International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 06 | June 2019 www.irjet.net p-ISSN: 2395-0072

Design and Development of 40mm Automatic Gun Dispensing Machine

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Abstract - *Indian Armed forces is one of the pivotal backbone of the nation and with the motto of "Service to Services" Armament Research and Development Establishment (ARDE) has played a major role in maintaining and development of armaments with enhancement of range, lethality and precision. 30mm AGS is Russian made grenade launcher developed in 1995 and is used by India as a security weapon. But with the increase in technology and advancement in ammunition system this 30mm gun do not outright the performance so we designed a 40mm dual barrel AGS which is more capable, has better performance in terms of range. Grenade used is 40mm in size thus has a better explosive carrying capacity than earlier. With the development of 40mm AGS there would be significant additional impact on security due to up gradation from 30mm single barrel AGS to 40 mm twin barrel AGS*

1. INTRODUCTION

The 40mm AGS is designed to engage enemy manpower and their weapons in the ground battlefield of any terrain. It is light weighted, medium sized which can be easily be carried by soldiers with the tripod mount. A considerable field of fire allows the AGS to engage the fleeting targets. The 40mm AGS is twin barrel machine thus has wider and better range of 400m in length to 300m in breath and it has better explosive carrying capacity than 30mm AGS. The twin barrel AGS operates on basic principle of backflow of thrust after the ejection of grenade from other barrel. As the both barrel mounted at angle the tuning of ejection is done in such a way to accommodate ease of use and operation. The ammunition box used are two in number consisting 5 grenade in each box and are mounted on separate ejection path thus after a single triggering operation the 10 grenade firing is done automatically. The 40mm AGS has 20 percent less critical components components as compared to 30mm AGS because of variation in firing, ejection and shell removing mechanisms. But as this is twin barrel there is very small increment in weight of machine due to addition of an extra barrel but the performance it achieves does outmatch to the 30mm AGS.

1.1 Twin barrel assembly

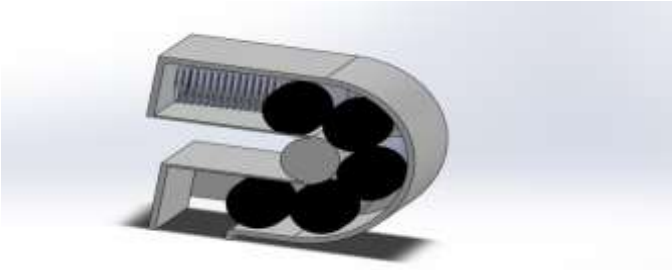
The maximum pressure acting is 240 MPA which is provided by ARDE, Pune .Using maximum pressure wall ratio is calculated then using wall ratio inside and outside diameter of barrel is calculated. The material best suited for this purpose from the reference of MIDHANI were VAR95 steel and J1150 alloy steel which has high thermal strength and low susceptibility for hydrogen embroilment.

Helix angle was introduced inside barrel to give required spinning action to grenade to achieve expected projectile. To achieve muzzle velocity of 86.86 m/s the length of barrel calculated as300mm with six grooves.

Twin barrel were mounted at the angle of 12 degree from the centre axis of shell ejection mechanism. The operation of grenade feeding and triggering is collinear with the axis of barrel to make sure grenade follows the required restricted path of operation.

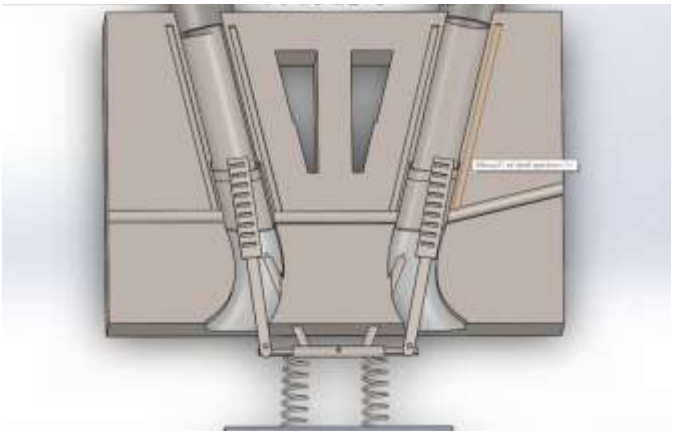
1.2 Feeding Mechanism

The vital operation in AGS 40 initiates with operation of grenades feeding in the assembly. The ammunition box was designed which accommodate 5 grenade in each box. The feeding mechanism is carried out automatically because grenades are mounted under the spring tension and it operates under the principle of gravitational pull .To make sure that automatic loading and firing to be carried out of grenade in a specified interval stopper is designed to engage and disengage the feeding.



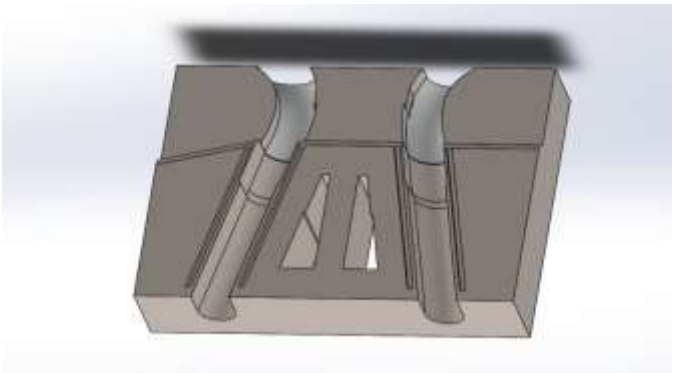
1.3 Firing (Triggering mechanism)

After the feeding of the grenade it need to triggered which is facilitated by lever operated triggering mechanism. As soon as the lever is actuated the automatic triggering takes place alternatively for twin barrel setup. When a grenade is fired out another round of firing is done alternatively to backpressure thrust of initial ejection. The force generated in another side need to be damped in order to reduce vibrations and shock so that operation of machine is under control. To serve this purpose two helical string of calculated stiffness and strength is accommodated in the assembly.



1.4 Shell ejection mechanism

A 40mm grenade consist of explosive carrying capacity in it and once the grenade is fired from assembly the cover of the grenade need to be removed so that operation is carried out seamlessly. To remove the shell automatically just after the firing the grenade it is guided in a predesigned path of ejection. The other purpose of the path is to reduce the pressure generated by expanding the area inside the shell ejection box.



3. CONCLUSION

Hence the design and development of AGS 40mm with reference to 30mm AGS is carried out and with the introduction of new invented mechanism such as twin barrel, shell ejection, feeding mechanism and automatic firing mechanism the performance characteristics of machine is enhanced thus it is now more capable, advanced, easy to operate, better firing range with maximum mechanical feasibility . “The best efforts you add to design the weapon the minimum blood u shed in the battlefield” giving justice to this quote the development of AGS 40mm is done to insure better performance.

ACKNOWLEDGEMENT

We would like express the gratitude to our college guide Prof S.B Patil for encouraging us to work on this particular topic under his valuable guidance through tout the project.

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