



E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED

WILMINGTON, DELAWARE 19898

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ENGINEERING DEPARTMENT
LOUVIERS BUILDING

August 24, 1981

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REMINGTON ARMS COMPANY, INCORPORATED - ILION
MAINTENANCE ENGINEERING - LUBRICATION OF RIFLES

Scope of Work

Remington Arms Company is interested in developing a cleaning and lubrication procedure for the Model 700 Fire Control that can be included in the rifles instruction manual. It is intended that the cleaning and lubrication procedure be done without disassembly from the receiver and the products used should not gum up the close tolerances of the mechanism. The products selected should also be readily available on a nationwide basis, be non-flammable and non-toxic, as well as operate from -20°F to 120°F.

An evaluation program was conducted that consisted of a preliminary review of all potential cleaning and lubrication candidates within the proposed guidelines. Selected products were screened for rust removal, rust prevention, grease displacement, water displacement, cleaning capability, and appearance on metal and wood parts of the firearm. Details of the products tested, description of the tests and test results are included in the attachments of this report.

John W. Brooks
August 24, 1981

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Test Results

Over 40 different products were considered in the initial screening phase of this program. The number was reduced to 25 for physical properties and performance evaluations. This number was further reduced to 5 candidates as follows:

1. Du Pont - Synthetic Diester
2. Krylon Ten-4
3. Sprayon 711*
4. CRC 3-36*
5. Houghton HLP

* Included in the attachment for Sprayon 711 and CRC 3-36 are the results of extensive firearms tests conducted by various military and police protection agencies.

Recommendations

The products listed above meet all of the basic requirements for a firearms cleaning and lubricating agent. It is now recommended that Remington Arms proceed with field tests as well as dry firing test in a hot and cold environment.

ENGINEERING SERVICE DIVISION

A. B. Hughes *3/6/81*

A. B. Hughes, Senior Consultant
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ABH/pld
Attachment

Attachments

1. Recommended Products for Further Testing
2. Index of Products Tested
3. Description of Tests
4. Test Results of Products #1-25
5. Product Description and Safety Data Sheets

RECOMMENDED PRODUCTS
FOR FURTHER TESTING

Du Pont Diester	Excellent rust removal and protection. Good cleaning and water displacement. High Falex load rating (lubricant).
Krylon Ten-4	Excellent rust removal and protection. Good cleaning and water displacement. Good degreaser.
Sprayon 711	Good rust removal and protection. Very good cleaning and water displacement. Excellent firearms reports.
CRC 3-36	Good rust removal and protection. Very good cleaning and water displacement. Excellent firearms reports.
Houghton HLP	Good rust removal and protection. Cleaning and water displacement Limited by aerosol container used.

INDEX OF PRODUCTS

1. Keystone - Penetrating Oil #1
2. Keystone - Penetrating Oil #2
3. Crown - All 4
4. Crown - Silicone Lubricant 8034
5. Sprayway RD90
6. Sprayway - Hoil Penetrating Oil #960
7. Molykote - Pene Lube
8. Molykote - #557 Lubricant
9. Molykote - Metal Protector
10. Seymour - HD 5 Way
11. E. F. Houghton - HLP All Purpose
12. E. F. Houghton - Solvent Degreaser
13. Krylon - Tan 4
14. Sprayon #711 Penetrant/Lube/Demoisturize
15. CRC - 3-36
16. McLube 1725 Fluorocarbon Coating
17. McLube 1775 Fluorocarbon Coating
18. McLube 710 Solvent
19. Du Pont - Synthetic Diester - 10%
20. Du Pont - Synthetic Diester - 20%
21. WD-40
22. Tenneco - Anderol Gun Oil - Synthetic
23. Steel Guard
24. Hoppe Gun Oil
25. Outers Gun Oil

DESCRIPTION OF TESTS

1. Odor

Comments are made concerning the general impression of the odor when first applied and after about 5 minutes.

2. Feel

The lubricant was applied freely to the fingers and a judgment was made as to the product feel after the propellant had dispersed.

3. Drying Rate

The product was applied to a clean metal surface and the drying rate estimated for the first 10 minutes.

4. Penetration

A single drop of product was applied to a special lubricant white blotting paper. The rate of absorption, size of final diameter and stain appearance was noted.

5. Surface Wetting

A single drop of product was applied to a clean polished metal aluminum surface. The wetting and cleanup properties were noted.

6. Grease Displacement

A thin layer of grease was applied to a clean metal surface, then a single drop of lubricant was applied. The dissolving rate and cleanup properties were noted.

7. Container

The type of product container is noted.

8. Liquid Appearance

The appearance of a puddle of liquid in a watch glass was noted.

9. Wood - Open Pore

The product was applied to the surface of an unprotected section of walnut and the reaction noted.

10. Metal Surface

The product was applied to a freshly polished steel surface and observed up to 24 hours.

11. Rust Removal

The product was applied to a well rusted steel surface. The surface was lightly wire brushed after 10 minutes and the results noted.

12. Displaced Moisture

A solvent cleaned trigger assembly was wetted by dipping into water. The product was then applied and the assembly examined for residual water. Water droplets were then applied to the surface to observe rewetability.

13. Displace Solids

A solvent cleaned trigger assembly was coated with a wet flour paste. The product was applied and the assembly observed for residual flour.

14. Gun Barrel

The product was applied to the surface of a gun barrel, then wiped with a dry cloth. The feel and appearance of the metal surface was noted.

15. Wood Stock

The product was applied to the surface of a gun wood stock, then wiped with a dry cloth. The feel and appearance of the wood surface was noted.

16. Rust Prevention

The product was applied to a freshly machine steel surface and also a recessed hole. The surface was wetted every 24 hours and the rate of rust buildup noted.

Rating - Free of Rust After:

- 1 - 1 Day
- 3 - 3 Days
- 5 - 5 Days
- 7 - 1 Week
- 8 - 2 Weeks
- 9 - 3 Weeks

17. Reason For Elimination

Product properties and test results were analyzed for acceptability for use as a firearms cleaning and rust preventive agent. Reason for elimination from further testing is noted.

Test # 1

Product: Keystone - Penetrating Oil #1

Function: Dissolves rust, loosen rusted parts
Displace gums, moisture, dirt and lubricates

Evaluation Notes

1. Odor: Pleasant peppermint smell - lasting
2. Feel: Very mild oily feel
3. Drying Rate: No solvents, very slow drying
4. Penetration: Rapid absorption, slow spreading, clear color
5. Surface Wetting: Rapid spreading, removed oxidation, bright
6. Grease Displacement: Rapid wetting, min. dissolving, good cleanup
7. Type Container: 16 oz. pour spout can w/tip cover
8. Liquid Appearance: Clear, very watery
9. Wood-Open Pore: Slight wet look, no damage
10. Metal Surface: Dry after 30 min. Rust trace within 24 hours.
11. Rust Removal: No evidence of rust removal
12. Displace Moisture: Poor
13. Displace Solids: Poor
14. Gun Barrel: Fair
15. Wood Stock: Fair
16. Rust Prevention:

Test 1 - 1

Test 2 - 1

Avg - 1.0

17. Reason for Elimination: Poor rust protection

Test # 2

Product: Keystone - Penetrating Oil #2

Function: Rust preventive plus lubricant
Displace gums, rust dirt and lubricates

Evaluation Notes

1. Odor: Mild fly spray or cutting oil - not objectionable
2. Feel: Mild oily feel
3. Drying Rate: Very slow drying
4. Penetration: Rapid penetration, med. spreading, tan stain
5. Surface Wetting: Rapid spreading, removed oxidation, bright
6. Grease Displacement: Rapid wetting, no dissolving, good cleanup
7. Type Container: 16 oz. pour spout can w/tip cover
8. Liquid Appearance: Slight brown watery fluid
9. Wood-Open Pore: Slight wet look, no damage
10. Metal Surface: Dry after 30 min., no rust after 24 hours
11. Rust Removal: Some rust removed
12. Displace Moisture: Good
13. Displace Solids: Poor
14. Gun Barrel: Fair
15. Wood Stock: Fair
16. Rust Prevention:
 - Test 1 - 3
 - Test 2 - 4
 - . Avg - 3.5
17. Reason for Elimination: Poor rust protection

Test # 3

Product: Crown - All 4

Function: Multipurpose, dissolves rust
Displaces gums, moisture, dirt and lubricates

Evaluation Notes

1. Odor: Mild fly spray - not objectionable
2. Feel: Mild oily feel
3. Drying Rate: Slow evaporation
4. Penetration: Rapid absorption, med. spreading, clear color
5. Surface Wetting: Rapid spreading, removed oxidation, bright
6. Grease Displacement: Rapid wetting, some dissolving, good cleanup
7. Type Container: Aerosol can, 12 oz, nozzle w/straw
8. Liquid Appearance: Clear watery fluid
9. Wood-Open Pore: Damp wood, no damage
10. Metal Surface: Dry after 30 min, no rust after 24 hours
11. Rust Removal: No rust removed
12. Displace Moisture: Excellent
13. Displace Solids: Excellent
14. Gun Barrel: Good
15. Wood Stock: Good
16. Rust Prevention:
 - Test 1 - 3
 - Test 2 - 3
 - Avg - 3.0
17. Reason for Elimination: Poor rust protection

Test # 4

Product: Crown - Silicone Lubricant 8034

Function: Lubricant
Displace Moisture and lubricates

Evaluation Notes

1. Odor: Carson tetrachloride smell - not lasting
2. Feel: Dry feel - with slight wax trace
3. Drying Rate: Rapid drying
4. Penetration: Very rapid penetration, min spreading, clear color
5. Surface Wetting: Minimum spreading, good cleanup
6. Grease Displacement: Slow spread, no dissolving, good cleanup
7. Type Container: 16 oz. aerosol, nozzle w/straw
8. Liquid Appearance: Watery fluid - slightly milky
9. Wood-Open Pore: Damp wood - no damage
10. Metal Surface: Dry within 10 min, no rust within 24 hours
11. Rust Removal: No rust removed
12. Displace Moisture: Not tested
13. Displace Solids: Not tested
14. Gun Barrel: Poor - dull
15. Wood Stock: Poor - dull
16. Rust Prevention:

Test 1 - 1

Test 2 - 1

Avg - 1.0

17. Reason for Elimination: Poor rust protection

Test # 5

Product: Sprayway PD90

Function: Multipurpose
Displace moisture, dirt and lubricates

Evaluation Notes

1. Odor: Strong fly spray - lasting
2. Feel: slight oil feel
3. Drying Rate: Slow drying
4. Penetration: Rapid absorption, med. spreading, clear color
5. Surface Wetting: Slow wetting, good cleanup
6. Grease Displacement: Rapid spread, no dissolving, good cleanup
7. Type Container: 11 oz. aerosol, nozzle- w/straw
8. Liquid Appearance: Tan color watery fluid
9. Wood-Open Pore: Wet looking, no damage
10. Metal Surface: Oily appearance, no rust within 24 hours
11. Rust Removal: No rust removed
12. Displace Moisture: Excellent
13. Displace Solids: Fair
14. Gun Barrel: Good
15. Wood Stock: Good
16. Rust Prevention:
Test 1 - 5
Test 2 - 4
Avg - 4.5
17. Reason for Elimination: Weak rust protection, mild cleaning property

Test # 6

Product: Sprayway - Hoil Penetrating Oil #960

Function: Rust preventive - never dries
Displace moisture and lubricates

Evaluation Notes

1. Odor: Paint smell - lasting
2. Feel: Slight oily feel
3. Drying Rate: Slow drying
4. Penetration: Slow absorption, min. spreading, tan color
5. Surface Wetting: Minimum spreading, good cleanup
6. Grease Displacement: Slow spread, no dissolving, good cleanup
7. Type Container: 13 oz aerosol, nozzle w/straw
8. Liquid Appearance: Water fluid, tan color
9. Wood-Open Pore: Wet looking, no damage
10. Metal Surface: Oily, no rust within 24 hours
11. Rust Removal: Most rust removed
12. Displace Moisture: Poor
13. Displace Solids: Poor
14. Gun Barrel: Good
15. Wood Stock: Good
16. Rust Prevention:

Test 1 - 5

Test 2 - 5

Avg - 5.0

17. Reason for Elimination: Poor cleaning and water displacement

Test # 7

Product: Molykote - Pene Lube

Function: Multipurpose - prevents rust
Displaces moisture, dirt and lubricates

Evaluation Notes

1. Odor: Strong fly spray - lasting
2. Feel: Medium oily feel
3. Drying Rate: Minimum drying
4. Penetration: Rapid absorption, med. spreading, tan color
5. Surface Wetting: Good wetting, oily appearance, good cleanup
6. Grease Displacement: Rapid spreading, no dissolving, good cleanup
7. Type Container: 16 oz aerosol, nozzle
8. Liquid Appearance: Light tan watery fluid
9. Wood-Open Pore: Wet look - no damage
10. Metal Surface: Wet surface - no rust within 24 hours
11. Rust Removal: Some rust removed
12. Displace Moisture: Fair
13. Displace Solids: Fair
14. Gun Barrel: Poor - oily
15. Wood Stock: Poor - oily
16. Rust Prevention:
 - Test 1 - 5
 - Test 2 - 4
 - Avg - 4.5
17. Reason for Elimination: Weak rust protection, oily on metal and wood surfaces

Test # 8

Product: Molykote - 1557 Lubricant

Function: Wax-like silicone
Lubricates

Evaluation Notes

1. Odor: Carbon tetrachloride smell - not lasting
2. Feel: Waxy feel
3. Drying Rate: Rapid drying
4. Penetration: Rapid absorption, min. spreading, clear stain
5. Surface Wetting: Rapid spreading to dry wax film, hard to clean
6. Grease Displacement: Slow wetting, no dissolving, hard to clean
7. Type Container: 14 oz. aerosol, nozzle
8. Liquid Appearance: Cloudy, waxy, watery
9. Wood-Open Pore: White appearance, no damage
10. Metal Surface: Dry white, rust trace within 24 hours
11. Rust Removal: Some rust removed
12. Displace Moisture: Poor
13. Displace Solids: Fair
14. Gun Barrel: Fair, dull
15. Wood Stock: Poor, very dry
16. Rust Prevention:

Test 1 - 1

Test 2 - 2

Avg - 1.5

17. Reason for Elimination: Poor rust protection

Test # 9

Product: Molykote - Metal Protector

Function: Thin film lubricant
Prevents rust and lubricates

Evaluation Notes

1. Odor: Paint, fly spray or waxy smell, lasting
2. Feel: Dry feel
3. Drying Rate: Slow drying, but thickens rapidly
4. Penetration: No spreading, dark tan stain
5. Surface Wetting: Slow wetting, thickens to waxy film, hard to clean
6. Grease Displacement: Rapid wetting, no dissolving, good cleanup
7. Type Container: 4 oz aerosol, nozzle
8. Liquid Appearance: Thick watery, waxy, dark tan
9. Wood-Open Pore: White stain, no damage
10. Metal Surface: Dry white, no rust within 24 hours
11. Rust Removal: No rust removed
12. Displace Moisture: Poor
13. Displace Solids: Poor
14. Gun Barrel: Poor, dull
15. Wood Stock: Poor, dull
16. Rust Prevention:

Test 1 - 9

Test 2 - 9

Avg - 9.0

17. Reason for Elimination: Very waxy mess on metal and wood surfaces

Test # 10

Product: Seymour - HD 5 Wav

Function: Multipurpose, corrosion inhibitor
Displaces moisture, dirt and lubricates

Evaluation Notes

1. Odor: Burnt paint, waxy smell, lasting
2. Feel: Oily feel
3. Drying Rate: Slow drying
4. Penetration: Rapid spreading, dark tan stain
5. Surface Wetting: Rapid spreading, removes oxidation, bright
6. Grease Displacement: Good wetting, some dissolving, easy to clean
7. Type Container: 16 oz aerosol, nozzle with straw
8. Liquid Appearance: Thick watery, dark tan
9. Wood-Open Pore: Clear dry, no damage
10. Metal Surface: Oil appearance, no rust within 24 hours
11. Rust Removal: Some rust removed
12. Displace Moisture: Good
13. Displace Solids: Good
14. Gun Barrel: Poor, oily
15. Wood Stock: Poor, oily
16. Rust Prevention:

Test 1 - 7

Test 2 - 6

Avg - 6.5

17. Reason for Elimination: Very oily on metal and wood surfaces

Test # 11 .

Product: E. F. Houghton - HLP All Purpose

Function: Multipurpose, prevents rust
Displaces moisture, dirt and lubricates

Evaluation Notes

1. Odor: Fly spray smell, not lasting
2. Feel: Oily feel
3. Drying Rate: Rapid drying
4. Penetration: Rapid spreading, med. spreading, tan stain
5. Surface Wetting: Slow spreading, rapid dry to oily film, hard to clean
6. Grease Displacement: Rapid spread, no dissolving, good cleanup
7. Type Container: 12 oz aerosol, nozzle with straw
8. Liquid Appearance: Waxy, dark tan
9. Wood-Open Pore: Damp look, no damage
10. Metal Surface: Oil look, no rust within 24 hours
11. Rust Removal: No rust removal
12. Displace Moisture: Poor
13. Displace Solids: Fair
14. Gun Barrel: Good
15. Wood Stock: Good
16. Rust Prevention:
 - Test 1 - 8
 - Test 2 - 5
 - Avg - 6.5
17. Reason for Elimination: Continue testing

Test # 12

Product: S. F. Houghton - Solvent Degreaser

Function: Degreaser, removes gums
No lubricant

Evaluation Notes

1. Odor: Strong fly spray, not lasting
2. Feel: Oily feel
3. Drying Rate: Rapid drying
4. Penetration: Rapid penetration and spreading, clear color
5. Surface Wetting: Medium spreading, removes oxidation, good cleanup
6. Grease Displacement: Rapid spreading, no dissolving, good cleanup
7. Type Container: 12 oz aerosol, adjustable nozzle
8. Liquid Appearance: Clear watery
9. Wood-Open Pore: Dry, no damage
10. Metal Surface: Oil look, no rust within 24 hours
11. Rust Removal: No rust removed
12. Displace Moisture: Excellent
13. Displace Solids: Excellent
14. Gun Barrel: Good
15. Wood Stock: Good
16. Rust Prevention:

Test 1 - 3

Test 2 - 3

Avg - 3.0

17. Reason for Elimination: Poor rust protection

Test # 13

Product: Krylon - Ten 4

Function: Multipurpose, prevents rust
Displaces moisture, gums, dirt and lubricates

Evaluation Notes

1. Odor: Strong fly spray, lasting
2. Feel: Light oily feel
3. Drying Rate: Medium drying rate
4. Penetration: Rapid absorption and spreading, dark tan stain
5. Surface Wetting: Slow spreading, oily appearance, good cleanup
6. Grease Displacement: Rapid spread, no dissolving, good cleanup
7. Type Container: 11 oz aerosol, nozzle with stray
8. Liquid Appearance: Dark tan, watery
9. Wood-Open Pore: Damp look, no damage
10. Metal Surface: Damp look, no rust within 24 hours
11. Rust Removal: Most rust removed
12. Displace Moisture: Good
13. Displace Solids: Good
14. Gun Barrel: Good
15. Wood Stock: Good
16. Rust Prevention:
 - Test 1 - 8
 - Test 2 - 5
 - Avg - 6.5
17. Reason for Elimination: Continue testing

Test # 14

Product: Sprayon #711 Penetrant/Lube/Demoisturize

Function: Multipurpose, prevents rust
Displaces moisture and lubricates

Evaluation Notes

1. Odor: Strong fly spray, lasting
2. Feel: Very oily feel
3. Drying Rate: Medium drying rate
4. Penetration: Slow spreading, but continuous, clear color
5. Surface Wetting: Minimum spreading, removes oxidation, bright
6. Grease Displacement: Rapid spread, no dissolving, good cleanup
7. Type Container: 12 oz aerosol, nozzle with straw
8. Liquid Appearance: Very watery, light tan
9. Wood-Open Pore: Damp look, no damage
10. Metal Surface: Oily look, no rust within 24 hours
11. Rust Removal: Some rust removed
12. Displace Moisture: Excellent
13. Displace Solids: Good
14. Gun Barrel: Excellent
15. Wood Stock: Excellent
16. Rust Prevention:
 - Test 1 - 6
 - Test 2 - 5
 - Avg - 5.5
17. Reason for Elimination: Continue testing

Test # 15

Product: CRC - 3-36

Function: Multipurpose, prevents rust
Displaces moisture and lubricates

Evaluation Notes

1. Odor: Pleasant peppermint smell, lasting
2. Feel: Light oily feel
3. Drying Rate: Medium drying rate
4. Penetration: Medium penetrating and spreading, tan color
5. Surface Wetting: Slow spread, removes oxidation, good cleanup
6. Grease Displacement: Rapid spreading, some dissolving, easy cleanup
7. Type Container: 1 oz aerosol, nozzle
8. Liquid Appearance: Watery, light tan
9. Wood-Open Pore: Damp look, no damage
10. Metal Surface: Oily look, no rust within 24 hours
11. Rust Removal: Some rust removed
12. Displace Moisture: Excellent
13. Displace Solids: Good
14. Gun Barrel: Excellent
15. Wood Stock: Excellent
16. Rust Prevention:
 - Test 1 - 4
 - Test 2 - 5
 - Avg - 4.5
17. Reason for Elimination: Continue testing

Test # 16

Product: McLube 1725 Fluorocarbon Coating

Function: TFE, soft coat, prevents rust
Displaces moisture and lubricates

Evaluation Notes

1. Odor: Paint brush cleaner, turpentine, lasting
2. Feel: Medium oily feel
3. Drying Rate: Rapid drying
4. Penetration: No spreading, min. wetting, clear color
5. Surface Wetting: Min. spread to thick film, hard to clean
6. Grease Displacement: Slow spread, some dissolving, good cleanup
7. Type Container: 16 oz paint can
8. Liquid Appearance: Clear watery
9. Wood-Open Pore: White stain, no damage
10. Metal Surface: Dry white film, rust trace within 24 hours
11. Rust Removal: No rust removed
12. Displace Moisture: Poor
13. Displace Solids: Poor
14. Gun Barrel: Poor, dull
15. Wood Stock: Poor, dull
16. Rust Prevention:
 - Test 1 - 1
 - Test 2 - 3
 - Avg - 2.0
17. Reason for Elimination: Poor rust protection

Test # 17

Product: McLube 1775 Fluorocarbon Coating

Function: TFE, hard coat, prevents rust
Displaces moisture and lubricates

Evaluation Notes

1. Odor: Paint brush cleaner turpentine, lasting
2. Feel: Oily feel
3. Drying Rate: Slow spreading, rapid drying
4. Penetration: Very rapid absorption, min. spreading, clear color
5. Surface Wetting: No spread, waxy drop, hard to clean
6. Grease Displacement: Rapid spread, some dissolving, hard to clean
7. Type Container: 16 oz paint can
8. Liquid Appearance: Watery, waxy, milky
9. Wood-Open Pore: Damp look, no damage
10. Metal Surface: Oily look, no rust within 24 hours
11. Rust Removal: No rust removed
12. Displace Moisture: Poor
13. Displace Solids: Poor
14. Gun Barrel: Poor, dull
15. Wood Stock: Poor, dull
16. Rust Prevention:

Test 1 - 5

Test 2 - 9

Avg - 7.0

17. Reason for Elimination: Poor appearance on metal and wood surfaces

Test # 18

Product: McLube 710 Solvent

Function: Penetrating oil with MOS_2
Dissolves rust and lubricates

Evaluation Notes

1. Odor: Almost odorless, faint fly spray
2. Feel: Sticky, gooey, messy, MOS_2 in solution
3. Drying Rate: Rapid drying of solvent
4. Penetration: Thick glob, black stain
5. Surface Wetting: No spread, thick glob, hard to clean
6. Grease Displacement: No reaction, hard to clean
7. Type Container: 16 oz paint can
8. Liquid Appearance: Dark gray, like mud
9. Wood-Open Pore: Wet black, clogged pores
10. Metal Surface: Wet black, no rust within 24 hours
11. Rust Removal: No rust removed
12. Displace Moisture: Poor
13. Displace Solids: Poor
14. Gun Barrel: Poor, messy
15. Wood Stock: Poor, messy
16. Rust Prevention:

Test 1 - 7

Test 2 - 9

Avg - 5.0

17. Reason for Elimination: Very dirty mess

Test # 19

Product: Du Pont - Synthetic Diaster - 10%

Function: Multipurpose, prevents rust
Displaces moisture, dirt and lubricates

Evaluation Notes

1. Odor: Synthetic chemical oily smell, not lasting
2. Feel: Light oily feel
3. Drying Rate: Slow drying
4. Penetration: Rapid penetration and spreading, clear color
5. Surface Wetting: Local wetting, removes oxidation, good cleanup
6. Grease Displacement: Rapid spread, softening, good cleanup
7. Type Container: 6 oz glass bottle
8. Liquid Appearance: Watery, light tan
9. Wood-Open Pore: Damp lock, no damage
10. Metal Surface: Wet lock, no rust within 24 hours
11. Rust Removal: Most rust removed
12. Displace Moisture: Not tested
13. Displace Solids: Not tested
14. Gun Barrel: Excellent
15. Wood Stock: Excellent
16. Rust Prevention:

Test 1 - 5

Test 2 - 5

Avg - 5.0

17. Reason for Elimination: Product discontinued

Test # 20

Product: Du Pont - Synthetic Diester - 20%

Function: Multipurpose, prevents rust
Displaces moisture, dirt and lubricates

Evaluation Notes

1. Odor: Synthetic chemical oily smell, not lasting
2. Feel: Light oily feel
3. Drying Rate: Slow drying
4. Penetration: Rapid penetration and spreading, clear color
5. Surface Wetting: Local wetting, removes oxidation, good cleanup
6. Grease Displacement: Rapid spreading, no dissolving, good cleanup
7. Type Container: 4 oz aerosol, nozzle with straw
8. Liquid Appearance: Watery, light tan
9. Wood-Open Pore: Damp lock, no damage
10. Metal Surface: Wet lock, no rust within 24 hours
11. Rust Removal: Most rust removed
12. Displace Moisture: Excellent
13. Displace Solids: Excellent
14. Gun Barrel: Excellent
15. Wood Stock: Excellent
16. Rust Prevention:
 - Test 1 - 7
 - Test 2 - 7
 - Avg - 7.0
17. Reason for Elimination: Continue testing

Test # 21

Product: WD-40

Function: Multipurpose, prevents rust
Displaces moisture, dirt and lubricates

Evaluation Notes

1. Odor: Very strong vly spray, lasting
2. Feel: Very oily feel
3. Drying Rate: Slow drying
4. Penetration: Medium penetration and spreading, clear color
5. Surface Wetting: Local wetting, removes oxidation, good cleanup
6. Grease Displacement: Rapid wetting, no dissolving, smear on cleanup
7. Type Container: 9 oz aerosol, nozzle with stray
8. Liquid Appearance: Very watery, clear
9. Wood-Open Pore: Damp look, no damage
10. Metal Surface: Damp look, no rust within 24 hours
11. Rust Removal: No rust removed
12. Displace Moisture: Excellent
13. Displace Solids: Excellent
14. Gun Barrel: Excellent
15. Wood Stock: Excellent
16. Rust Prevention:
 - Test 1 - 4
 - Test 2 - 5
 - Avg - 4.5
17. Reason for Elimination: Limited rust protection

Test # 22

Product: Tenneco - Anderol Gun Oil - Synthetic

Function: Lubricant, diester
Lubricates

Evaluation Notes

1. Odor: Strong oily smell, lasting
2. Feel: Very oily feel
3. Drying Rate: No drying
4. Penetration: Medium absorption and spreading, dark tan stain
5. Surface Wetting: No spreading, thin film after cleanup
6. Grease Displacement: No spreading or dissolving, good cleanup
7. Type Container: 4 oz plastic bottle with adjustable nozzle
8. Liquid Appearance: Soupy, dark tan
9. Wood-Open Pore: Oily look, no damage
10. Metal Surface: Oily look, no rust within 24 hours
11. Rust Removal: No rust removed
12. Displace Moisture: Poor
13. Displace Solids: Poor
14. Gun Barrel: Poor, oily
15. Wood Stock: Poor, oily
16. Rust Prevention:
 - Test 1 - 6
 - Test 2 - 3
 - Avg - 3.5
17. Reason for Elimination: Oily on metal and wood surfaces in addition to poor cleaning.

Test # 23

Product: Steel Guard

Function: Rust preventive

Evaluation Notes

1. Odor: Cutting fluid smell, not lasting
2. Feel: Very light oily feel, mostly water
3. Drying Rate: No apparent drying
4. Penetration: Very rapid absorption, thickening of blotter, clear color
5. Surface Wetting: Local drops, smeary but good cleanup
6. Grease Displacement: No spreading or dissolving, poor cleanup
7. Type Container: 12 oz glass bottle
8. Liquid Appearance: Watery, milky
9. Wood-Open Pore: Dry, no damage
10. Metal Surface: Dry, no rust within 24 hours
11. Rust Removal: Most rust removed
12. Displace Moisture: Poor
13. Displace Solids: Not tested
14. Gun Barrel: Good
15. Wood Stock: Fair, dull
16. Rust Prevention:
 - Test 1 - 5
 - Test 2 - 3
 - Avg - 4.0
17. Reason for Elimination: Poor rust protection

Test # 24

Product: Hoppe Gun Oil

Function: Lubricant

Evaluation Notes

1. Odor: Oily smell, not objectionable
2. Feel: Very oily feel
3. Drying Rate: No drying
4. Penetration: Medium absorption and spreading, tan stain
5. Surface Wetting: Local drops, thin film after cleanup
6. Grease Displacement: Slow wetting, no dissolving
7. Type Container: 3 oz metal can with tip cover
8. Liquid Appearance: Thick, dark tan
9. Wood-Open Pore: Oily look, no damage
10. Metal Surface: Oily look, no rust within 24 hours
11. Rust Removal: No rust removed
12. Displace Moisture: Poor
13. Displace Solids: Poor
14. Gun Barrel: Good
15. Wood Stock: Good
16. Rust Prevention:
 - Test 1 - Not tested
 - Test 2 - 1
 - Avg - 1.0
17. Reason for Elimination: Poor rust protection and cleaning property

Test # 25

Product: Outers Gun Oil

Function: Lubricant

Evaluation Notes

1. Odor: Oily smell, not objectionable
2. Feel: Very oily feel
3. Drying Rate: No drying
4. Penetration: Medium absorption and spreading, can stain
5. Surface Wetting: Local drops, thin film after cleanup
6. Grease Displacement: Slow wetting, no dissolving
7. Type Container: 2 oz metal can with tip cover
8. Liquid Appearance: Thick, dark tan
9. Wood-Open Pore: Oily look, no damage
10. Metal Surface: Oily look, no rust within 24 hours
11. Rust Removal: No rust removed
12. Displace Moisture: Poor
13. Displace Solids: Poor
14. Gun Barrel: Good
15. Wood Stock: Good
16. Rust Prevention:
 - Test 1 - Not tested
 - Test 2 - 5
 - Avg - 5.0
17. Reason for Elimination: Poor cleaning properties