



DACON STAND Hall 6 F170



Robot Inspection and Calibration System **ROBINCA**



Foto: Forsvaret

ROBINCA

Robot Inspection & Calibration System

Robinca is a portable and versatile measurement system for assessment of pitting, erosion and general wear of gun barrels. It combines visual inspection with highly accurate non-contact measurement technology.

High Resolution

Robinca features reliable Fogale Sensor technology that combine visual inspection with high resolution and accurate diameter measurements. This complies with standards provided by the barrel manufacturers and operating organization such as TDV018.

Capacitive sensors provide an almost unlimited accuracy (it “sees the first molecule”) and can be specified to measure at micron level. The Robinca system is designed for an accuracy of 5µm, and repeatability better than 1µm. The sensors are solid and contain no moving parts. They are rugged and durable, and are not easily affected by ambient conditions.

Modular Nature

The Robinca system is compounded of modules and the software contains all relevant gun bores. By switching between caliber specific components, one main unit can be utilized for all gun bores. The modular nature of the system provides increased versatility and cost savings. For the time being the system ranges from 4,6mm rifle barrel to 155mm howitzer. Software user-interface is uniform through the complete range.

Report Generation

The Robinca system automatically generates reports for statistics and analyses instantly after a measurement procedure. The operator can choose between several types of report formats. All measurement data can be imported into the Gun Barrel Management System (GBMS), a database for further analysis.

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Operational configuration management

Reduced barrel life cycle costs

Increased target precision

Better planning and barrel life estimation

Benefits

Safety

Robinca contributes to safety for investments and personnel by discovering developing degradation and by this reducing the risk for accidents. The system contributes to maintain operational precision by improved exit velocity prediction. Robinca reduces the risk of phasing out systems with remaining barrel life or overuse of worn barrels.

Operational availability

- Provide forecasts for the next service call-in time, so that this can be coordinated with other service needs. This will provide better operational availability and lower maintenance costs.
- Display pipe quality and lifecycle status per operational unit for assessment against production requirements and planned activities.

Optimization of use

- Rank the gun barrels according to remaining fatigue life and hit quality to ensure to equip personnel for a mission with the very best equipment the organization has available.

Maintenance & Service optimization

- Support the workshops with measurement data, history, and visualization that can improve the execution and quality of the measurements.
- Enable the workshops with insight of use of weapons to schedule time for the next gun barrel measurement depending on tolerances and shooting results.

Lifetime calculation & budget support

- Based on consumption of ammunition and measured wear & tear compared with measurement certificates, a calculation of the remaining lifetime of a gun barrel, residual value and estimated time for replacement based upon stock removal or new purchases.

Procurement & negotiation support

- Actively use during testing of new, current weapon systems to verify that the supplier's wear and life calculations are correct.
- Calculate own operating and purchasing costs based on measurement results.
- Use acquired knowledge to adjust the quality and design of gun barrels and associated equipment.
- Use acquired knowledge to adjust price and delivery requirements.
- Use lifetime calculations on existing weapon systems measured against equipment in stock, as input to the operating and investment budget.

Qualifying gun barrels

Maintain safety

Conditioning monitoring

Automatic report generation



Robinca 155mm measurement system

Robinca is a portable and versatile measurement system for assessment of pitting, erosion and general wear of gun barrels. It combines visual inspection with highly accurate non-contact measurement technology. The measurement system complies with standards provided by the barrel manufacturers and operating organization, such as TdV018.

Capacitive sensors provide an almost unlimited accuracy (it “sees the first molecule”) and can be specified to measure at micron level. The Robinca system is designed for an accuracy of 5µm, and repeatability better than 1µm. The sensors are solid and contain no moving parts. They are rugged and durable and are not easily affected by ambient conditions.



Technical specification

Robinca 155mm measurement head

Length:	532mm
Weight:	9,5kg
Diameter:	Ø154,5mm
Material:	Anodized aluminium
Colour:	Black

Diameter measurement

Technology:	Capacitive sensors
No. of sensors:	8
Accuracy mm:	±0,005mm
Accuracy mm:	±0,020mm
Resolution:	±0,001mm

Calibration ring and certificate

Condition monitoring of 155mm gun barrel includes diameter measurement, visual inspection and area calculation of findings. The Robinca system ensures an effective automatic condition monitoring process.

The measurement procedure includes predefined measurement positions, and the crawler automatically transport the measurement head to each positions. At each position the system performs a diameter measurement automatically. After the last predefined position the system returns back into the launcher. The Robinca software instruct the operator during the entire process.

The report is saved continuously during the entire measurement sequence. It is possible to save a PDF or excel file including raw data.

Description of use

The Robinca measurement probe is inserted into the muzzle end of the barrel by means of a launcher. Visual inspection is performed utilizing a rotating colour camera equipped with internal lights. The measurement unit is moved into the barrel by a crawler, and then automatically positioned at each predefined measuring point.

At the measurement positions, the capacitive sensors collect measurement data from the barrel. Average measurement accuracy is better than +/-5 microns. Repeatability is +/-1 micron.

Stored data can be displayed and reports is automatically generated from the software.



Robinca control unit & software

The Robinca system is robust and does withstand many years of normal use. Based upon our experience the life expectancy of the Robinca system is more than 20 years.

The Control Unit is compound of a Laptop and a MCU Datalogger. All implemented in a smart transport box with wheels and an extractable handle.

Setup of the system is quick and easy where the Control Unit is connected to the measurement head and the crawler with a 20m cable ensuring power, signal transfer and gas pressure. The gas pressure is needed to press the capacitive sensors as close as possible against the gun barrel wall to gain best possible measurement accuracy. In addition the Control Unit provides power to the position laser.



The Robinca software supports all gun barrels. The operator can create adapted inspection procedures based upon the tolerances for each gun barrel. Through customized guidelines the software can confirm any diameter measurement deviation. The software instructs the operator each step during the measurement procedure.

The Robinca system detect wear, bulges, burnup and other damages inside a gun barrel that may expose personnel to shooting accidents. Discovering shooting and hit deviations that could put a combatant at risk during a sharp mission does matter.



Technical specification

Robinca Control unit

Items:	Laptop & Datalogger
Dimensions:	565 x 355 x 241mm
Weight:	12kg
Colour:	Black

Robinca software

Operating system:	Windows 11
Type of calibre:	Big, Medium and Small
Type of measurement:	Diameter measurement Groove by groove Scan of a section
Report format:	csv, xml, PDF, Html



Foto: Synne Nilsson/Försvaret



Robinca 120mm measurement system

This system is used for assessing smooth bore Leopard 2 Gun Barrel. It combines visual inspection with non-contact measurement methods.

According to standards supplied by the barrel manufacturers and/or operating organizations, diameter increase, pitting depth and damaged area of chromium plating must be documented. In order to comply with these standards the measurement head is equipped with laser line deflection as well as capacitive sensors.

The Robinca 120mm measurement system consists of a camera, a crawler and a measurement head. The camera and the crawler are connected to the 120mm Robinca measurement head and assembled into the launcher.

The complete assembly is mounted by snap-on clamps onto the muzzle end of the barrel. All cables are connected to the control unit. Area measurement is carried out in the BCSoft software.

Technical specifications

Robinca 120mm measurement head

Length:	380mm
Weight:	9kg
Diameter:	Ø119,6mm
Material:	Anodized aluminium
Colour:	Black

Diameter measurement

Technology:	Capacitive sensors
No. of sensors:	8
Accuracy 119-122mm:	±0,005mm
Accuracy 122-126mm:	±0,020mm
Resolution:	±0,001mm

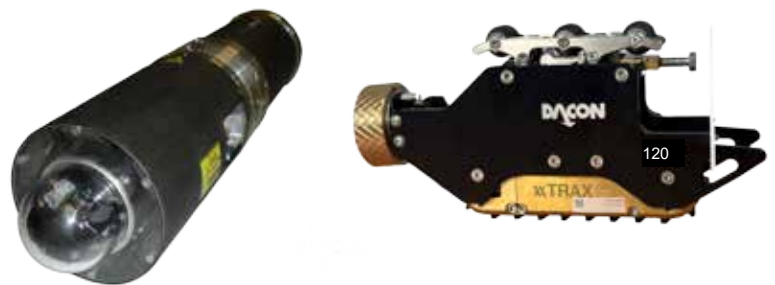
Calibration ring and certificate

Depth measurement

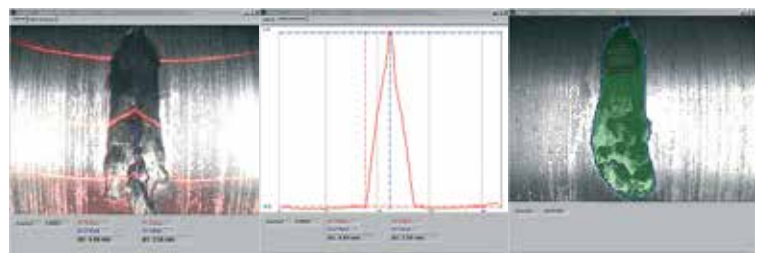
Technology:	Laser line deflection
Accuracy 0-7mm:	±0,050mm
Resolution:	±0,005mm

Camera

Specifications: See page 9



The system provides the possibility to perform either barrel and chamber measurement or only either one of the two. The measurement data are automatically stored in data files and visualized as tables and graphs.

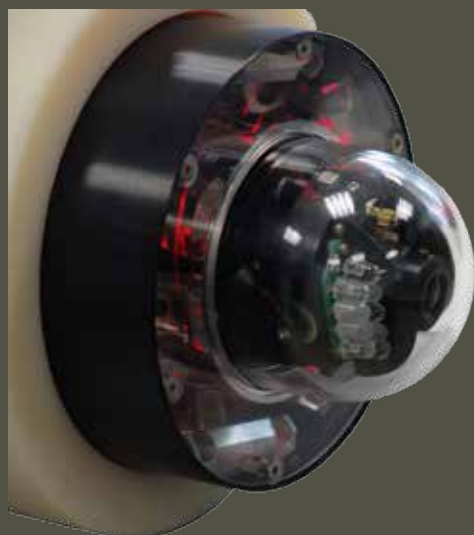


Description of use

The Robinca measurement probe is inserted into the muzzle end of the barrel by means of a launcher. Visual inspection is performed utilizing a rotating colour camera equipped with internal lights. The measurement unit is moved into the barrel by a crawler, and then automatically positioned at each predefined measuring point.

At the measurement positions, the capacitive sensors collect measurement data from the barrel. Average measurement accuracy is better than +/-5 microns. Repeatability is +/-1 micron.

Stored data can be displayed and reports is automatically generated from the software.



Robinca 120mm chamber measurement head



This system measures 8 predefined cross-sections in a chamber, as specified in the barrel manufacturer handbook.

Caseless ammunition requires a higher focus on the chamber. An increased diameter larger than 0,05 mm in the rear end should not be allowed according to standard.

Rolling balls situated all the way around the probe body ensures easy and safe insertion and rotation, either in the calibration ring or in the chamber.

The measurement probe is rotated manually according to instructions from the software. Pictures can be imported into the report.



A certified calibration ring is included. The purpose of this calibration ring is to set the correlation between the capacitive measurement and millimeters prior to a measurement sequence.

Description of use

Robinca measurement head is inserted into the chamber at rotation 0 degree. The probe has to be turned manually as instructed by the software.

At the predefined measurement positions, the capacitive sensors collect measurement data from the barrel. Average measurement accuracy is better than +/-20 microns. Repeatability is +/-1 micron. Stored data can be displayed and reports is automatically generated from the software.

Technical specification

Robinca 120mm chamber measurement probe

Length:	737,7mm
Weight:	13kg
Diameter:	Ø158,0mm
Material:	Anodized aluminium
Colour:	Black dim

Diameter measurement

Technology:	Capacitive sensors
No. of sensors:	16
Accuracy 119 (+4/-0)mm:	±0,020mm
Accuracy 158 (+4/-0)mm:	±0,020mm
Resolution:	±0,002mm

Calibration ring and certificate





Robinca 105mm measurement system

Robinca is a portable and versatile measurement system for assessment of pitting, erosion and general wear of gun barrels. It combines visual inspection with highly accurate non-contact measurement technology. The measurement system complies with standards provided by the barrel manufacturers and operating organization, such as TdV018.

Technical specification

Robinca 105mm measurement head

Length:	532mm
Weight:	6,6kg
Diameter:	Ø104,7mm
Material:	Anodized aluminium
Colour:	Black

Diameter measurement

Technology:	Capacitive sensors
No. of sensors:	8
Accuracy mm:	±0,005mm
Accuracy mm:	±0,020mm
Resolution:	±0,001mm

Calibration ring and certificate



Condition monitoring of 105mm gun barrel includes diameter measurement, visual inspection and area calculation of findings. The Robinca system ensures an effective automatic condition monitoring process.

The measurement procedure includes predefined measurement positions, and the crawler automatically transport the measurement head to each positions. At each position the system performs a diameter measurement automatically. After the last predefined position the system returns back into the launcher. The Robinca software instruct the operator during the entire process.

The report is saved continuously during the entire measurement sequence. It is possible to save a PDF or excel file including raw data.

Description of use

The Robinca measurement probe is inserted into the muzzle end of the barrel by means of a launcher. Visual inspection is performed utilizing a rotating colour camera equipped with internal lights. The measurement unit is moved into the barrel by a crawler, and then automatically positioned at each predefined measuring point.

At the measurement positions, the capacitive sensors collect measurement data from the barrel. Average measurement accuracy is better than +/-5 microns. Repeatability is +/-1 micron.

Stored data can be displayed and reports is automatically generated from the software.



Robinca 30mm measurement probe

The probe is manually fed into the barrel by extendable rods. This system measures caliber and groove diameters. A fixed tape measure indicates longitudinal position.

According to requirements set by the barrel manufacturers and/or operating organization, potential diameter increase must be assessed and documented. In order to comply with these requirements the measurement head is equipped with capacitive sensors.

The measurement data are automatically stored in data files and visualized as tables and graphs. By use of a VideoProbe pictures can be saved and imported into the Robinca report.



Description of use

Before initiating the Robinca measurement, we recommend to carry out the visual inspection by use of the VideoProbe. Robinca is inserted into the muzzle end of the barrel by extendable rods resting in a tripod mounted crib. The probe is pushed and rotated in the barrel manually according to instructions from the QtBCS software. At the selected measurement positions, the capacitive sensors collect measurement data from the barrel.



Technical specifications

Robinca 30mm measurement system

Length incl. extension rods:	2 660mm
Weight incl. extension rods:	19kg
Diameter, measurement head:	Ø29,9mm
Material, measurement head:	Stainless steel

Diameter measurement

Technology:	Capacitive sensors
No. of sensors:	4
Accuracy @ 0,5mm:	±0,005mm
Accuracy @ 1,2mm:	±0,050mm

Calibration ring and certificate





Robinca small caliber

The measurement probe is manually fed into the barrel by a single rod. This system measures the diameter on top of each caliber and down into each groove. A fixed tape measure indicates longitudinal position.

Technical specification

Robinca 12,7mm measurement probe

Length: 1220mm
 Diameter: Ø12,5mm
 Caliber, accuracy mm: ±0,010mm
 Groove, accuracy mm: ±0,030mm

Robinca 7,62mm measurement probe

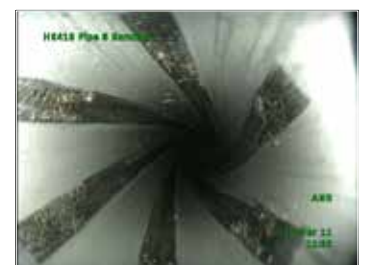
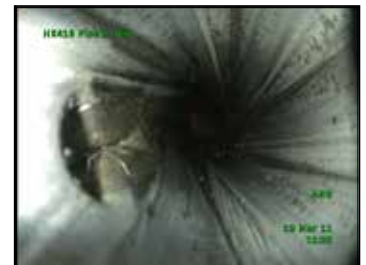
Length: 1000mm
 Diameter: Ø7,5mm
 Caliber, accuracy mm: ±0,010mm
 Groove, accuracy mm: ±0,030mm

Robinca 5,56mm measurement probe

Length: 800mm
 Diameter: Ø5,4mm
 Caliber, accuracy mm: ±0,010mm
 Groove, accuracy mm: ±0,030mm

According to requirements set by the barrel manufacturers and/or operating organization, potential diameter increase must be assessed and documented. In order to comply with these requirements the measurement head is equipped with capacitive sensors.

The measurement data are automatically stored in data files and visualized as tables and graphs. By use of a VideoProbe pictures can be saved and imported into the Robinca report.



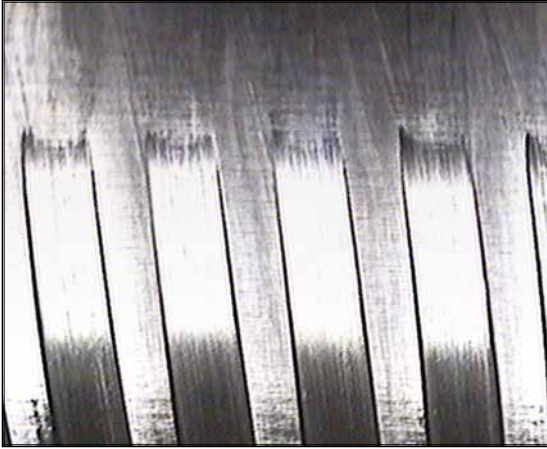
Calibration ring and certificate



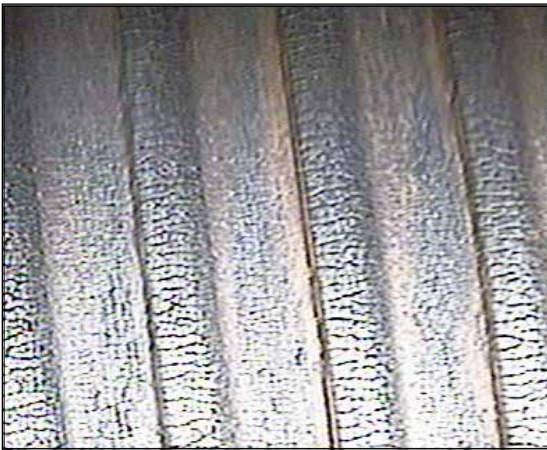
Description of use

Before initiating the Robinca measurement, we recommend to carry out the visual inspection by use of the VideoProbe. Robinca is inserted into the muzzle end of the gun by a single rod. The probe is pushed and rotated in the barrel manually according to instructions from the QtBCS software. At the selected measurement positions, the capacitive sensors collect measurement data from the barrel.

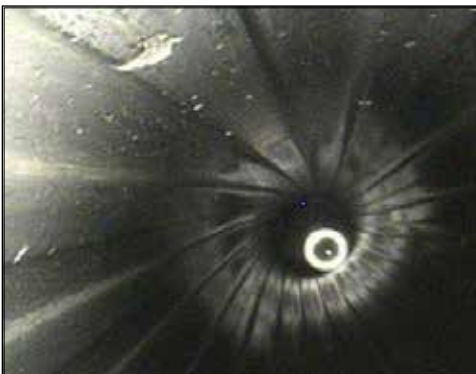
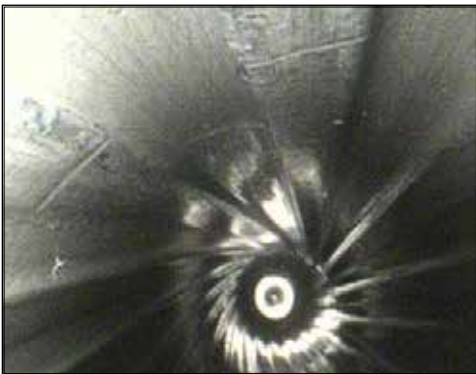
Examples of findings



Same 155mm cannon barrel - brand new and towards wear life time



155mm cannon barrel - copper deposits



30mm cannon barrel - detonation inside



Everest Mentor Visual iQ+ VideoProbe

Visual inspections by use of the VideoProbe can detect indications that helps an operator to make good decisions in condition monitoring of gun barrels, engines or turbines.

The Everest Mentor Visual iQ+ (MViQ+) VideoProbe is our most advanced portable, connected digital flexible borescope with 3D Measurement and remote wireless collaboration. It accurately detects visual findings such as corrosion, cracking, pits and tearing-off parts of a caliber or chromium. This is the only video borescope that features voice-activated commands, making it possible to freeze-frame live video, increase dark boost, save an image, and more - without the need for an extra hand.

A full selection of interchangeable probes with standard and measurement optical tips are designed to meet diverse application requirements.

The MViQ+ combines portability with powerful processing. It meets a variety of inspection needs with interchangeable probes and tip optics. The touchscreen interface enables faster navigation, precise cursor placement, and on-screen typing and annotation to speed up inspections. Designed and tested to recognized civilian and military standards (IP65, MIL-STD-810H and MIL-STD-461G), the device is dependable in the field. And at just 6.75lbs with a lithium-ion battery, the aircraft compliant MViQ+ stores in overhead compartments for easy mobility.

With Wi-Fi enabled Bluetooth keyboard and headset, inspectors of all levels can work together instantly. Inspectors will be able to share screens and images, gather opinions and even make notes in real time with Inspection Connect—no matter the environment or distance between them.

The images can easily be imported into a Robinca report.



Technical specification

Mentor Visual iQ+ VideoProbe

Weight:	From 3,0 kg
Diameter probe:	Ø4.0mm, 6.1mm, 8.4mm
Waterproof:	1 bar
Image sensor:	1/6" Color superHAD CCD camera
Pixel Count:	SD or HD format
Housing:	Titanium
Power:	Lithium Ion Battery, 10.8V
Hard button/joystick interface:	Yes
IP65/MIL-810 field durability & ruggedness:	Yes
QuickChange battery pack:	Yes
Connectivity:	Yes
<ul style="list-style-type: none"> • Wi-Fi/Bluetooth • Network drive mapping • InspectionWorks-ready 	
Comparison Measurement	Yes
Model can be upgraded	Yes
40/80/160GB SSB internal memory	Yes
QuickChange probes	Option
Touchscreen interface	Option
Real3D measurement	Option
Stereo measurement	Option
Probability of Detection Suite	Option
iView Remote for streaming & control	Option
Voice control	Option

Everest Mentor Flex VideoProbe

The Everest Mentor Flex is a digital video borescope with fixed insertion tube. Complete inspections with unrivaled TrueSight™ image clarity, housed on a large 5.8" WXGA (Wide XGA) LCD screen with Gorilla® Glass. Industry-leading light output means clearer images and more accurate assessments.

With mounting demand to get inspections done quicker and cheaper, without compromising the accuracy of the results, most equipment can't withstand the pressure. Combining portability with military-grade durability, the Everest Mentor Flex answers the call with the features you always wished you'd had for the tasks that demand it — all to help you make smart decisions, fast.

With an upgraded articulation design founded on high-power steering motors, the Everest Mentor Flex allows technicians to effortlessly navigate even the most challenging inspection paths, resulting in less time spent searching and more time spent capturing and analyzing indications — at a fraction of the time and cost.

Constructed with military-grade magnesium housing (MIL-STD) and tested by a third party to withstand the rigors of the industrial workplace, you can trust your Everest Mentor Flex borescope to deliver top performance in even the harshest environmental conditions.

Standard compliance and classifications are MIL-STD-810H and MIL-STD-416G.



Technical specification

Everest Mentor Flex VideoProbe

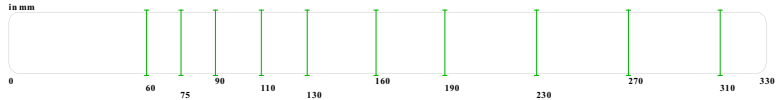
Weight:	From 2.5 kg
Diameter probe:	3.9mm, 4.0mm, 6.1mm, 8.4mm
Waterproof:	1 bar
Image sensor:	1/6" SuperHAD™ CCD camera
Pixel Count:	440 000 pixels
Housing:	Titanium
Power:	3h Lithium Ion Battery

Hard button/joystick interface:	Yes
MIL-STD-810H compliant:	Yes
MIL-STD-461G compliant:	Yes
IP rating:	IP65
QuickChange battery pack:	Yes
Internal memory:	32GB

Small caliber report

BCS result file

Barrel station : 17 / 0 Chamber station : 0 / 0
 Pictures : 10 Laser Measures : 0
 Max diameter : 7.884 Min diameter : 7.601



Software Revision : QBCS 1.2.0.26
 Operator : Harald Heimlund
 NATO stock number:
 Vehicle registration number:
 Shots count:

Date : 20160928
 Measurement type : station_per_station

Barrel

Tube

Ref: tube_762
 ID: 0033
 Length : 330mm
 Tube Diameter: 7.62mm
 Groove Diameter: 0mm
 Groove Count : 4

Probe

Ref: small_kaliber
 ID: S1571
 Layout : mcuframe

Stations (17)

Position (mm)	Radius Mode	Groove Mode	Station Number
60.00	tube centered view	groove per groove radius	1
75.00	tube centered view	groove per groove radius	2
90.00	tube centered view	groove per groove radius	3
110.00	tube centered view	groove per groove radius	4
130.00	tube centered view	groove per groove radius	5
160.00	tube centered view	groove per groove radius	6
190.00	tube centered view	groove per groove radius	7
230.00	tube centered view	groove per groove radius	8
270.00	tube centered view	groove per groove radius	9
310.00	tube centered view	groove per groove radius	10
350.00	tube centered view	groove per groove radius	11
390.00	tube centered view	groove per groove radius	12
410.00	tube centered view	groove per groove radius	13
413.00	tube centered view	groove per groove radius	14
416.00	tube centered view	groove per groove radius	15
419.00	tube centered view	groove per groove radius	16
422.00	tube centered view	groove per groove radius	17

Kalibers Overview (mm)

Station (mm) / Angular position (degree)

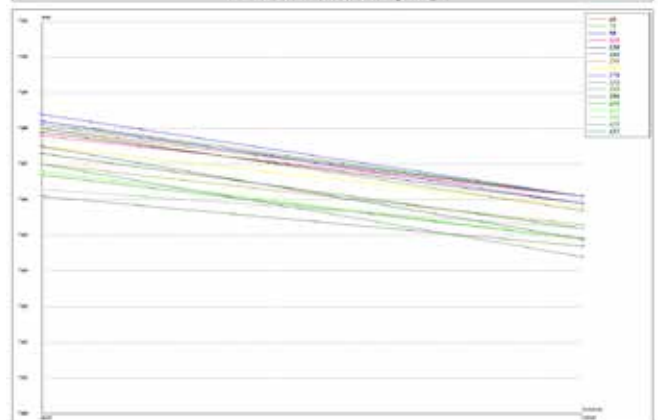
	0.0°	90.0°
60	7.63	7.62
75	7.64	7.64
90	7.63	7.63
110	7.64	7.63
130	7.64	7.63
160	7.64	7.63
190	7.62	7.61
230	7.64	7.63
270	7.64	7.63
310	7.62	7.60
350	7.65	7.63
390	7.63	7.62
410	7.74	7.71
413	7.75	7.74
416	7.71	7.69
419	7.75	7.73
422	7.80	7.79

Grooves Overview (mm)

Station (mm) / Angular position (degree)

	45.0°	135.0°
60	7.88	7.86
75	7.88	7.86
90	7.88	7.86
110	7.88	7.86
130	7.88	7.86
160	7.88	7.86
190	7.87	7.85
230	7.88	7.86
270	7.88	7.86
310	7.86	7.85
350	7.88	7.86
390	7.87	7.85
410	7.87	7.85
413	7.87	7.85
416	7.86	7.85
419	7.87	7.84
422	7.88	7.85

Grooves Overview (mm)



Medium caliber report

BCS result file

Barrel station : 24 / 0 Chamber station : 0 / 0
 Pictures : 14 Laser Measures : 0
 Max diameter : 31.303 Min diameter : 30.036



Software Revision : QBCS 1.2.0.12
 Operator : Harvard Heilmund
 NATO stock number:
 Vehicle registration number:
 Shots count: ukjent

Date : 20161125
 Measurement type : station_per_station

Barrel

Tube
 Ref: ref_30
 ID: 04330261
 Length : 2700mm
 Tube Diameter : 30mm
 Groove Diameter : 0mm
 Groove Count : 16

Probe
 Ref: small_kaliber
 ID: PRO Z 027sp90A
 Layout: mcaufame

Tolerances

30mm bushmaster
 $\Delta 25: 30.036 + 0.08\text{mm}$
 $0 - 75\text{mm}: 30.01 + 0.065\text{mm}$
 Grooves: $31.4 \pm 0.105\text{mm}$

Stations (24)

Position (mm)	Radius Mode	Groove Mode	Station Number
100.00	tube centered view	groove per groove radius	1
145.00	tube centered view	groove per groove radius	2
180.00	tube centered view	groove per groove radius	3
225.00	tube centered view	groove per groove radius	4
275.00	tube centered view	groove per groove radius	5
325.00	tube centered view	groove per groove radius	6
450.00	tube centered view	groove per groove radius	7
675.00	tube centered view	groove per groove radius	8
850.00	tube centered view	groove per groove radius	9
1075.00	tube centered view	groove per groove radius	10

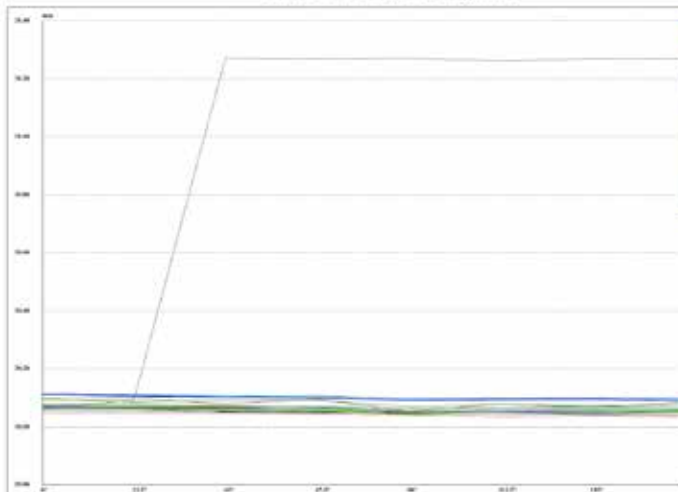
Grooves Overview (mm)

Station (mm) / Angular position (degree)	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
100 mm	31.25	31.25	31.26	31.25	31.19	31.18	31.20	31.18
145 mm	31.23	31.24	31.23	31.25	31.18	31.19	31.17	31.18
180 mm	31.22							
225 mm	31.22							
275 mm	31.24							
325 mm	31.23							
450 mm	31.25							
675 mm	31.27							
850 mm	31.28							
1075 mm	31.27							
1275 mm	31.27							
1475 mm	31.27							
1675 mm	31.26							
1875 mm	31.27							
2075 mm	31.27							
2275 mm	31.27							
2475 mm	31.28							
2500 mm	31.30							
2525 mm	31.27							
2550 mm	31.30							
2575 mm	31.28							
2578 mm	31.27							

Kalibers Overview (mm)

Station (mm) / Angular position (degree)	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
100 mm	30.09	30.10	30.08	30.09	30.05	30.08	30.07	30.08
145 mm	30.10	30.09	30.09	30.09	30.07	30.08	30.07	30.07
180 mm	30.07	30.07	30.06	30.07	30.05	30.05	30.05	30.05
225 mm	30.05	30.05	30.05	30.05	30.04	30.04	30.04	30.04
275 mm	30.06	30.06	30.05	30.05	30.05	30.05	30.04	30.04
325 mm	30.06	30.05	30.05	30.05	30.05	30.05	30.05	30.05
450 mm	30.07	30.07	30.07	30.07	30.06	30.07	30.07	30.07
675 mm	30.06	30.07	30.06	30.06	30.05	30.05	30.05	30.05
850 mm	30.07	30.07	30.07	30.06	30.05	30.05	30.05	30.05
1075 mm	30.06	30.07	30.07	30.06	30.05	30.05	30.05	30.05
1275 mm	30.07	30.07	30.06	30.06	30.05	30.05	30.05	30.06
1475 mm	30.06	30.06	30.06	30.05	30.05	30.05	30.05	30.05
1550 mm	30.06	30.07	30.06	30.06	30.05	30.05	30.05	30.06
1675 mm	30.06	30.06	30.06	30.06	30.04	30.05	30.05	30.06
1875 mm	30.06	30.07	30.07	30.06	30.05	30.05	30.05	30.05
2075 mm	30.07	30.09	31.27	31.27	31.27	31.26	31.27	31.27
2275 mm	30.07	30.07	30.07	30.07	30.05	30.06	30.06	30.06
2375 mm	30.08	30.08	30.07	30.07	30.07	30.07	30.07	30.07
2475 mm	30.11	30.11	30.11	30.11	30.10	30.10	30.10	30.10
2500 mm	30.11	30.11	30.10	30.11	30.10	30.10	30.10	30.10
2525 mm	30.11	30.10	30.10	30.10	30.09	30.09	30.10	30.10
2550 mm	30.11	30.11	30.11	30.10	30.09	30.09	30.09	30.09
2575 mm	30.11	30.11	30.10	30.10	30.09	30.09	30.09	30.09
2578 mm	30.12	30.11	30.10	30.10	30.09	30.10	30.10	30.09

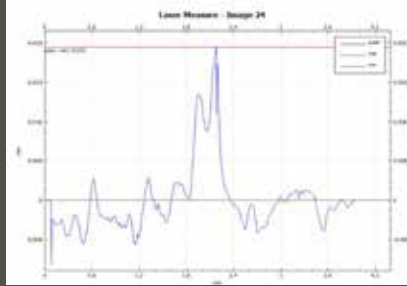
Kalibers Overview (mm)



10:53 25/11/2016



120mm smooth barrel report



BCS result file

Barrel station : 6 / 0 Chamber station : 6 / 0
 Pictures : 29 Laser Measures : 4
 Max diameter : 120.042 Min diameter : 119.866



Software Revision : QtBCS 1.2.0.12
 Operator : Halvard Heimland
 NATO stock number : 1015-12-178-9535
 Vehicle registration number: Nammo Teststr
 Shots count: 292

Date : 20161205
 Measurement type : station_per_station

Barrel

Tube
 Ref: 120mm leo2
 ID : 2265
 Length : 5280mm
 Tube Diameter : 120mm
 Groove Diameter : 0mm
 Groove Count : 0

Probe
 Ref: analog
 ID : PRO Z0276120A
 Layout : cascaded

Stations (6)

Position (mm)	Radius Mode	Groove Mode	Station Number
70.00	tube centered view	groove to groove diameter	1
205.20	tube centered view	groove to groove diameter	2
400.00	tube centered view	groove to groove diameter	3
3300.70	tube centered view	groove to groove diameter	4
3999.60	tube centered view	groove to groove diameter	5
4099.30	tube centered view	groove to groove diameter	6

Angular Section : Average Diameter (mm)

Station (mm) / Angular position (degree)	0°	6°	12°	18°	24°	30°	36°	42°	48°	54°	60°	66°	72°	78°	84°	90°	96°	102°	108°	114°	120°	126°	132°	138°	144°	150°	156°	162°	168°	174°	
70 mm	119.99	119.99	120.00	120.00	120.00	119.99	120.00	120.00	120.00	119.99	119.98	119.99	119.99	119.98	119.98	119.98	119.97	119.96	119.98	119.97	119.95	119.96	119.97	119.96	119.96	119.97	119.98	119.98	119.98	119.99	119.99

Angular Section : Min Diameter (mm)

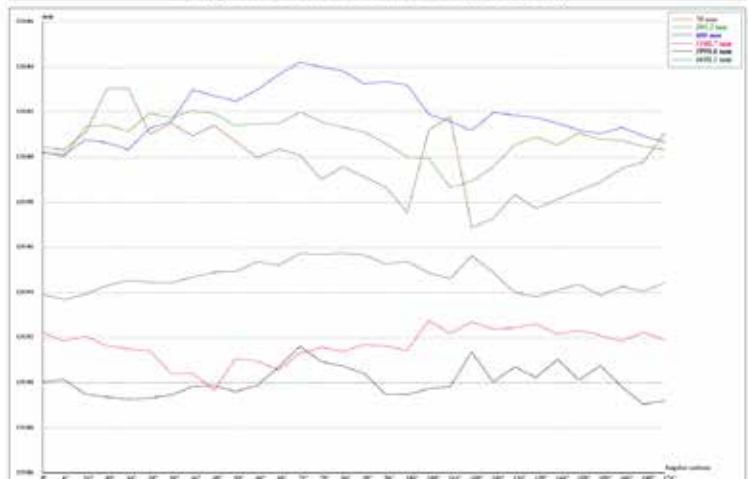
Station (mm) / Angular position (degree)	0°	6°	12°	18°	24°	30°	36°	42°	48°	54°	60°	66°	72°	78°	84°	90°	96°	102°	108°	114°	120°	126°	132°	138°	144°	150°	156°	162°	168°	174°	
70 mm	119.97	119.97	119.99	119.98	119.97	119.98	119.98	119.98	119.98	119.97	119.97	119.97	119.97	119.97	119.97	119.96	119.96	119.93	119.95	119.94	119.94	119.95	119.95	119.95	119.95	119.95	119.95	119.96	119.97	119.98	119.98

Angular Section : Max Diameter (mm)

Station (mm) / Angular position (degree)	0°	6°	12°	18°	24°	30°	36°	42°	48°	54°	60°	66°	72°	78°	84°	90°	96°	102°	108°	114°	120°	126°	132°	138°	144°	150°	156°	162°	168°	174°	
70 mm	120.00	120.00	120.01	120.03	120.03	120.01	120.02	120.01	120.01	120.01	120.00	120.00	120.00	119.99	120.00	119.99	119.99	119.98	120.01	120.02	119.97	119.97	119.98	119.98	119.98	119.99	119.99	119.99	120.00	120.01	120.01
205.2 mm	120.00	120.00	120.01	120.01	120.01	120.02	120.02	120.02	120.02	120.01	120.01	120.01	120.02	120.02	120.01	120.01	120.01	120.00	120.00	119.99	119.99	120.00	120.01	120.01	120.01	120.01	120.01	120.01	120.01	120.01	120.01
400 mm	120.00	120.00	120.01	120.01	120.00	120.01	120.02	120.03	120.03	120.02	120.03	120.04	120.04	120.04	120.04	120.03	120.03	120.03	120.02	120.02	120.01	120.02	120.02	120.02	120.02	120.01	120.01	120.01	120.01	120.01	120.01
3300.7 mm	119.92	119.92	119.92	119.92	119.92	119.91	119.90	119.90	119.90	119.90	119.91	119.91	119.91	119.92	119.92	119.91	119.92	119.92	119.91	119.93	119.92	119.92	119.92	119.93	119.92	119.92	119.92	119.92	119.92	119.92	119.92
3999.6 mm	119.90	119.90	119.89	119.89	119.89	119.89	119.89	119.89	119.89	119.90	119.90	119.90	119.91	119.92	119.91	119.90	119.89	119.89	119.90	119.90	119.91	119.90	119.91	119.90	119.91	119.90	119.91	119.90	119.89	119.89	119.89
4099.3 mm	119.94	119.94	119.94	119.94	119.95	119.94	119.94	119.95	119.95	119.95	119.95	119.95	119.96	119.96	119.96	119.96	119.95	119.95	119.95	119.95	119.96	119.95	119.95	119.94	119.94	119.94	119.94	119.94	119.94	119.94	



Angular Section : Max Diameter (mm)



155mm rifled barrel report

BCS result file

Barrel station : 13 / 0 Chamber station : 0 / 0
 Pictures : 25 Laser Measures : 0
 Max diameter : 157.625 Min diameter : 154.919



Software Revision : QHBCS 1.2.0.32 Date : 20200430
 Operator : Halvard Heimlund Measurement type : station_per_station
 NATO stock number :
 Vehicle registration number: 90011
 Shots count: ca 120

Barrel

Tube
 Ref: K9 155mm
 ID: 47001
 Length: 8090mm
 Tube Diameter: 155mm
 Groove Diameter: 0mm
 Groove Count: 48

Probe
 Ref: analog
 ID: PRO A 0266155A
 Layout: cascaded

Grooves Overview (mm)

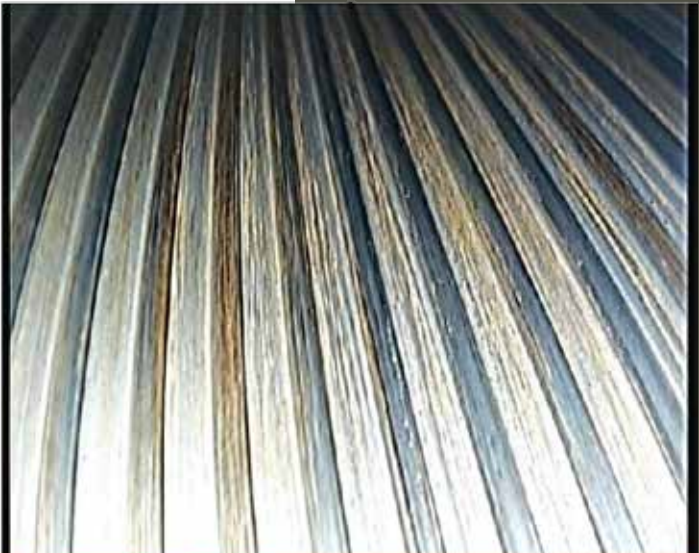
Station (mm) / Angular position (degree)	1.9°	9.2°	16.7°	24.2°	31.7°	39.1°	46.6°	54.1°	61.6°	69.1°	76.7°	84.2°	91.7°	99.1°	106.7°	114.2°	121.7°	129.1°	136.6°	144.1°	151.7°	159.1°	166.6°	174.2°	
14.1	157.51	157.54	157.55	157.56	157.55	157.55	157.54	157.56	157.56	157.56	157.55	157.55	157.53	157.54	157.47	157.47	157.46	157.46	157.45	157.47	157.47	157.48	157.49	157.50	157.50
893.9	157.50	157.52	157.52	157.52	157.51	157.52	157.52	157.54	157.54	157.54	157.54	157.54	157.51	157.48	157.48	157.48	157.48	157.48	157.48	157.48	157.48	157.48	157.48	157.48	157.49
1894.1	157.50	157.53	157.52	157.52	157.53	157.53	157.54	157.54	157.55	157.55	157.55	157.52	157.49	157.50	157.50	157.49	157.49	157.49	157.49	157.49	157.49	157.49	157.48	157.48	157.49
3894.3	157.49	157.53	157.53	157.52	157.52	157.52	157.53	157.54	157.53	157.54	157.54	157.54	157.51	157.48	157.48	157.48	157.48	157.48	157.48	157.47	157.46	157.46	157.46	157.45	157.46
4394.1	157.49	157.53	157.52	157.51	157.52	157.52	157.52	157.53	157.52	157.53	157.53	157.54	157.50	157.47	157.47	157.47	157.47	157.47	157.47	157.47	157.48	157.48	157.48	157.48	157.48
4893.6	157.49	157.51	157.51	157.50	157.50	157.50	157.50	157.52	157.51	157.53	157.53	157.53	157.50	157.47	157.47	157.47	157.47	157.46	157.46	157.46	157.47	157.47	157.46	157.46	157.47
5394.1	157.49	157.51	157.51	157.51	157.51	157.50	157.51	157.52	157.51	157.53	157.53	157.53	157.51	157.48	157.48	157.48	157.48	157.48	157.48	157.47	157.48	157.48	157.48	157.48	157.47
5893.9	157.49	157.51	157.51	157.51	157.50	157.51	157.50	157.52	157.51	157.53	157.53	157.55	157.51	157.49	157.49	157.49	157.49	157.49	157.49	157.49	157.48	157.48	157.48	157.47	157.47
6393.7	157.50	157.53	157.53	157.53	157.53	157.53	157.54	157.54	157.55	157.56	157.56	157.53	157.50	157.49	157.49	157.49	157.49	157.48	157.48	157.48	157.48	157.48	157.47	157.46	157.46
6739.5	157.52	157.57	157.56	157.56	157.56	157.55	157.55	157.55	157.55	157.56	157.57	157.57	157.54	157.51	157.50	157.51	157.50	157.51	157.50	157.49	157.49	157.49	157.48	157.49	157.49
6819.6	157.55	157.59	157.59	157.59	157.58	157.58	157.57	157.60	157.59	157.61	157.62	157.62	157.59	157.55	157.55	157.54	157.54	157.53	157.52	157.52	157.52	157.51	157.51	157.51	157.51
6835.6	157.55	157.60	157.59	157.59	157.59	157.59	157.58	157.61	157.60	157.62	157.62	157.63	157.59	157.56	157.55	157.55	157.54	157.53	157.53	157.53	157.52	157.52	157.52	157.51	157.51

Kalibers Overview (mm)

Station (mm) / Angular position (degree)	12.9°	20.4°	27.8°	35.3°	42.8°	50.3°	57.8°	65.4°	72.9°	80.4°	87.8°	95.4°	103.0°	110.4°	118.0°	125.4°	132.8°	140.3°	147.8°	155.3°	162.8°	170.4°	177.9°	185.4°	
14.1	155.06	155.01	155.02	155.03	155.03	155.02	155.01	155.00	154.99	155.00	155.00	155.00	155.01	155.00	154.99	154.99	154.99	154.99	154.99	155.00	155.01	155.01	155.02	155.02	155.00
893.9	154.96	154.97	154.96	154.96	154.96	154.97	154.97	154.97	154.96	154.96	154.96	154.96	154.97	154.97	154.96	154.96	154.97	154.96	154.96	154.95	154.95	154.95	154.95	154.96	154.95
1894.1	154.96	154.96	154.95	154.95	154.96	154.96	154.96	154.96	154.95	154.95	154.95	154.96	154.95	154.96	154.97	154.96	154.96	154.97	154.97	154.97	154.97	154.97	154.98	154.98	154.98
2894.1	154.97	154.97	154.96	154.96	154.97	154.97	154.96	154.96	154.96	154.95	154.95	154.96	154.96	154.98	154.97	154.98	154.98	154.98	154.98	154.98	154.98	154.98	154.98	154.98	154.99
3894.3	154.95	154.97	154.96	154.96	154.97	154.94	154.96	154.96	154.96	154.95	154.95	154.95	154.94	154.96	154.96	154.96	154.96	154.95	154.95	154.95	154.94	154.95	154.95	154.94	154.94
4394.1	154.95	154.96	154.95	154.96	154.96	154.96	154.95	154.94	154.94	154.94	154.94	154.94	154.94	154.94	154.94	154.95	154.95	154.95	154.95	154.95	154.95	154.95	154.95	154.95	154.96
4893.6	154.95	154.95	154.95	154.94	154.95	154.95	154.94	154.94	154.94	154.94	154.94	154.94	154.94	154.94	154.94	154.95	154.95	154.96	154.96	154.96	154.96	154.96	154.96	154.96	154.96
5394.1	154.95	154.94	154.95	154.95	154.94	154.94	154.93	154.94	154.95	154.94	154.95	154.94	154.95	154.96	154.96	154.96	154.96	154.97	154.97	154.97	154.97	154.96	154.97	154.97	154.97
5893.9	154.92	154.93	154.92	154.92	154.94	154.93	154.92	154.93	154.93	154.93	154.96	154.94	154.95	154.97	154.96	154.95	154.95	154.96	154.96	154.95	154.95	154.95	154.97	154.95	154.96
6393.7	154.99	154.99	155.00	155.00	155.00	155.00	154.99	155.00	155.01	155.00	154.99	154.98	154.99	155.00	155.00	155.00	154.99	155.00	155.00	155.00	155.00	155.00	155.00	154.99	154.99
6739.5	155.03	155.05	155.05	155.06	155.06	155.05	155.04	155.04	155.05	155.05	155.05	155.05	155.05	155.05	155.06	155.05	155.04	155.04	155.04	155.03	155.04	155.03	155.03	155.03	155.03
6819.6	155.05	155.07	155.07	155.07	155.07	155.06	155.06	155.06	155.06	155.06	155.06	155.06	155.07	155.07	155.06	155.06	155.05	155.05	155.05	155.05	155.04	155.04	155.04	155.04	155.04
6835.6	155.06	155.07	155.07	155.07	155.07	155.07	155.06	155.06	155.07	155.07	155.07	155.07	155.07	155.06	155.06	155.06	155.06	155.05	155.05	155.05	155.05	155.04	155.04	155.04	155.05

Image 15

Image 9



Position: 3435.1 mm Rotation: 191° Tilt: 90°
 Comments: gasbulkhead

Position: 2089.4 mm Rotation: 246° Tilt: 43°
 Comments: mantle

GBMS database & software

Gun Barrel Management System

Gun Barrel Management System (GBMS) is a database and analysis software that collects and contains measurement data from the Robinca system or other measurement tools. GBMS compiles management data from measurement data and displays the data for decision making. GBMS provides interface to other military records.

This is to support the Armed Forces service organization and weapon experts in their assessment and evaluation of condition and quality of the individual weapon system or the global fleet. Safety and operational availability will improve and maintained in the best possible way by not exceeding tolerances. Wear and damage can be detected before they cause accidents or provide poor performance during a mission.

Every gun barrel measurement tool generates a lot of measurement data. To be able to save measurement data and analyze the information, the Gun Barrel Management System database is vital.

In an informative and well-arranged way GBMS makes measurement data from the Robinca system or other measurement tools available. It combines the measurement data with Defence organization data and material to support the service organization of the Armed Forces and weapon experts in their assessment and evaluation of the quality and condition of the individual tubes or of the total fleet.

It also provides functionality to compare inspections over time for the same barrel – including pictures – and compare inspections from different barrels. It stores all the inspections in the database and allows the users to see details develop over time. GBMS organizes the barrels and weapon systems into groups and hierarchies that can be changed and defined by the Administrator user. For each weapon system you can register shots, ammo used, in order for the officers to keep track of the usage of the weapon and the time to next inspection according to the limits recommended by the producer and the authorities. It is also possible to register other useful information like hit rate and temperature influencing the wear and tear for the barrel.

ENHANCE SAFETY &
OPERATIONAL AVAILABILITY

CONDITION MONITORING

SUPPORT FOR PURCHASE &
NEGOTIATIONS

OPTIMIZE HIT PROBABILITY

FOLLOW-UP CONTRACTS,
GUARANTEES & PROCEDURES

Unit	Barrel type	Ea	Status	Reason
Brigade 1	30mm barrel	149	Approved	
Brigade 1	30mm barrel	15	Approved w/comment	
Brigade 1	30mm barrel	12	Not evaluated	
Brigade 1	120mm smooth bore	35	Approved	
Brigade 1	120mm smooth bore	9	Not evaluated	
Brigade 2	155mm barrel	56	Approved	
Brigade 2	155mm barrel	36	Not evaluated	
Brigade 2	155mm barrel	8	Shooting prohibition	Safety
Brigade 3	155mm barrel	79	Approved	
Brigade 3	155mm barrel	19	Not evaluated	
Brigade 3	155mm barrel	2	Shooting prohibition	Safety

Status	Ea	%
Approved	319	76
Approved w/comment	15	3,5
Not evaluated	76	18
Shooting prohibition	10	2,4

Operational status
Fleet management



Benefits

Every gun barrel measurement tool generates a lot of measurement data. To be able to save measurement data and analyze the information, the GBMS database is vital.

In an informative and well-arranged way GBMS makes measurement data from the Robinca system or other measurement tools available. It combines the measurement data with Defence organization data and material to support the service organisation of the Armed Forces and weapon experts in their assessment and evaluation of the quality and condition of the individual tubes or of the total fleet.

The GBMS contributes to optimal management and service efficiency, provides an overview of the status of the Armed Forces material, budgeting, preservation and distribution of competence and experience across the Armed Forces organizations.

GBMS imports the data from the inspection and provides functionality to read, analyse and enrich the inspections with more data and comments.

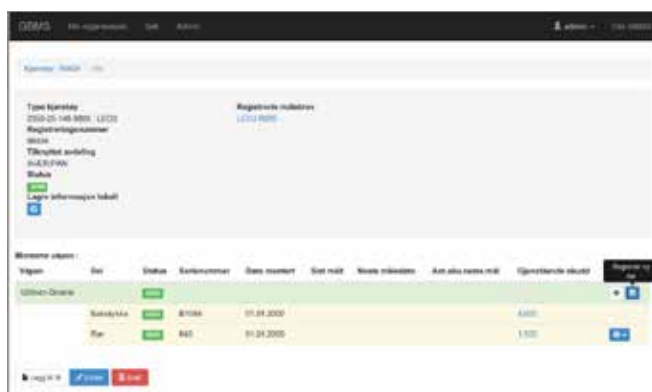
Functionality to compare inspections over time for the same barrel – including pictures – and compare inspections from different barrels.

GBMS stores all the inspections in the database and allows the users to see details develop over time.

GBMS organises the barrels and weapon systems into groups and hierarchies that can be changed and defined by the Administrator user.

For each weapon system you can register shots, ammo used, in order for the officers to keep track of the usage of the weapon and the time to next inspection according to the limits recommended by the producer and the authorities.

It is possible to register other useful information like hit rate and temperature influencing the wear and tear for the barrel.



The screenshot displays the GBMS web application interface. At the top, there is a navigation bar with the GBMS logo and user information. Below this, there are two main sections: 'Type kunnokko' and 'Registroidut kunnokot'. The 'Type kunnokko' section contains a list of technical specifications for a barrel, including '2030-20-140-8000-LE20', 'Registroidut kunnokot', '9000', 'Tilastettu valmistus', '14.03.2000', 'Status', and 'Lisää tarkennuksia tähän'. Below this, there is a table with the following columns: 'Tilanne', 'Seri', 'Status', 'Kunnokkumäärä', 'Osta-aikaväli', 'Osta-päivä', 'Seuraava tarkastus', 'Aika alla normaali', and 'Ongelmatilanteiden määrä'. The table contains two rows of data:

Tilanne	Seri	Status	Kunnokkumäärä	Osta-aikaväli	Osta-päivä	Seuraava tarkastus	Aika alla normaali	Ongelmatilanteiden määrä
Valmis	2030-20-140-8000-LE20	OK	1	10000	01.01.2000	01.01.2000	10000	0
Valmis	2030-20-140-8000-LE20	OK	1	10000	01.01.2000	01.01.2000	10000	0



Foto: Arne Flaaten

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