

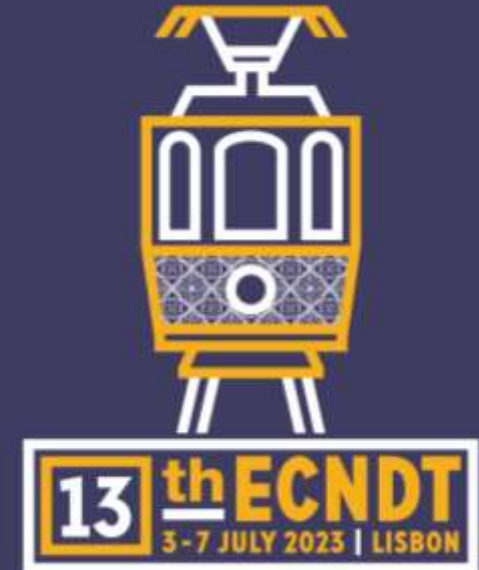
13th EUROPEAN CONFERENCE ON NON-DESTRUCTIVE TESTING

LISBON – PORTUGAL, 3 – 7 JULY 2023

BIO WATER BASED LIQUID PENETRANTS AND MAGNETICS: A SAFER AND COST EFFICIENT SOLUTION FOR TODAY

NDT ITALIANA – www.ndt.it

Speaker: Michele Cevenini



ORGANISERS



Biography



Michele Cevenini is the managing director of NDT Italiana, one of the world's most known non-destructive testing companies.

NDT Italiana has a very long experience manufacturing liquid penetrants, magnetic particles, ultrasonic couplants and UV lamps, and is focused on safety of operators and environment and the productivity of quality control.

Company



NDT ITALIANA

Via Del Lavoro 28
Concorezzo (MB) ITALY
+39 039 64 75 90

WWW.NDT.IT
INFO@NDT.IT

You are welcome to visit us in Italy!



About us – Quality Pioneers

- NDT ITALIANA works since 1952 in the field of NON-DESTRUCTIVE TESTING.
The headquarters are in Italy near Milan. A large area is devoted to production and goods stocking, to guarantee quick supply to customers worldwide
- NDT Italiana is certified UNI EN ISO 9001 and approved NATO AQAP-120, and is equipped with internal Chemical and Electronic Laboratories, Technical Service, Specialised Consulting at the service of our customers



NDT founder, Mrs. Angela in 1952



NDT factory in Italy, near Milan



About us – visit our website WWW.NDT.IT

➤ NDT Italiana manufactures:

1. LIQUID PENETRANTS:

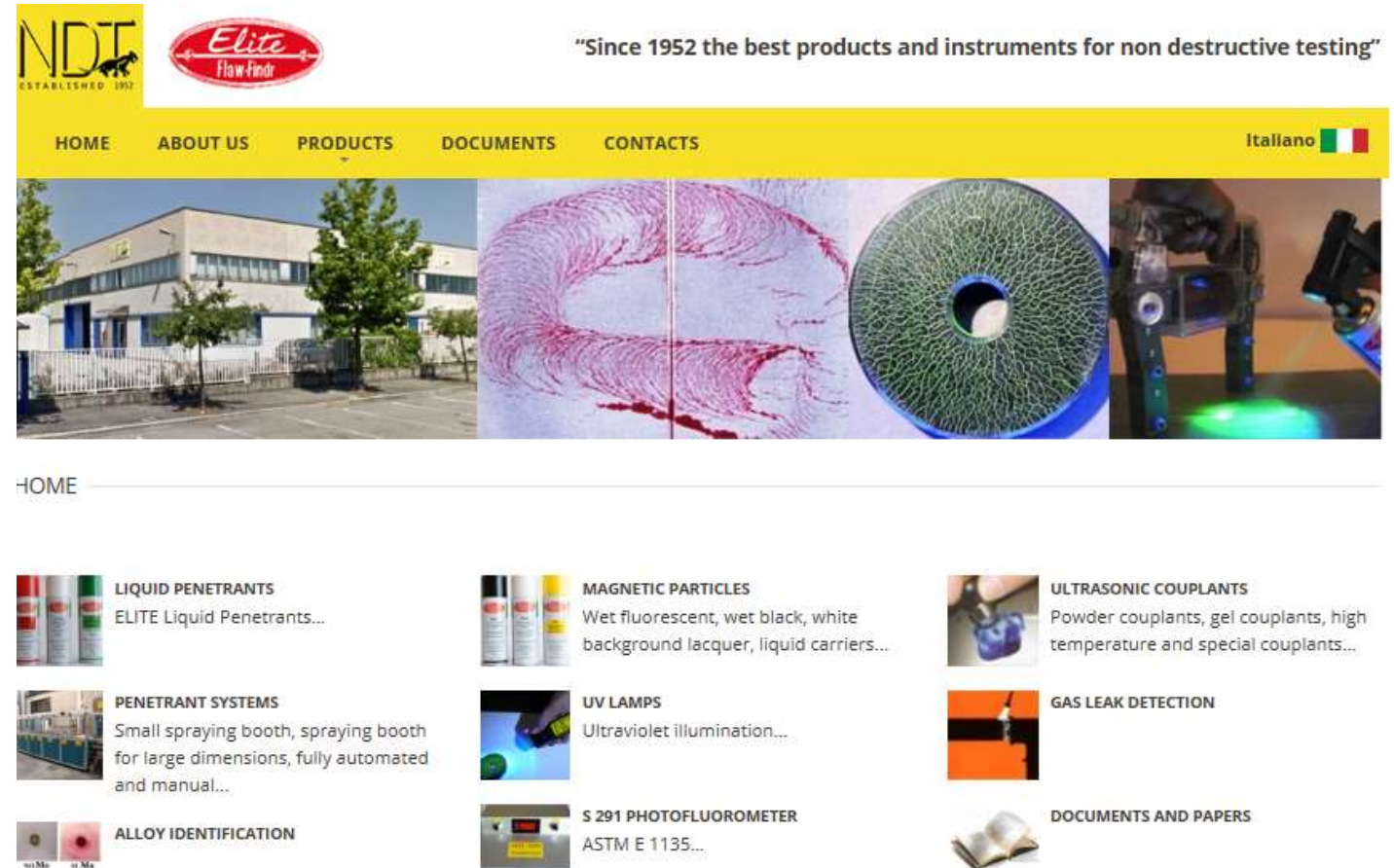
- FLUORESCENT WATER BASED
- RED WATER BASED AND TRADITIONAL OIL-BASED

2. MAGNETIC PARTICLES:

- FLUORESCENT AND DUAL COLORED, BLACK

3. ULTRASONIC COUPLANTS

4. UV LED LIGHTS





About us – Quality Pioneers

- NDT ITALIANA with its products and instruments meets the requirements of many key industrial sectors with turn-key solutions



- NDT Italiana's Products are sold in over 100 countries:

Albania, Algeria, Angola, Argentina, Australia, Austria, Azerbaijan, Bahrain, Bangladesh, Belgium, Bolivia, Bosnia Herzegovina, Brazil, Bulgaria, Canada, Chile, China, Colombia, Congo, Croatia, Cyprus, Czech Republic, Denmark, Ecuador, Egypt, Equatorial Guinea, Estonia, Ethiopia, Finland, France, Germany, Great Britain, Greece, Holland, Hong Kong, Hungary, Iceland, India, Indonesia, Iraq, Ireland, Israel, Italy, Ivory Coast, Japan, Jordan, Kazakhstan, Kenya, Kosovo, Kuwait, Latvia, Lebanon, Libya, Lithuania, Luxembourg, Malaysia, Mali, Malta, Morocco, Mexico, Nepal, New Zealand, Nigeria, Norway, Oman, Pakistan, Panama, Peru, Philippines, Poland, Portugal, Qatar, Romania, Saudi Arabia, Serbia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sudan, Sweden, Switzerland, Taiwan, Thailand, Trinidad, Tunisia, Turkey, Ukraine, United Arab Emirates, United States, Venezuela, Vietnam, Zimbabwe...



International Standards: ISO 3452; ASME V Art. 6; API 20D, AMS 2644...

“Penetrant systems are to be classified as follows [...]:

- Method A(W) Water washable – water containing ($\geq 20\%$ water by volume)

AMS 2644

“Penetrant testing products shall be classified by type method and form [...] Form c: Water Suspendable”

EN ISO 3452

“PT shall be performed using either Type 1 (fluorescent) or Type 2 (visible) penetrant [...]:

- Method A: Water Washable
- Form c: Water suspendable”

API 20D

Safer Products – the BIO line

Elite Bio NDT Products

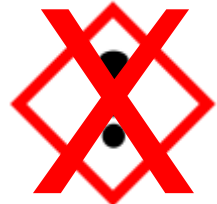
Standard NDT Competitor Products



GHS02



Flammable



GHS07



Xi Irritant



Xn Harmful



Environmental Hazard



Penetrant and Magnetic Bio products are not flammable, not harmful, not even irritant for the eyes or the skin, not polluting for the environment



Bio Liquid Penetrants: Advantages for the operators and the environment

The VOC Solvents Emissions Directive (1999/13/EC) regulates the emissions of volatile organic compounds

Safety Advantages:

1. No flammability risk, not irritant for the eyes or the skin of the operator (water-based)
2. 0% Volatile Organic Compounds (VOC), no expensive air treatment with active carbon filtration needed, safe for the environment

Cost Advantages:

1. No costs of cabins with active carbon filtration for solvents (being water-based)
 2. Economical: free of oil and other volatile solvents
 3. Lower risks and costs associated with Environmental Protection Agencies
- Same sensitivity and process parameters compared to traditional oil- based penetrants and solvent-based developers



K71B2 BIO red penetrant+
Elite DWS2 developer



Elite BIO line – Calculating the emissions reduction

NDT's industry contribution to global targets (Paris Agreement, EU Climate Neutrality "Fit for 55")

- Our NDT industry can contribute to the global targets by reducing the unnecessary use of VOCs during the quality control process
- It is easy to calculate the economic advantage when using Bio liquid penetrants and magnetics.
But how much can we really save in emissions when operators choose a COV-free alternative in liquid penetrants and magnetics?
- We measured:
 - 1) **TVOC** (total volatile organic compounds) levels in mg/M³;
 - 2) **CO₂** (carbon dioxide) levels in ppm.

while using different kinds of spray and cans water-based equivalent products, to be able to effectively show the quantity of emissions we can save by using water-based formulations.



Elite BIO line – using compressed air as propellant

NDT's compared to polluting traditional propellants used in the NDT industry as butane/propane or CO2 gas



Spray Cans



Versus:

Bio water-based red penetrant and developer

Referee:



Elite BIO line – using compressed air as propellant

Elite NDT compared to polluting traditional propellants used in the NDT industry as butane/propane or CO₂ gas

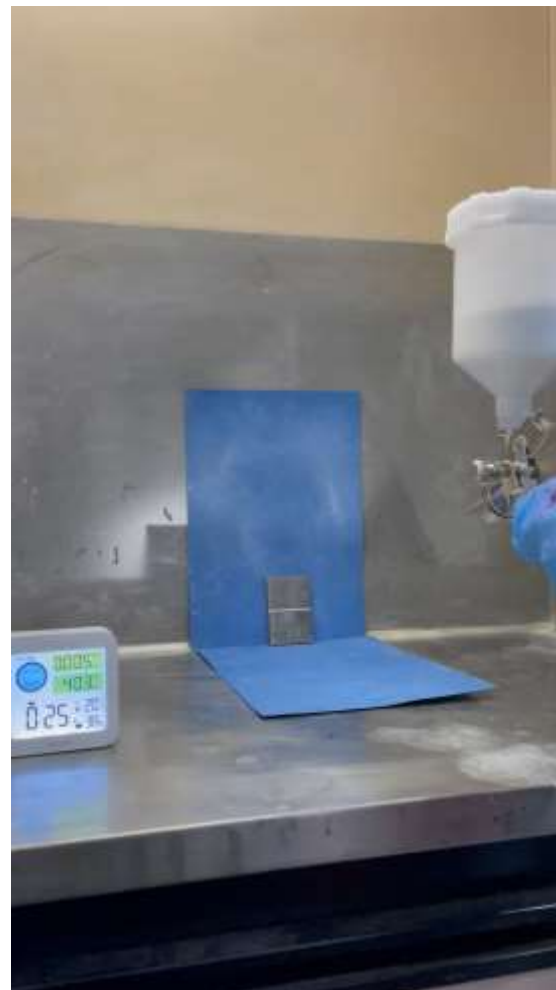
VOCs and CO₂ increase using spray cans





Elite BIO line – using compressed air as propellant

VOCs and CO₂ do not increase using Bio water based developer, penetrant or solvent





Elite BIO line – using compressed air as propellant

Elite Bio compared to polluting traditional propellants used in the NDT industry as butane/propane or CO2 gas

Measurement of VOCs and CO ² (5 seconds spraying time)				
	Unit of measure: mg/M ³		Unit of measure: ppm	
	VOC level (closed environment)	VOC level (with aspiration)	CO ² level (closed environment)	CO ² level (with aspiration)
Product				
Red Liquid penetrant spray A	Out of range (over 10 mg/M ³)	3,8	Out of range (over 10k ppm)	3.400
Red Liquid penetrant spray B	1,6	1,3	1.400	1.000
Elite red penetrant K71 B2 Bio	Zero (0)	Zero (0)	Zero (0)	Zero (0)
Developer spray A	Out of range (over 10 mg/M ³)		Out of range (over 10k ppm)	9.300
Developer spray B	Out of range (over 10 mg/M ³)	Out of range (over 10 mg/M ³)	Out of range (over 10k ppm)	9.400
Elite DWS2 water suspendable developer	Zero (0)	Zero (0)	Zero (0)	Zero (0)
Solvent / Remover for penetrant A	Out of range (over 10 mg/M ³)	Out of range (over 10 mg/M ³)	Out of range (over 10k ppm)	Out of range (over 10k ppm)
Solvent / Remover for penetrant B	Out of range (over 10 mg/M ³)	Out of range (over 10 mg/M ³)	Out of range (over 10k ppm)	9.300
Elite 20 solvent remover	Zero (0)	Zero (0)	Zero (0)	Zero (0)
Fluorescent magnetic spray A	1,2	0,5	1.900	700
Fluorescent magnetic spray B	0,8	0,5	1.600	1.300
Elite FW1 fluorescent dual water-based magnetic	Zero (0)	Zero (0)	Zero (0)	Zero (0)
Fluorescent liquid penetrant Spray A	Out of range (over 10 mg/M ³)	4,1	Out of range (over 10k ppm)	1.500
Fluorescent liquid penetrant Spray B	Out of range (over 10 mg/M ³)	5,6	Out of range (over 10k ppm)	3.800
Elite K81B bio water based liquid penetrant	Zero (0)	Zero (0)	Zero (0)	Zero (0)
Black magnetic spray A	4,1	3,4	4.300	3.500
Black magnetic spray B	1,2	0,9	1.700	1.300
Elite BW2C black water-based magnetic	Zero (0)	Zero (0)	Zero (0)	Zero (0)
No Products sprayed (ambient)	0,02		402	
21 Degrees Celsius, Umidity 30%				



Elite BIO line – using compressed air as propellant

Conclusions

- In every environment there is a different natural base level of TVOCs and CO₂ depending on the Country / area, time of the day, so the measurements have been differential: values measured with no NDT activity versus values measured while applying solvent, penetrant, developer or magnetics
- Different spray cans show a different level of TVOCs and CO₂, depending on how much and which type of propellant is in use, and whether the base active product inside the spray can (example the liquid penetrant) contains VOCs or not
- All water-based products have registered NO difference at all in the level of TVOCs or CO₂, significantly contributing to reducing pollution caused by these components.
- Even working in a cabin with strong aspiration, not 100% of the pollutants are aspirated away: for this reason it is important to wear a suitable mask, and evaluate the use of Bio water based products

Red Bio Liquid Penetrant indications on test block

Stable and reliable indications' sizing over time



Penetrant Elite K71B2 BIO red
penetrant+ Elite DWS2 developer

Left: few seconds after development

Right: 10 min after development



Form c developer allows twice as long
developing time (2 hours max)



Competitor equivalent «B»

Left: few seconds after application

Right: 10 min after application



Too much bleed out =
generation of false cracks +
missing small ones

Company case studies in the Oil&Gas industry

Liquid Penetrant Inspection with Bio penetrants

- Large Valve producer for the Oil&Gas Industry
 - Target: eliminate any risk for the operators and dangerous emissions (VOC volatile organic compounds) during quality inspection of Valves with liquid penetrants and magnetics
 - Solution: Elite red Bio Penetrant K71B2 and white developer water suspendable Elite DWS2
 - Easy to apply and economical, uses a compressed air spraying gun (no empty spray cans to dispose of)



Company case studies in the Oil&Gas industry

Liquid Penetrant Inspection with Bio penetrants

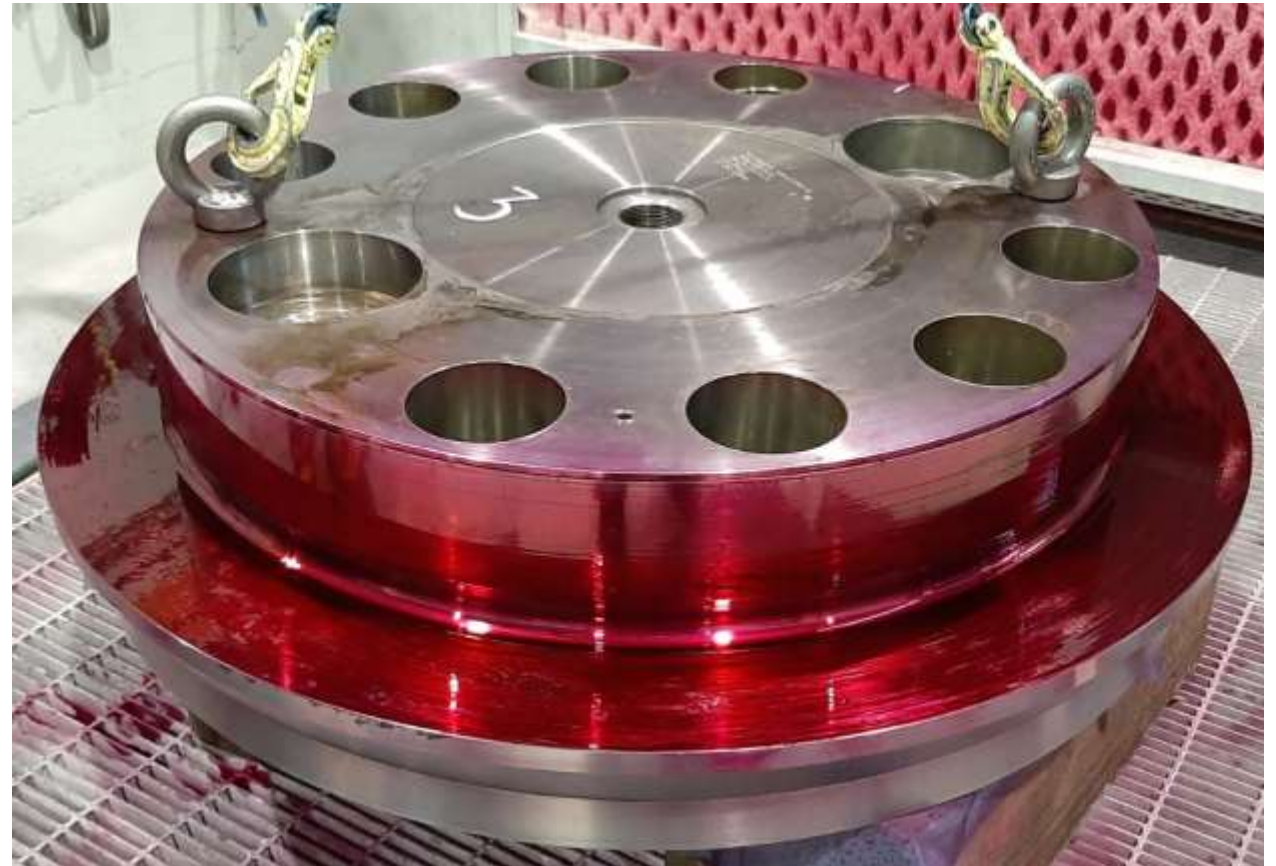
- Large producer for the Oil&Gas Industry
 - Target: large pieces to be inspected with max operator's safety and environment care
 - Solution: water based penetrant Elite K71B2 bio



Company case studies in the Oil&Gas industry

Liquid Penetrant Inspection with Bio penetrants

- Using Elite K71B2.bio on large components
 - Less over spray in the air: the product is applied with a standard compressed air erogator (or by brush or dipping)
 - Less waste of empty spray cans and propellant gas in the air



Company case studies in the Oil&Gas industry

Liquid Penetrant Inspection with Bio penetrants

- Using Elite K71B2.bio on long components
 - Very long pipe
 - No possibility of air aspiration and active carbon filtration due to large size



Company case studies in the Oil&Gas industry

Liquid Penetrant Inspection with Bio penetrants

- Using Elite K71B2.bio on many small components
 - When working with many components of small dimensions, it is a good idea to dip them in a tank with Elite K71B2.bio
- Advantages:
 - Faster productivity (many pieces covered with penetrant all together)
 - No aspiration needed on the tank



Company case studies in the Oil&Gas industry

Liquid Penetrant Inspection with Bio penetrants

- Using Elite K71B2.bio on Ship Parts
 - When working with large ship parts using Elite K71B2.bio is easier:
 - Less over spray in the air- the product is applied with a standard compressed air erogator
 - Less waste of empty spray cans and propellant gas in the air





Company case studies in the Oil&Gas industry

Liquid Penetrant Inspection with Bio penetrants

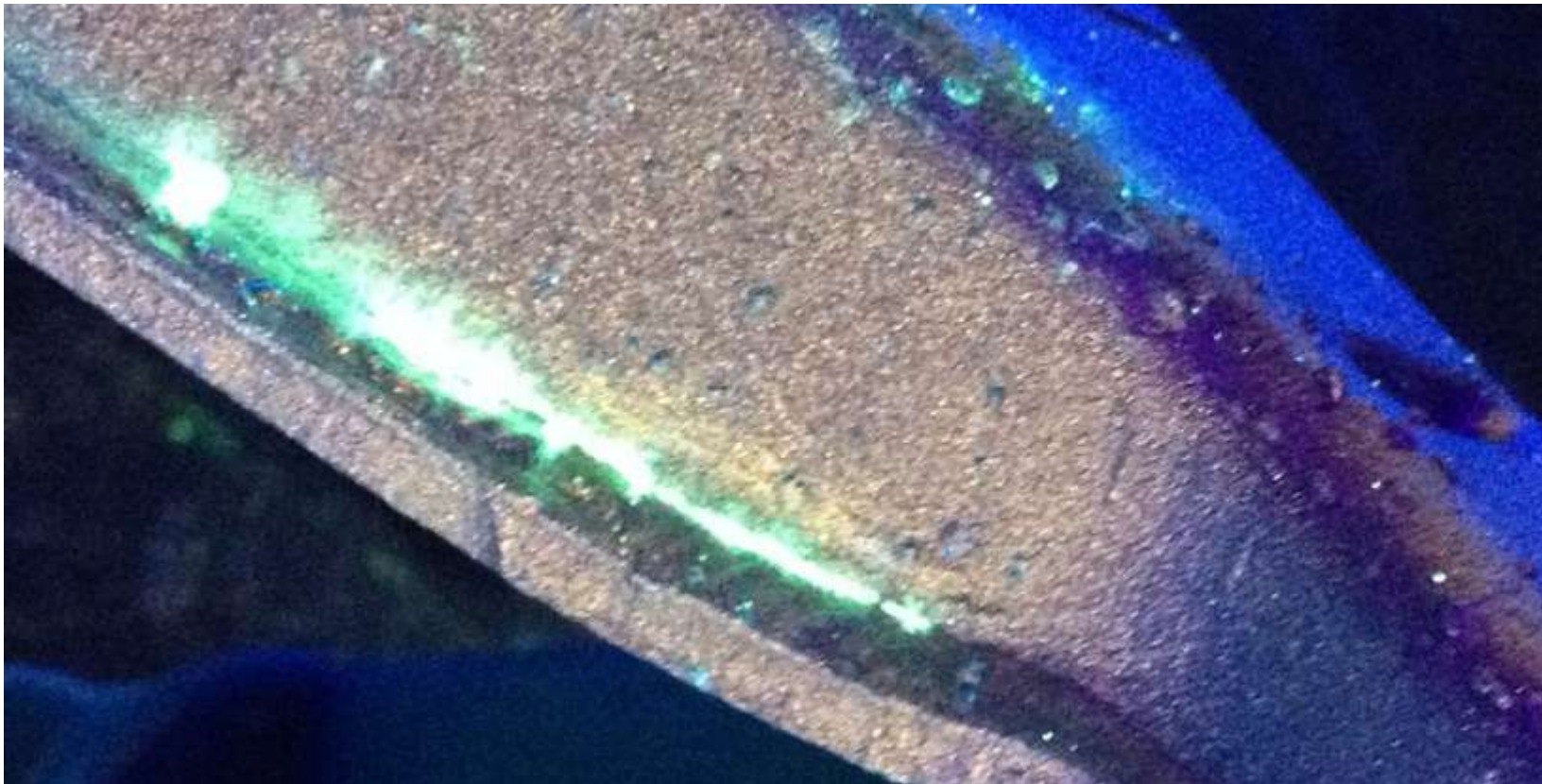
- Large producer for the Oil&Gas Industry
 - Target: use only water based risk free products to improve to sustainability profile of the Company
 - Solution: water based penetrant Elite K71B2 bio and Elite DWS2 white developer
 - Application tutorial



Company case studies in the Oil&Gas industry

Liquid Penetrant Inspection with Bio fluorescent penetrants

The importance of managing background even on rough surfaces



- Liquid Penetrant "Elite K81B"
fluorescent Bio water based on a very
rough surface. Background managed
through the use of a pre-wash with
emulsifier Elite E81B



Magnetic testing with our line of Bio Magnetics

- Also for magnetic inspection today is available the possibility to use a safer Fluorescent Bio Magnetic product

Cracks with Elite FW1AC Bio
Water Based Fluorescent Dual Magnetic:

- No need to apply and remove white contrast paint!



Same Cracks with standard white
contrast paint + black magnetic:

- Need to apply and remove white contrast paint!





Magnetic testing: new safer products



07.130 SY5 SILVER YOKE SUPERLIFT 230 V CA Most powerful AC Yoke on the market: allows you to work quickly with the best definition of indications

Maximum magnetic poles opening on the market: 18 inches (457 mm) across poles: for fast inspection of large parts

Best duty cycle: 50% (up to 2 minutes on – 2 minutes off)

Dimension 280x273x70 mm - 11 H × 10.75 L × 2.75 W in., weight 5,3 Kg - 12 lb



12.143 BAT12 LITHIUM BATTERY KIT FOR ELECTROMAGNETIC YOKES

Extremely light (800g / 28 oz.) portable kit including battery, small waist carrying bag and charger.

Allows a 12V power supply with battery operating time up to 4 hours.



12.142 BAT LITHIUM BATTERY KIT FOR INVERTER

New lithium battery kit that allows the use of the magnetic yoke everywhere with no wires!

12.142 INV PORTABLE YOKE INVERTER DC / AC

It allows to magnetize both in DC and AC!

1st yoke in the world lithium battery powered working DC and AC!

Highest portability: no wires linked to mains

Lightweight battery: only 800 grams (28 oz) in shoulder bag (included)

Voltage: 12V

Capacity: 9 A/h allows for an use of up to 4 hours (50% duty cycle) in AC and up to 8 hours (50% duty cycle) in DC.

Battery charger included.

Dimensions: 260 x 130 x 110 mm (10 x 5 x 4.5 in)

Company case studies in the Oil&Gas industry

Magnetic Particles Inspection with Bio magnetics

- Large producer for the Oil&Gas Industry
 - Target: eliminate any risk for the operators and dangerous emissions (VOC volatile organic compounds) during quality inspection with liquid penetrants and magnetics
 - Solution: Elite Bio Fluorescent Dual Magnetic particles FW1AC
 - No risk for the operator or the environment, economical and fast: no need to apply and then remove the white contrast paint!





Conclusions

Bio water-based Liquid Penetrants and Magnetics for today

- In the past limited use due to:
 - Lower environmental awareness
 - Higher costs
 - More difficult practical application process
- Today:
 - Lower product costs
 - Lower indirect costs (No disposal cost of spray cans)
 - Higher environmental and sustainability awareness
 - Global need to reduce emissions of VOC and CO₂
 - Easy practical application process (but spray cans will always be used!)

Most companies choose a water-based product because of the lowest risk for the operators, but also the lower environmental impact and lower overall costs have had an increasing role in the decision by Companies to try these safer products.



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Q & A SESSION

Thank you for your attention!

WWW.NDT.IT

info@ndt.it

Michele Cevenini

Linkedin Page «NDT Italiana»

Facebook Page «NDT Italiana»

NDT ITALIANA Proudly Supports Beat Leukemia Foundation

www.beat-leukemia.org

***"The difference between difficult and impossible is that impossible takes longer.
Miracles just require faith"***