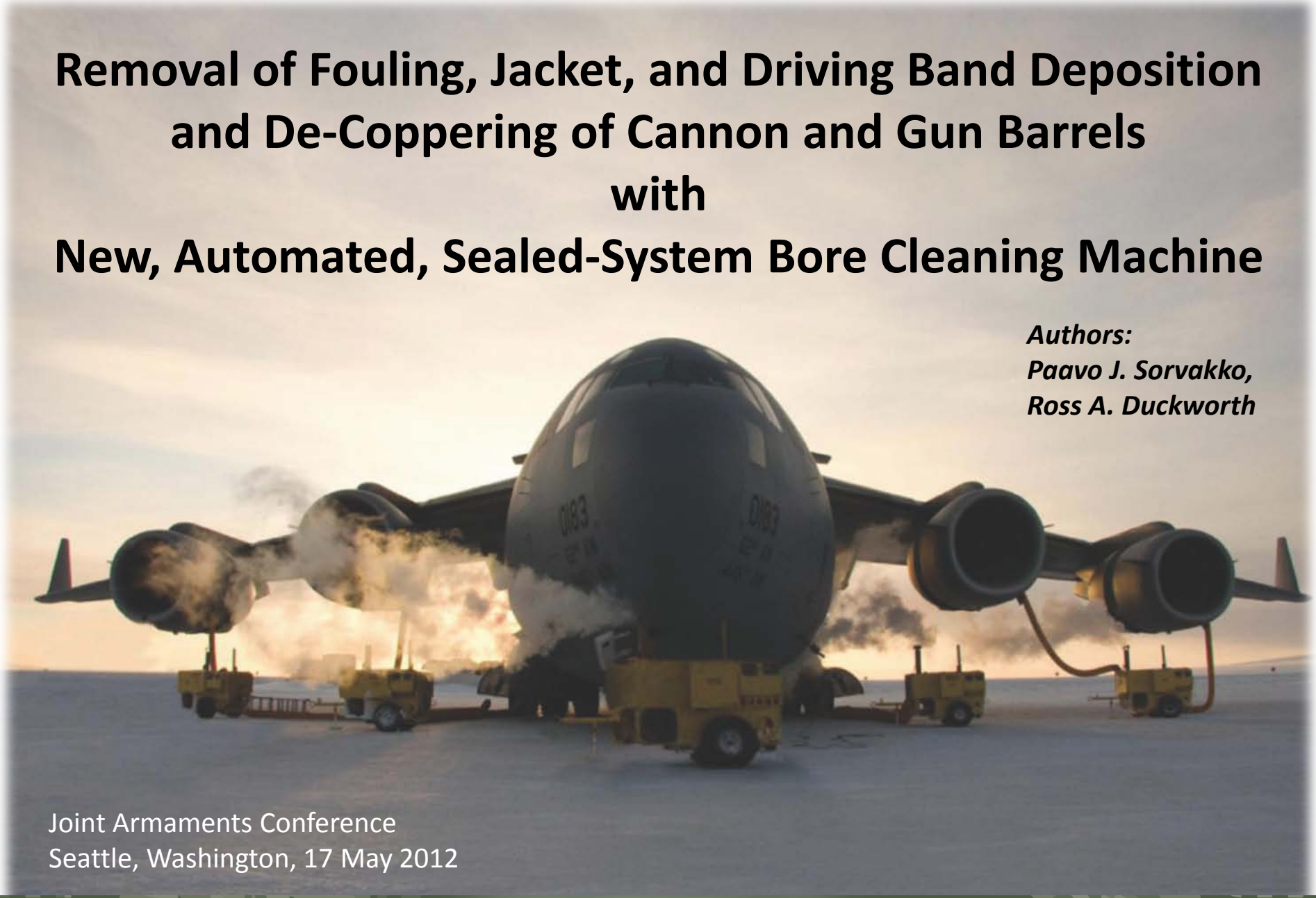
Removal of Fouling, Jacket, and Driving Band Deposition and De-Coppering of Cannon and Gun Barrels with New, Automated, Sealed-System Bore Cleaning Machine

Authors:
Paavo J. Sorvakko,
Ross A. Duckworth



Joint Armaments Conference
Seattle, Washington, 17 May 2012

AIRCRAFT GROUND HEATING

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CANNON CLEANING EQUIPMENT

AIRCRAFT GROUND HEATING

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CANNON CLEANING EQUIPMENT

AIRCRAFT GROUND HEATING

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CANNON CLEANING EQUIPMENT

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CLEAR-
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WHY ARE WE STILL USING THIS?

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155 mm BARREL CLEANER IN OPERATION

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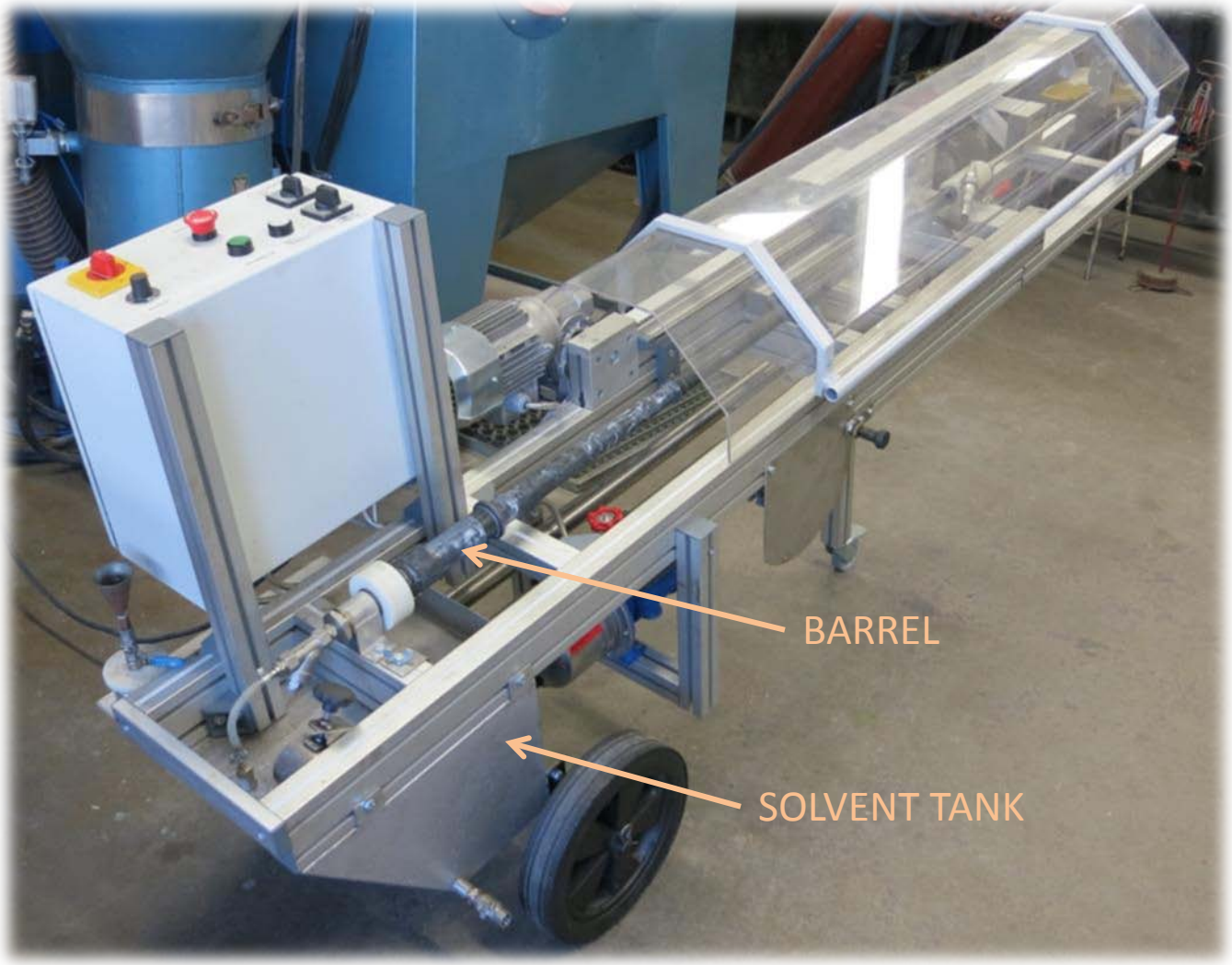
MEDIUM BORE BARREL CLEANER



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57 mm BARREL CLEANER DETAILS

Accessories: Adapters, Chamber brush, Barrel brush

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Copper Removal solvent

Laboratory Test Results

Time	+21°C, agitated		+21°C		+50°C		+1°C	
h	weight loss		weight loss		weight loss		weight loss	
	grams	%	grams	%	grams	%	grams	%
			COPPER	Kupari Cu				
2	0.1070	24.8	0.0107	3.1	0.0123	2.3	0.0112	2.9
4	0.1822	35.5	0.0167	5.2	0.0510	9.2	0.0130	3.3
6	0.1678	33.1	0.0321	6.6	0.0745	11.3	0.0145	4.4
20	0.1892	24.8	0.0645	12.7	0.0812	9.7	0.0501	11.7
			IRON	Rauta Fe				
2	0	0	0.0002	0	0	0	0	0
4	0	0	0.0001	0	0.0001	0	0	0
6	-	-	0.0001	0	0	0	0	0
20	-	-	0	0	0	0	-	-
			CARBON STEEL	Hiiliteräs (pala)				
2	0	0	0.0001	0	0	0	0	0
4	0.0002	0	0.0001	0	0	0	0	0
6	0	0	0	0	0.0001	0	0.0001	0
20	0	0	0	0	0.0007	0	0	0
			ALUMINUM	Alumiini Al				
2	0.0003	0.1	0	0	0	0	0.0001	0
4	0.0001	0	0.0001	0	0.0002	0.1	0	0
6	0	0	0	0	0.0001	0	0	0
20	0.0001	0	-	-	0.0005	0.2	0.0002	0.1
			ZINC	Sinkki Zn				
2	0.0713	53.1	0.0036	5.3	0.0072	10.1	0.0022	3.4
4	0.0732	88.4	0.0045	7.8	0.0060	9.8	0.0022	3.9
6	0.1079	94.6	0.0055	7.7	0.0202	20.7	0.0036	5.0
20	0.1184	100	0.0063	9.8	0.0194	19.6	0.0050	10.3
			RUBBER	Kumi				
2	-	-	0	0	0.0001	0	-	-
4	-	-	0	0	0.0001	0	0.0001	0.1
6	0	0	0.0001	0.1	-	-	0	0
20	0.0001	0	0.0002	0.2	0.0001	0	0.0004	0.1

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SOLVENT No 17 INGREDIENTS

16% Solution of:

- Ammonium Oxalate
- Sodium Hydroxide
- Hydrogen Peroxide
- Citric Acid (Buffer)

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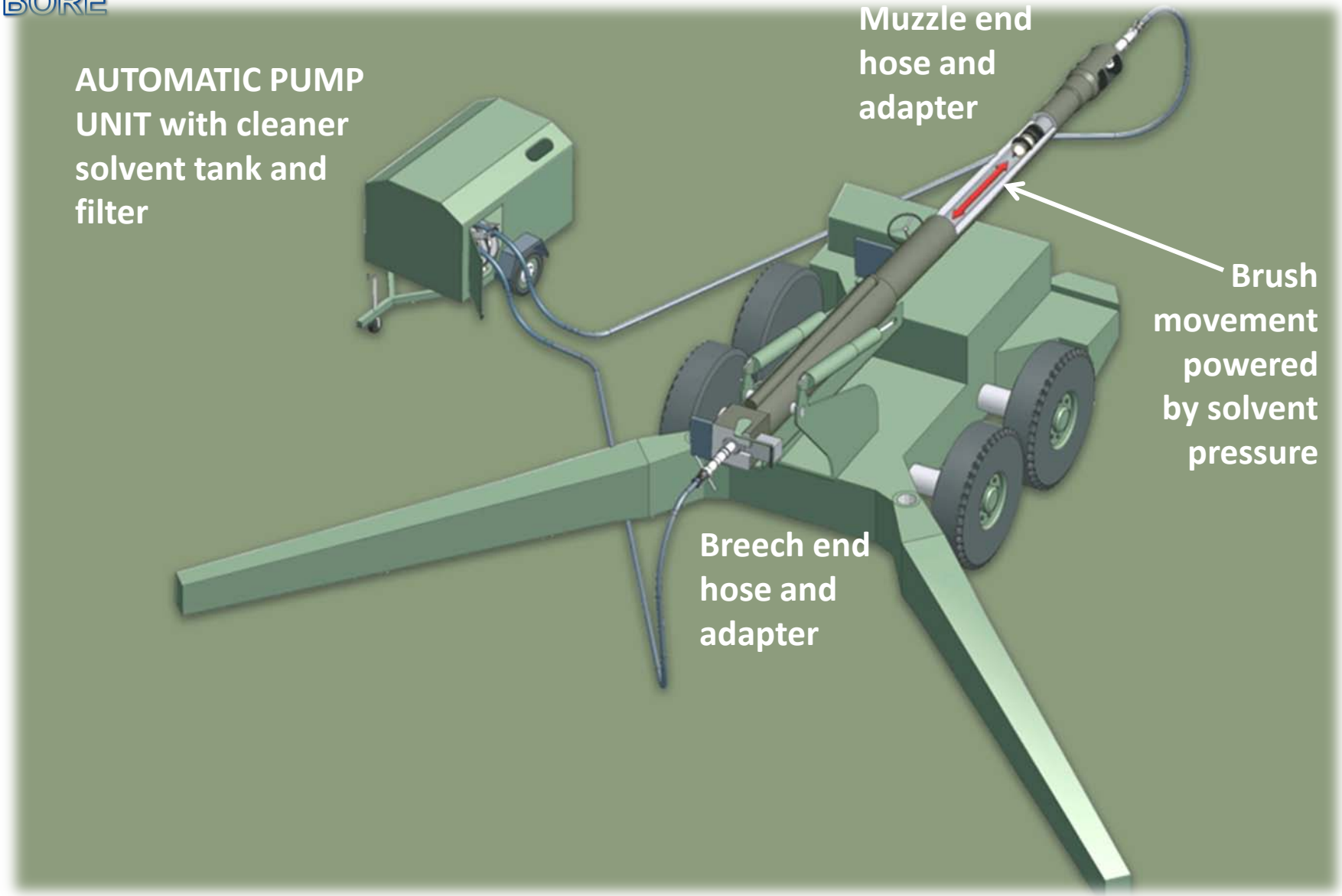
MAIN PRINCIPLE AND COMPONENTS

CLEAR-BORE



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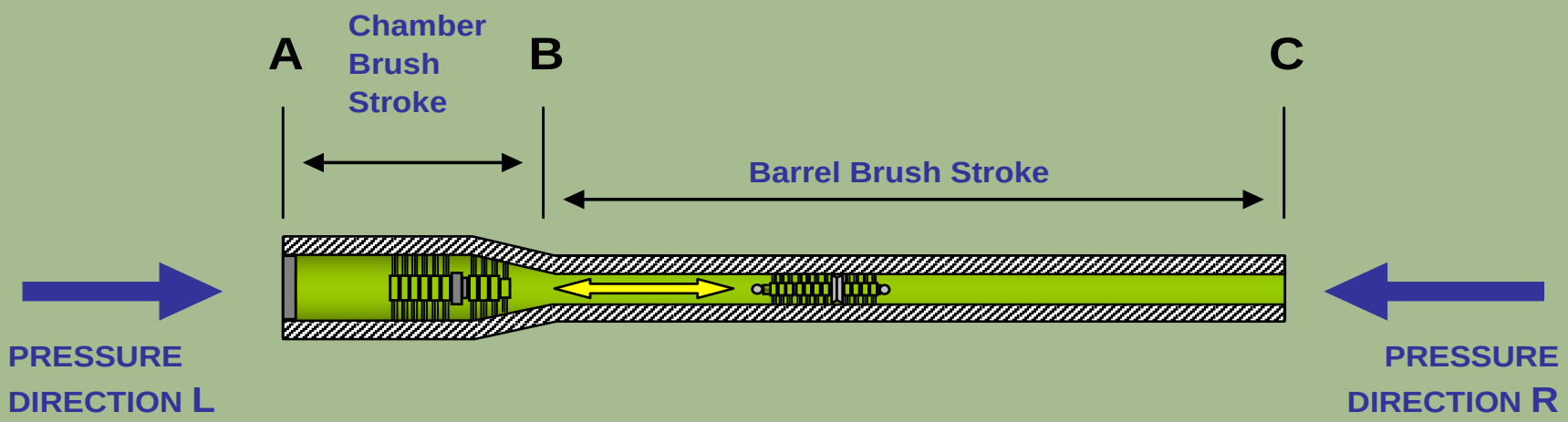
Simultaneous chamber and barrel cleaning



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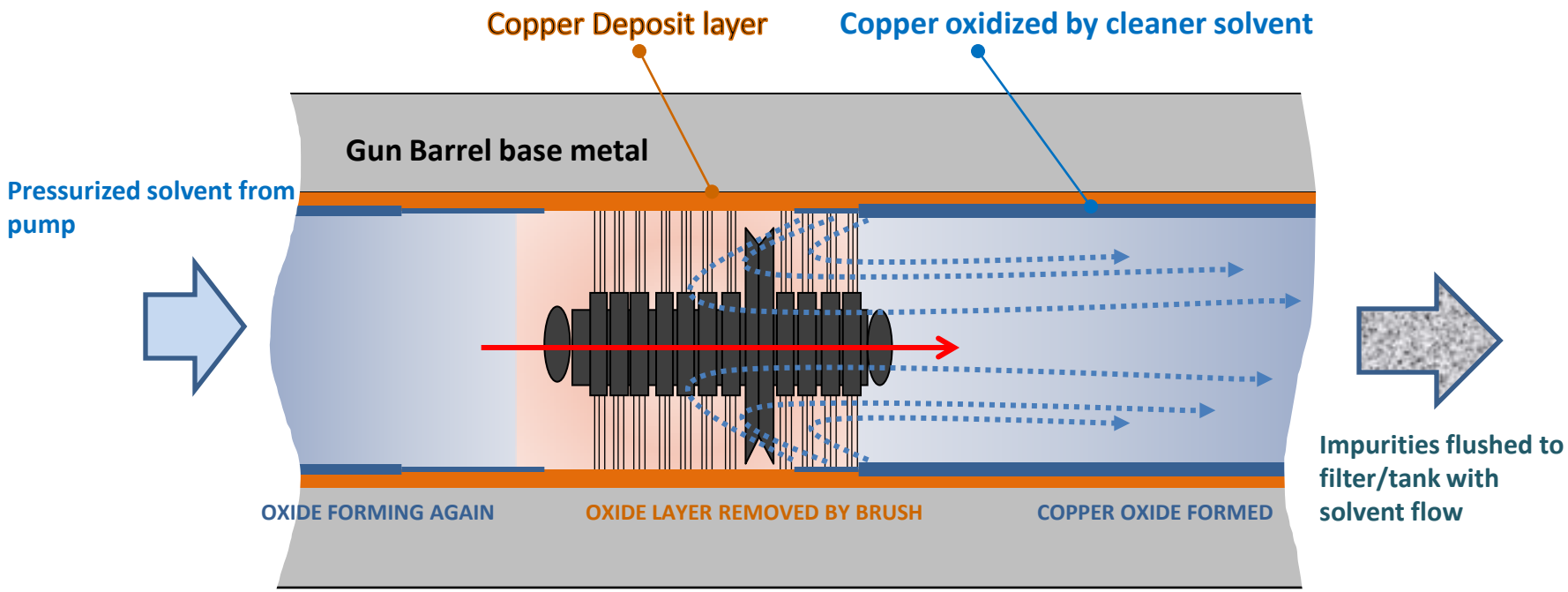
CLEAR-BORE

PRINCIPLE OF COPPER REMOVAL



The Brush moves with the pressurized solvent flow.
When reaching end of barrel, the flow direction is automatically reversed.

NOTE: For smaller weapons, from 40mm down, the brush movement is mechanical.

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CLEAR-BORE

United States Patent
Pulliainen

METHOD AND SYSTEM FOR CLEANING AN ARTILLERY GUN BARREL

(12) **United States Patent**
Pulliainen

(10) **Patent No.: US 8,083,858 B2**
(45) **Date of Patent: Dec. 27, 2011**

(54) **METHOD AND SYSTEM FOR CLEANING AN ARTILLERY GUN BARREL**

(75) Inventor: **Kalervo Pulliainen**, Jyväskylä (FI)

(73) Assignee: **Coefa Company Ltd Oy**, Luvia (FI)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 325 days.

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§ 371 (c)(1),
(2), (4) Date: **Jun. 4, 2008**

(87) PCT Pub. No.: **WO2007/085693**
PCT Pub. Date: **Aug. 2, 2007**

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(51) **Int. Cl.**
C23G 1/00 (2006.01)

(52) **U.S. Cl.** **134/2**; 134/8

(58) **Field of Classification Search** 134/2, 3, 134/6, 8, 22.1, 22.11, 40, 41, 42
See application file for complete search history.

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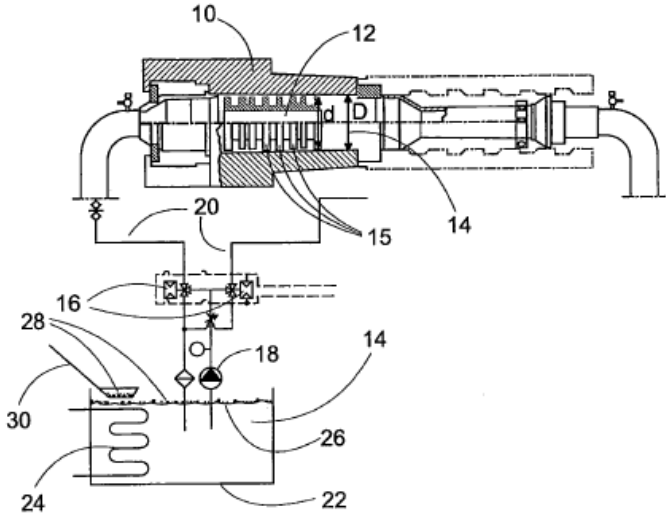
Primary Examiner — Michael Kornakov
Assistant Examiner — Eric Golightly
(74) *Attorney, Agent, or Firm* — Fildes & Outland, P.C.

(57) **ABSTRACT**

The invention relates to a method for cleaning an artillery gun barrel, which is cleaned of gun oil, greases, or combustion residues using a washing liquid and a brush element. The brush element is moved backwards and forwards in the barrel with the aid of the washing liquid. In addition, copper is cleaned out of the simultaneously in the same process. The invention also relates to a system for cleaning an artillery gun barrel.

14 Claims, 1 Drawing Sheet



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CLEAR-BORE

155 mm BARREL CLEANER IN OPERATION

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155 mm BARREL CLEANER DETAILS

Stationary (depot-type) cleaner

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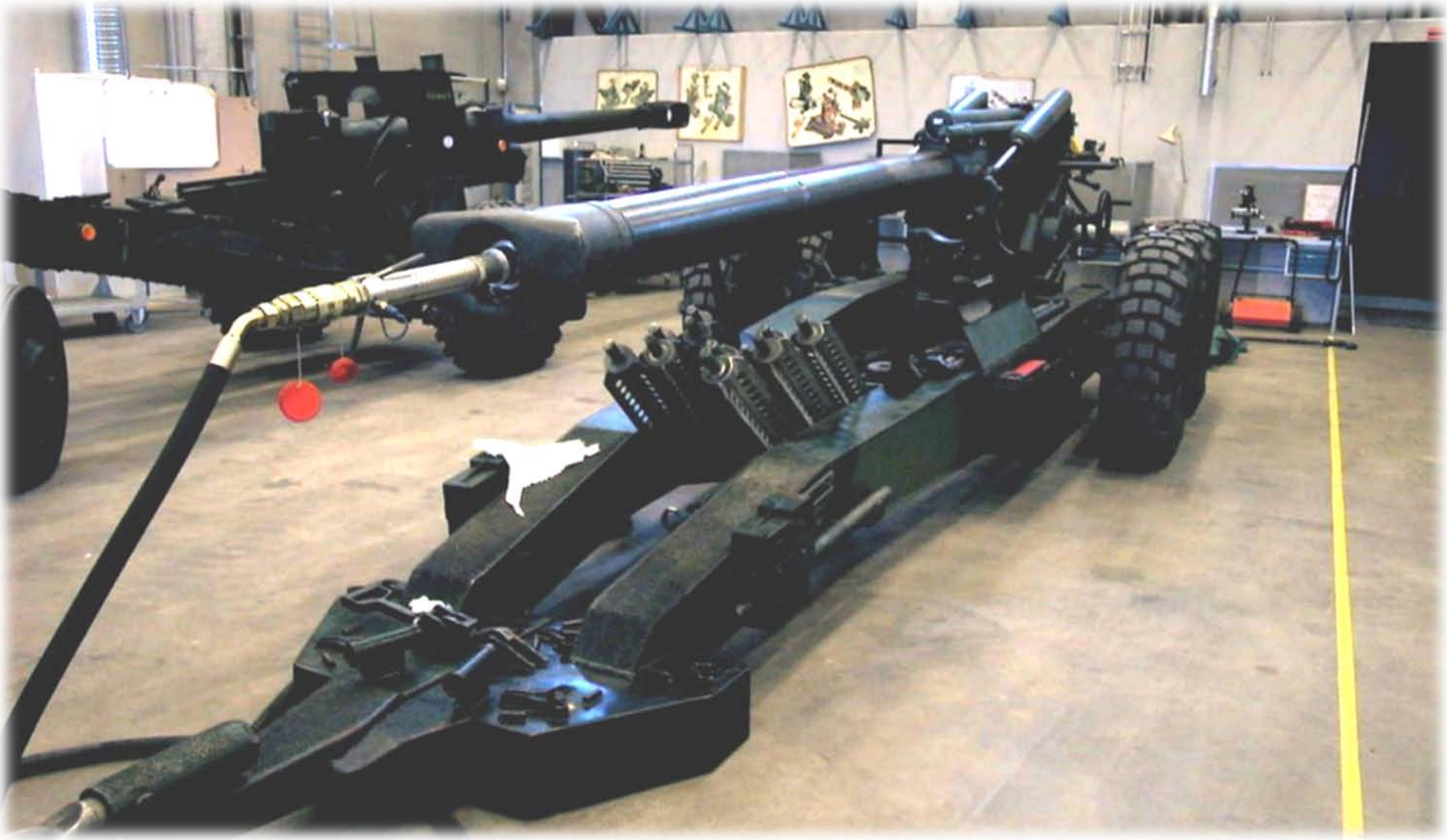
155 MM MUZZLE ADAPTER



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155 mm BARREL CLEANER DETAILS

Breech adapter

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155 MM BRUSH AND DRYING TAMPON SET

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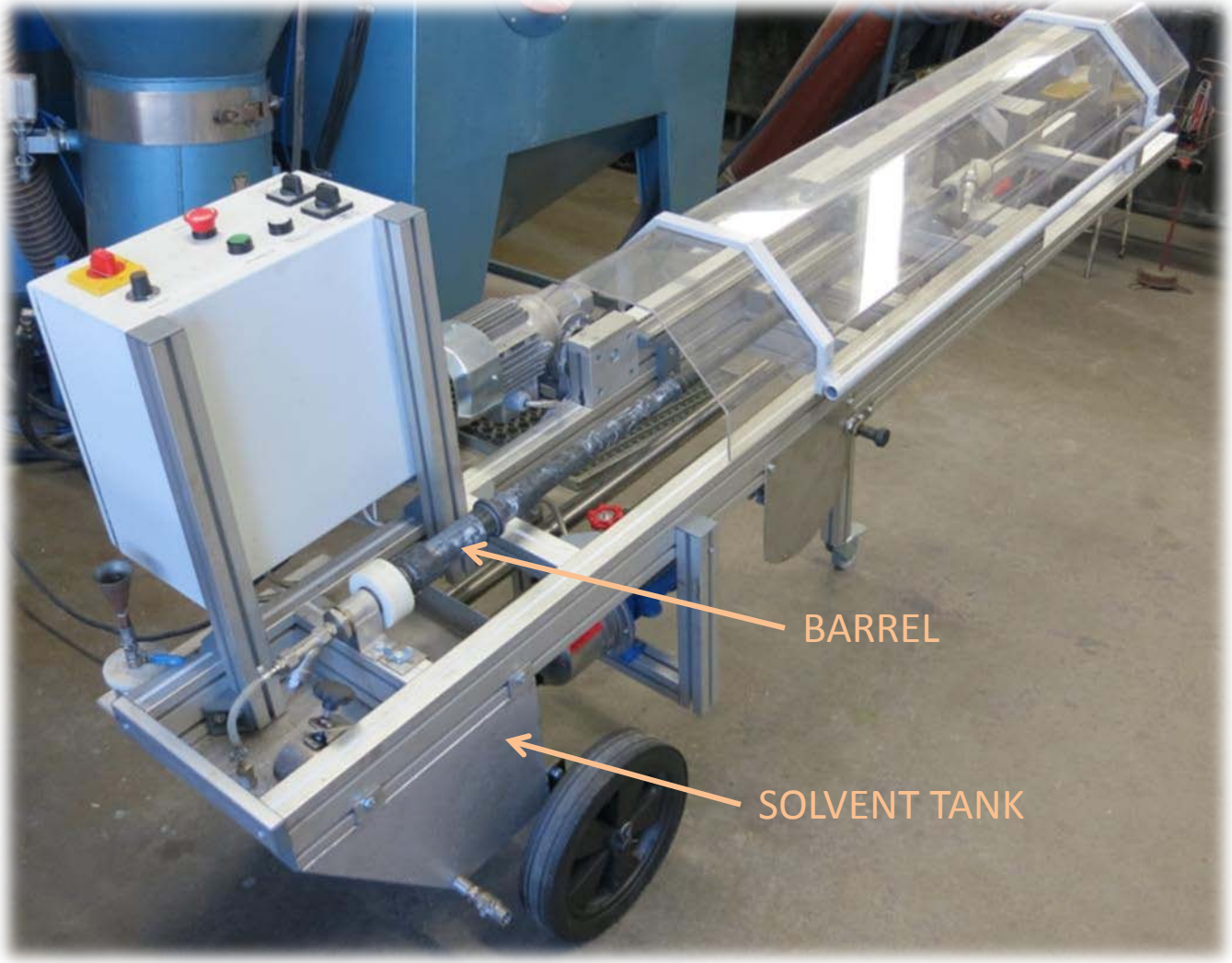
MEDIUM BORE BARREL CLEANER



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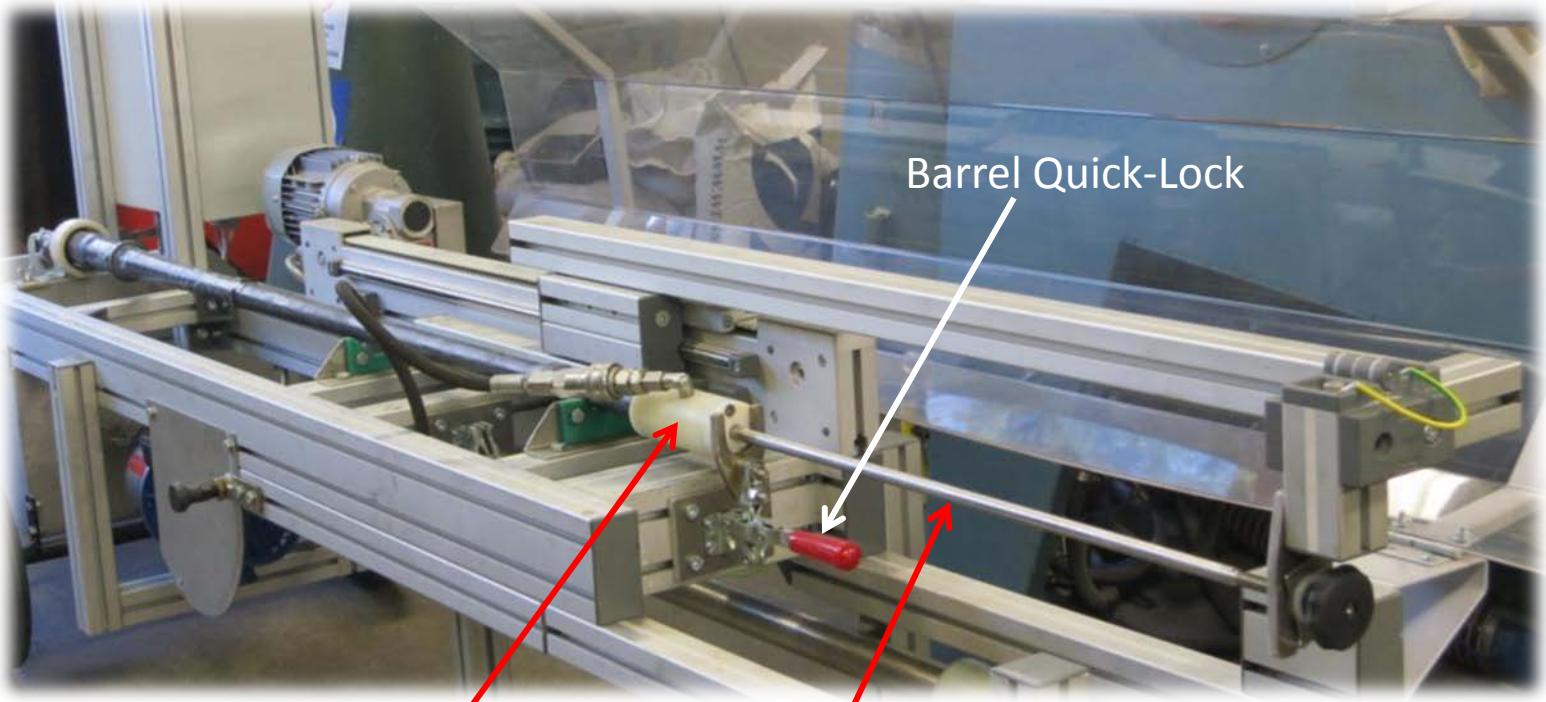
MEDIUM BORE BARREL CLEANER



Muzzle adapter with cleaning solvent feed

Brush Rod

NOTE: For Calibers 40mm and below, the brush movement is mechanical!

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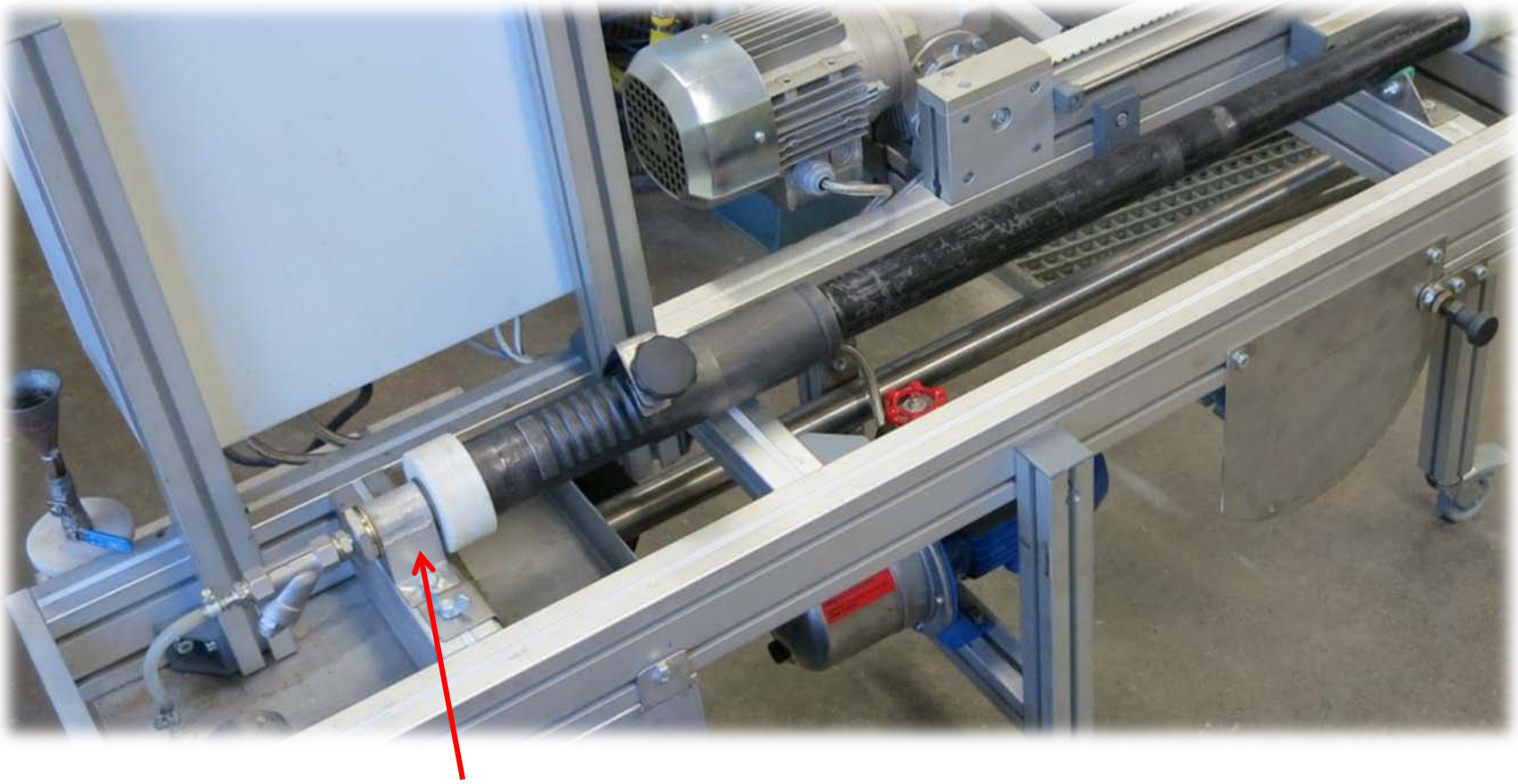
MEDIUM BORE BARREL CLEANER



Breech adapter with solvent return

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57 mm BARREL CLEANER DETAILS

Controls side; covers off

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57 mm BARREL CLEANER DETAILS

Hose reel side; covers off

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57 mm BARREL CLEANER DETAILS

Accessories: Adapters, Chamber brush, Barrel brush

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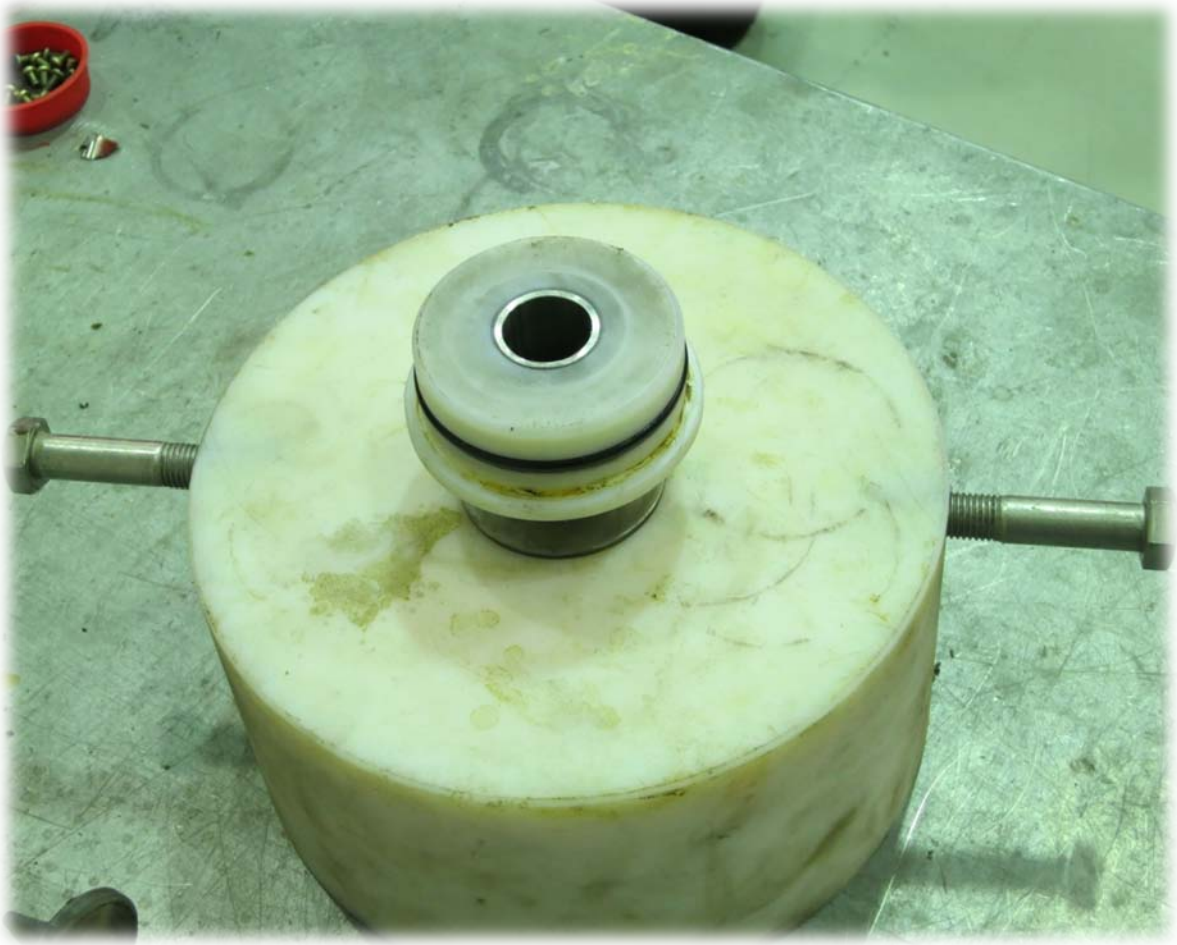
CLEAR-BORE

57 MM BRUSH & ADAPTER



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INDIAN “ARJUN” 130 MM TANK GUN AFTER 24 ROUNDS

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INDIAN “ARJUN” 130 MM TANK GUN CLEANED

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As always – More Research is Ongoing. We need your Help!

Polartherm is interested in acquiring heavily used or unserviceable MATCHING BARRELS with a KNOWN FIRING RECORD, in Calibres .50 / 12.7mm, 20mm, 25mm, 30mm, 35mm, 105mm, 120mm, and 155mm for quantitative studies.

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Questions?

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Polartherm Contact Information

U.S. America
Polartherm USA
Ross Duckworth
duckworth@polartherm.fi

Europe & Asia
Polartherm Finland
Paavo Sorvakko
sorvakko@polartherm.fi

www.polartherm.fi