse") +  
  geom_text_repel(aes(label = Velocity, col = Velocity), nudge_y = 0.6) +  
  geom_text_repel(aes(label = Shot), nudge_x = 0.4, nudge_y = -1.20) +  
  labs(title = "Velocity of 77gr. SMK Loads", x = "Shot",  
        y = "Velocity (in fps.)") +  
  dark_theme_gray()
```



```
summary(SMK_77) #velocity readouts are all in fps.
```

##	Shot	Velocity
##	Min. :23.00	Min. :2562
##	1st Qu.:23.23	1st Qu.:2635
##	Median :23.45	Median :2700
##	Mean :23.45	Mean :2673
##	3rd Qu.:23.68	3rd Qu.:2721
##	Max. :23.90	Max. :2736

Loads 8, 9, and 10, performed tremendously well out of the LaRue Tactical 20" Stealth barrel. My recommendation is to use load powder charge data for shot 8 as it is abundantly clear that shot 9 is a fluke. Furthermore, we can clearly see that the Saterlee Method is working its proverbial magic!