



## MAX Cylinder and barrel length

1. Why all models of MAX use the cylinder unit for M4-A1?
2. Why MAX-A2 / A3 uses the inner barrel for M4-A1?

We would like to answer above questions;

We position MAX as “P.T.W. base custom gun”, which is put a high priority on the initial rate.

We had a custom gun called SYSTEMA COMPLETE CUSTOM in the past, which was made based on the other company’s product.

PTW is the electric gun which is created by our original idea and technology, so it is natural that the potential of P.T.W. is better than COMPLETE because it is not unconstrained by the other’s design.

So, we just express a part of ability of the P.T.W. in the form of “MAX”.

At the time of debut, there were many negative comments - “ P.T.W. is mechanically fragile, because it’s size is same with the real gun”, “since the cylinder capacity of the real gun size P.T.W. is smaller than traditional products, it does not have enough power” and so on.

The electric gun drives DC motor with NiCd battery and converts rotary motion into linear motion through decelerating mechanism.

In the next stage, piston is moved forward by the returning power of the spring, and BB bullet is shot by the compressed air – its energy conversion is inefficient.

Our starting point of idea for new structure and mechanism is “efficiency” and the way to pursuit it is “rationality”.

So, there is no reason that bigger gearbox is stronger, and it is not necessary to indicate durability considering only the bigness.

Obviously, since it is same for cylinder capacity, if the bore is large, unnecessary resistance is added to back and force movement, and if the stroke is longer, it is waste of electricity.

High efficiency does not come from irrational design.

As we wrote before, we process the receiver of P.T.W. with the highest measurement management technology.

Nonetheless, accumulation of tolerances of all components makes individual difference of performance.

So, it is necessary to adjust certain part carefully one by one – the set size of cylinder unit.

We have two ways to set cylinder into the body, A2/A3 and M4-A1. Since M4-A1 is better way to adjust this part, we are going to unify the way for all products including MAX.

The point is that cylinder capacity is decided to suit its purpose and the purpose of setting method is to reduce difference of performance with shim adjustment.

Regarding the length of inner barrel, opinion is divided – our remark for P.T.W. MAX is as follows;

For the purpose of MAX power, M4 size is more powerful.  
We choose it in accordance with the fact. No other reason.

Then, why does the shorter barrel have more power?

We assume as follows;

We can explain the relationship between the inside of barrel and BB bullets moving at high speed inside the barrel by replacing it to the relationship between piston and cylinder.

That is, in front of BB bullet which is accelerating inside the barrel, there is air space of which pressure is more than that of air, and in back of BB bullet, there is air space of which pressure is less than that of air (negative pressure) by rapid movement of the BB bullet.

This negative pressure is balanced out by the pressure from cylinder which shoots out the BB bullet. However, if the BB bullet is not shot out from the barrel for some reasons that cylinder capacity is small, speed of piston is slow and so on, it rapidly changes to the power of pulling the BB bullet.

So, in shorter barrel, since it is more likely to shoot out before getting the influence of negative pressure, it may be able to get faster acceleration.

Also, this can be easily occurred in P.T.W.

In addition to P.T.W.'s rigidity, since the size of each air duct is precisely managed, there is little space to contact with air from the inside of cylinder to the end of nozzle. This creates the environment, which easily cause the pressure difference due to the acceleration of BB bullets

We are currently studying which barrel length is the most effective to get the fastest initial rate for MAX.

When we produced SYSTEMA parts, we prepared various barrel lengths by 10mm and tested repeatedly with various cylinders and springs.

Hopefully, we will inform you the latest result soon.

The electronic gun is the machine which moves with relatively less energy than the real gun. So, very little things make big differences.

We are always fascinated with seeking the little “reasons”.

177-0032 東京都練馬区谷原 2-8-3

TEL 03-3997-8544 FAX 03-3997-8900

**SYSTEMA Co.**

<http://www.systema-engineering.com>