GAU-19/A Barrel Life Study

Agenda

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- Barrel Design Parameters
- Customer Background
- Barrels Used in the Study
- Barrel Inspection & Results
- Barrel Testing & Results
- Conclusion
GAU-19/A Barrel Life Study

GAU-19/A Description

- Three-barrel 12.7mm externally powered Gatling gun
- Provides lightweight, lethal firepower to a variety of platforms:
  - Helicopters
  - Ground vehicles
  - Naval vessels
  - High speed patrol boats
  - Fixed Wing Aircraft
GAU-19/A Barrel Life Study
GAU-19/A Description
### GAU-19/A Barrel Life Study

### GAU-19/A Description

- **Rate of Fire**: 1000/2000 spm (1,300 spm HMMWV)
- **Effective Range**: 1800 Meters
- **Maximum Range**: 6000 Meters
- **Max Dispersion**: 5 mrads (80 % circle) = 5m at 1000m
- **Weight**: 138 Lbs (gun & feeder assembly)
- **Reliability**: 40,000 MRBF
- **Average Recoil**: 600 Lbs at 2000 SPM
- **Maintenance**: 30,000 rds.
- **Barrel replacement**: 50,000 rds. per set
- **Sighting**: Holographic, NVG compatible, Laser Pointer
- **Uses entire range of .50 cal NATO / Mil Spec ammunition**
GAU-19/A Barrel Life Study
Initial Barrel Design Parameters

- Crack Propagation Program utilized for barrel analysis
- Each barrel set must be capable of firing out a complete ammunition container load
- Target life expectancy of 35000 rounds per set used in analysis program
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Barrel Physical Description

- Mat'l: CrMoV steel per A10505
- Bore: Chrome plated per A10374
- Exterior Finish: Solid Film Lubricant 119A2115
- 12.69 mm bore/12.98 mm groove diameter
- 8 land rifling: right-hand constant twist 1 turn in 30 calibers
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Customer Background
GAU-19/A Barrel Life Study

Barrels Used in Study

- Barrel sets from customers with 35,000 to 54,000 rounds
  - Typical firing cycles of 50 to 100 rounds
  - API ammunition
- Barrel set from GDATP with 50,000 rounds
  - Ten 800 round bursts with all others at 200 to 400 rounds
  - M33 Ball and M17 Tracer, 4:1
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Parameters Measured

- Inspection
  - Erosion
    - Indicator of velocity reduction
  - Crack Depth
    - Indicator of rounds to failure
- Test
  - Velocity
    - Indicator of barrel performance and resultant targeting
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Parameters Measured – Barrel Erosion

Barrel Serial#1000003
50,000-rds. per set

Washout area from 800-rds. fireout bursts. More severe than other two barrel samples that were used by customer in combat and practice.
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Parameters Measured – Barrel Erosion

Bore Erosion .50 cal barrels

Distance from muzzle (in)

Gage reading

54 k Rounds per set
48 k Rounds per set
43 k Rounds per set
35 k Rounds per set
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Parameters Measured – Crack Propagation

1000273
53000-rds per cluster
Cut plane @ 4.4 “
Crack depth .020 “
GAU-19/A Barrel Life Study
Parameters Measured – Crack Propagation

.50 Cal. Barrel Life Analysis

- Barrel 3 .0118 initial crack
- Columbian barrel .006 initial crack
- Lil Bird barrel .004 initial crack

Rounds fired per barrel set vs. Crack depth (inches)
# GAU-19/A Barrel Life Study

**Parameters Measured - Velocity**

<table>
<thead>
<tr>
<th>ROUNDS AS RECEIVED</th>
<th>VELOCITY (ft./sec.)</th>
<th>YAW RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(per barrel cluster)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4000</td>
<td>2800</td>
<td>No yaw</td>
</tr>
<tr>
<td>43250</td>
<td>2680</td>
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<td>2655</td>
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<tr>
<td>48405</td>
<td>2565</td>
<td>Two minor yaws, tracer only</td>
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<tr>
<td>53000</td>
<td>2210</td>
<td>Yaw present, tracer only</td>
</tr>
<tr>
<td>54000</td>
<td>2150</td>
<td>Yaw present, tracer only</td>
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</tbody>
</table>
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Conclusion

- At approximately 50,000 rounds
  - Significant velocity change
  - Yawing begins to occur in tracers affecting targeting
  - No danger of crack propagation causing failure

- BARREL REPLACEMENT PER ROUNDS FIRED CAN BE INCREASED FROM 35000 TO 50000 ROUNDS PER SET