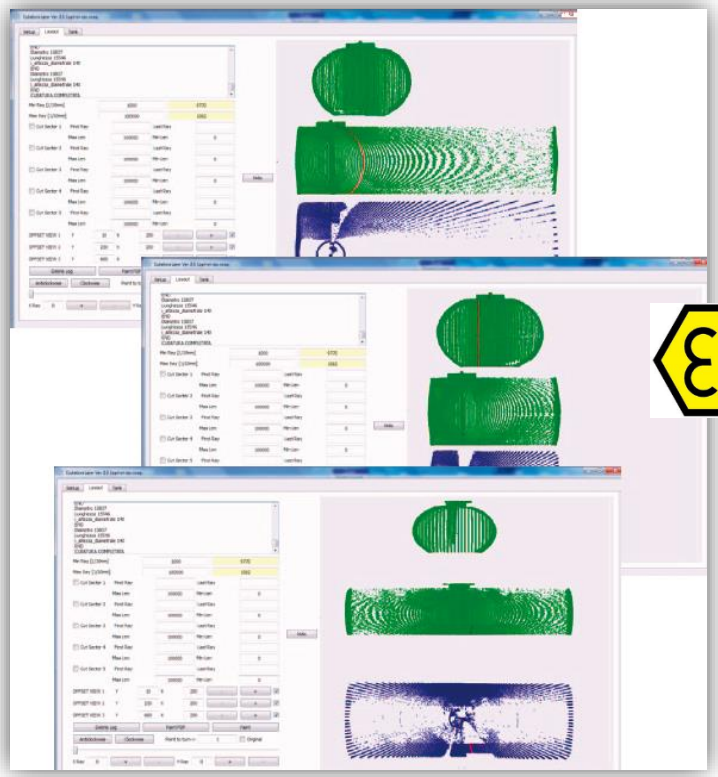
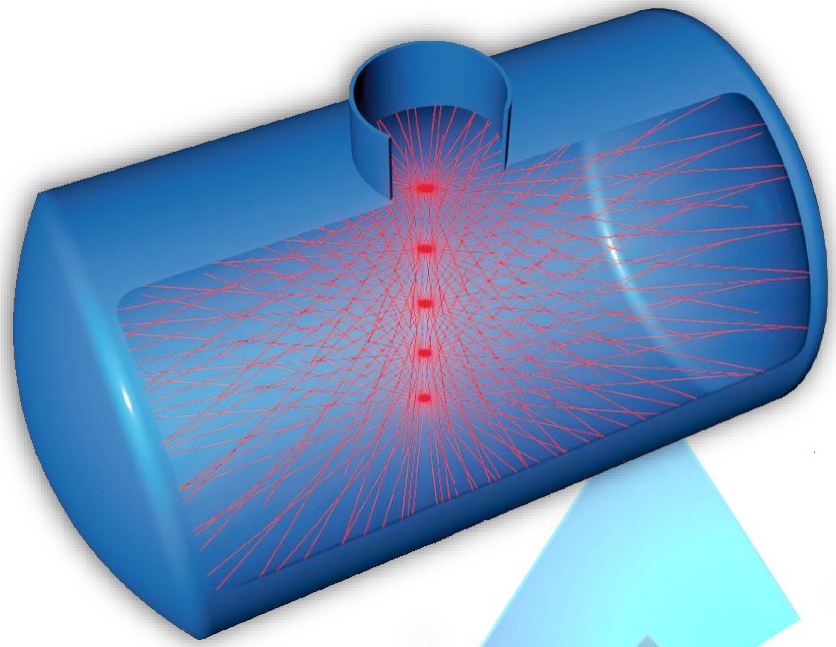
# 3D LASER TANK CALIBRATION



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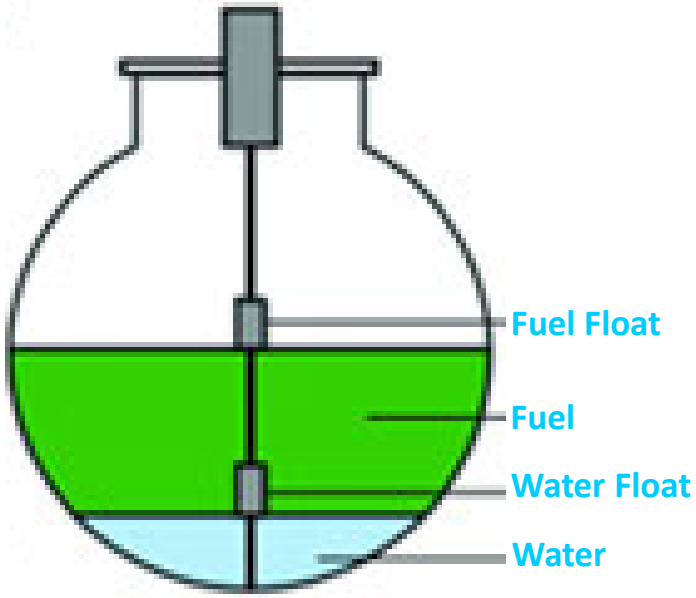
# 3D LASER TANK CALIBRATION
# Why Calibration Needed




**Probes just measure the level of fuel**

**X cm = ? liter**

**The answer is the above question is**

**CORRECT CALIBRATION TABLE**

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# Different Methods for Calibration

- Tank Manufacturer Calibration Table
- Physical Calibration (Wet calibration)
- Dynamic/Automatic Calibration
- Virtual Central Calibration
- 3D LASER CALIBRATION

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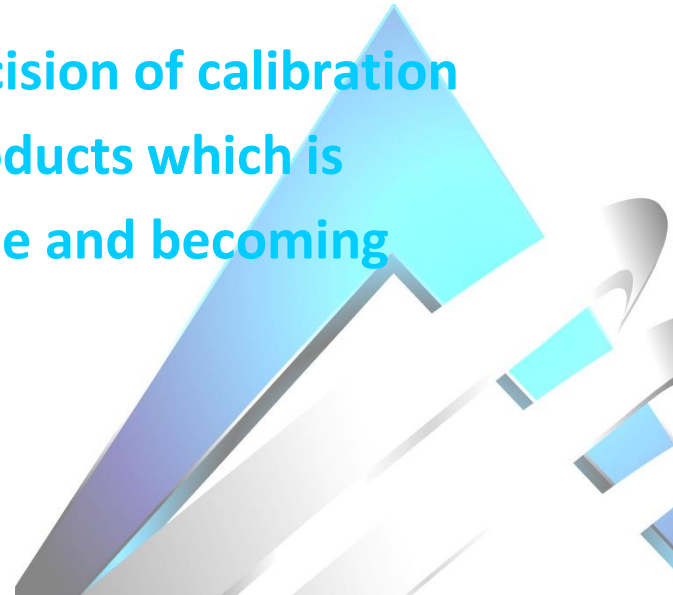
# Tank Manufacturer Calibration Table

All tank manufacturer issues their tank calibration tables which is calculated using mathematical methods.

Calibration table is not unique for each produced tank and it is generic.

For instance 20.000 liters tank is not exactly 20.000 liters volume

Non of tank manufacturer guarantees the precision of calibration table for their own above and ground tank products which is mounted into field because of assembling angle and becoming elliptic shape changing by the time



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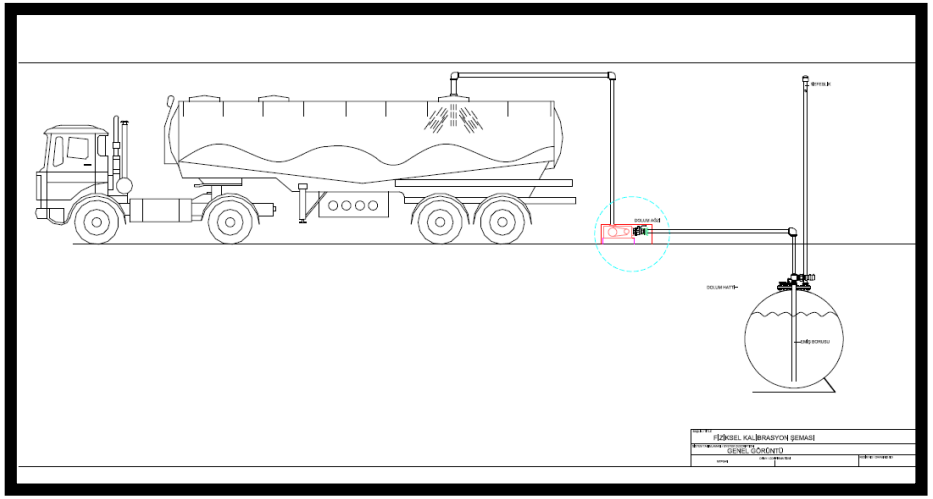
# WET CALIBRATION

Fixed amount of fuel is transfered from tank to tank or tanker by using transfer pump.

Cm and liters value of each transfer matches in a table and creates the calibration tables.



- Huge amount of fuel transfer to station is needed.
- Process takes too long time (~1 day/tank)
- During process on the tank, selling is unable
- Process includes high risk, safety is dependent on the person too much

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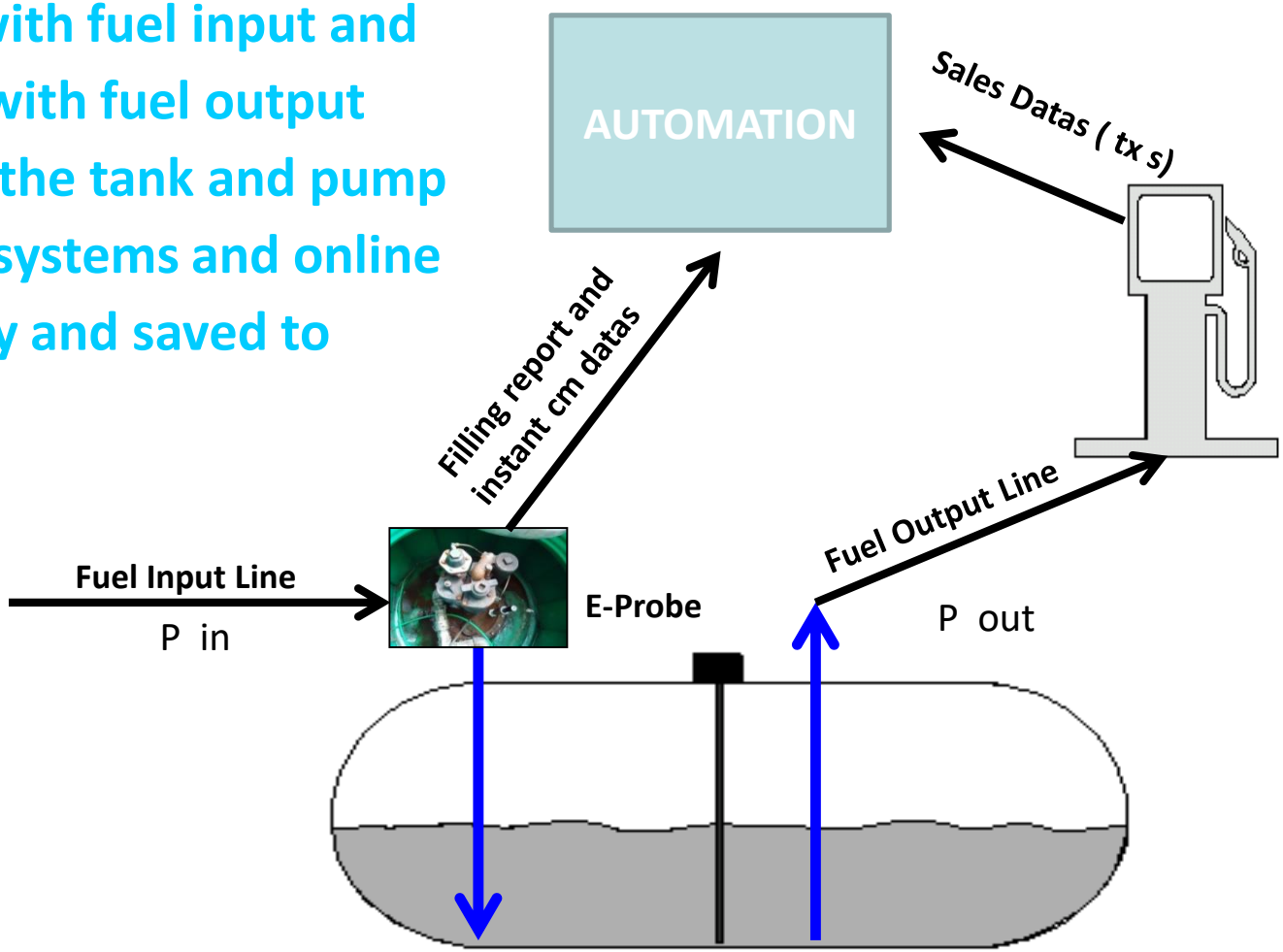
# AUTOMATIC CALIBRATION

Tank filling with fuel input and pump sales with fuel output monitors by the tank and pump automation systems and online electronically and saved to database



# AUTOMATIC CALIBRATION

Not possible to applied to manifolded and syphoned tanks

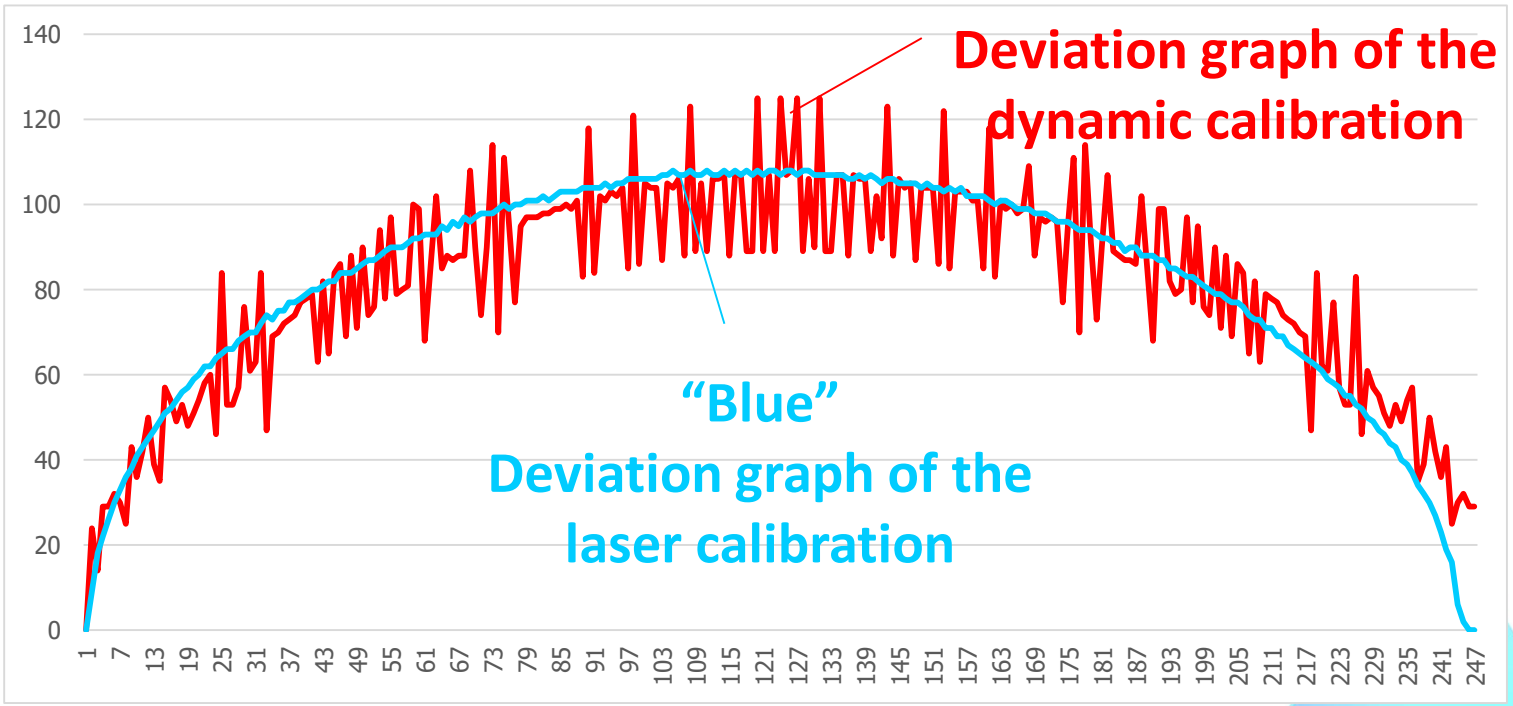
Min. 3-7 tank filling and discharging is needed for each tank. Therefore duration is too long (1- 6 months)

During this period tank and pump automation is never be offline otherwise process starts form the beginning.

Temperature changing during the long duration directly effects the accuracy of the result.

If the submersible pump or vacuum line is closer than 30cm to tank probe might causes errors on the cm table even small waves on the fuel.

# 3D LASER TANK CALIBRATION COMP. With AUTOMATIC CALIBRATION




Although 2 methods give the same capacity, easily seen the volume differences according to cms of the Automatic/dynamic calibration

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# VIRTUAL CENTRAL CALIBRATION

- This calibration method is developed by creating a relationship inventory change-pump sales which collected at the headoffice.
- Less accuracy than automatic calibration, field instan datas, nozzle on-off details are not exist in headoffice. Therefore it is applicable when low precision calibration is required
- Not possible to applied to manifolded and syphoned tanks
- Tank-nozzle configuration on the field, fuel float offset values, situation of pipe-tank infrastructures are assumed to be ideal and changing here is not calculated.
- Processing is assumed that automation is never been offline during this period and received historical data and to be analyzed data is calculated according to this condition.
- Interpolation method might not work properly on the tilted and distorted tanks
- Shortly Automatic calibration is creating by using less and historical datas

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# 3D LASER TANK CALIBRATION

- The state of the art
- Most safety solution (The only system in the World which can work in Zone 0)
- Most accuracy results
- Solution in the shortest time
- Additional information about inside of thank by 3D scanning

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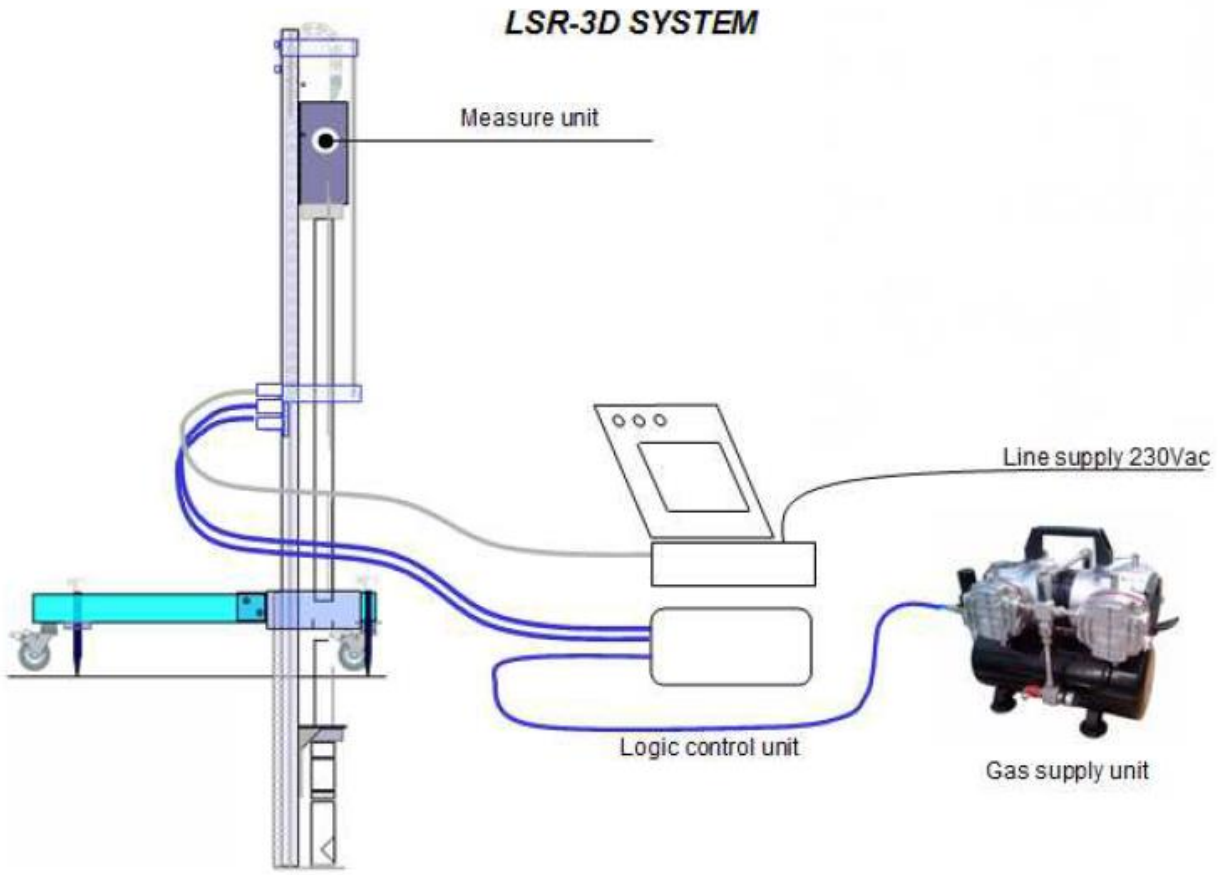
# BENCHMARK

| | WET CALIBRATION | AUTOMATIC-VIRTUAL CALIBRATION | **3D LASER CALIBRATION** |
|---|---|---|---|
| **Safety** | **High Hazardous Process** | **No Action in Hazardous Areas** | **Zone 0 Atex Certified** |
| **Accuracy** | **Low Accuracy** | **Uncertanity is High** | **Most Sensitive (cm basis)** |
| **Processing Time** | **Long Period** (1 day/tank) | **Continuosly (yearly)** (Also requires ATG & Dispenser Automation without pausing during the calibration process) | **Very Short (30 min/tank)** |
| **Fuel Requirement** | **Required** (According to tank capacities 20.000 lt-50.000 lt) | **Required** (Tank fuel levels should pass through all the segments of the tanks) | **Not Required** |
| **Availability of Tank usage during Calibration process** | **Not Available** | **Available** | **Available** |
| **Manifolded and Syphoned Tanks** | **Phsyical Separation needed during Calibration Process** | **Error in results** | **No effect on Results** |
| **Additional feedbacks (3D drawings of the tanks)** | **Not Available** | **Not Available** | **Available** |
| **Tank-Nozzle Configuration** | **Not Required** | **High Importance in configuration** | **Not Required** |
| **History of Tank-Nozzle movements database** | **Not required** | **Required** | **Not Required** |

# 3D LASER TANK CALIBRATION

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# 3D LASER TANK CALIBRATION Certificates


NATIONAL QUALITY INFRASTRUCTURE SYSTEM

HELLENIC INSTITUTE OF METROLOGY

Issuing Authority

Name: National Quality Infrastructure System /Hellenic Institute of Metrology (EIM)

Address: Industrial Area of Thessaloniki Block 45, 57 022 SINDOS GREECE

Person responsible: Dr Zoe Metaxiotou

Applicant

Name:

Address:

IDENTIFICATION OF THE METHOD

3D LASER METHOD FOR THE CALIBRATION OF STORAGE TANKS

IDENTIFICATION OF THE INSTRUMENT

Manufacturer:

Type: LSR-3D

$V_{max}$ 48Vdc 100VA Year 14

$T_{amb}$ -20°C ÷ +60°C S.N.: 100

CEC 13 ATEX 074





Consorzio Europeo Certificazione

CERTIFICATO DI ESAME CE DEL TIPO

EC-TYPE EXAMINATION CERTIFICATE

APPARECCHIO:

CEC 13 ATEX 074

Foglio 1 di 2

13/2014 – AET

Tipo

FABBRICANTE:

INDIRIZZO:

Via Isola, 6

Sovislo (MB) – Italy

Questo Certificato CE di esame del Tipo si riferisce solo al progetto, esami e prove sull'apparecchio specificato o sui sistemi di protezione specificati, eseguiti conformemente alla Direttiva 94/9/CE. Requisiti ulteriori della Direttiva, che si applicano al processo di Fabbricazione ed al Fabbricante di questo sistema di protezione, non sono coperti dal presente certificato.

This EC-Type Examination Certificate relates only to the design, examination and test of the specified equipment or protective system in accordance to the Directive 94/9/EC. Further requirements of the Directive, applied to the manufacturing process and to the manufacturer of this equipment or protective system, are not covered by this certificate.

[12] La marcatura dell'apparecchio comprende le seguenti indicazioni:

The marking of the equipment shall include the following:

II 1/2 G Ex px IIC T6 Gb (Tamb -20°C÷+60°C)

Legnano, 26 giugno 2014

CONSORZIO EUROPEO CERTIFICAZIONE

L'ORGANO DELIBERANTE

Il Direttore Tecnico (A. FUGAZZI)

Il Direttore Generale (L. TIMOSSI)

ACCREDIA

CEC - CONSORZIO EUROPEO CERTIFICAZIONE S.C.A.R.L.

Sede Legale e Uffici: Via Pisacane, 46- 20025 LEGNANO (MI) Italy - tel. +39 0331 442 266- fax +39.0331.440 054

www.consorziocec.com - info@consorziocec.com - C.F./P.IVA 13073160155 – Reg. Impr. MI 13073160155 – R.E.A. 1612104



**The only laser calibration solution in the world having these approvals**

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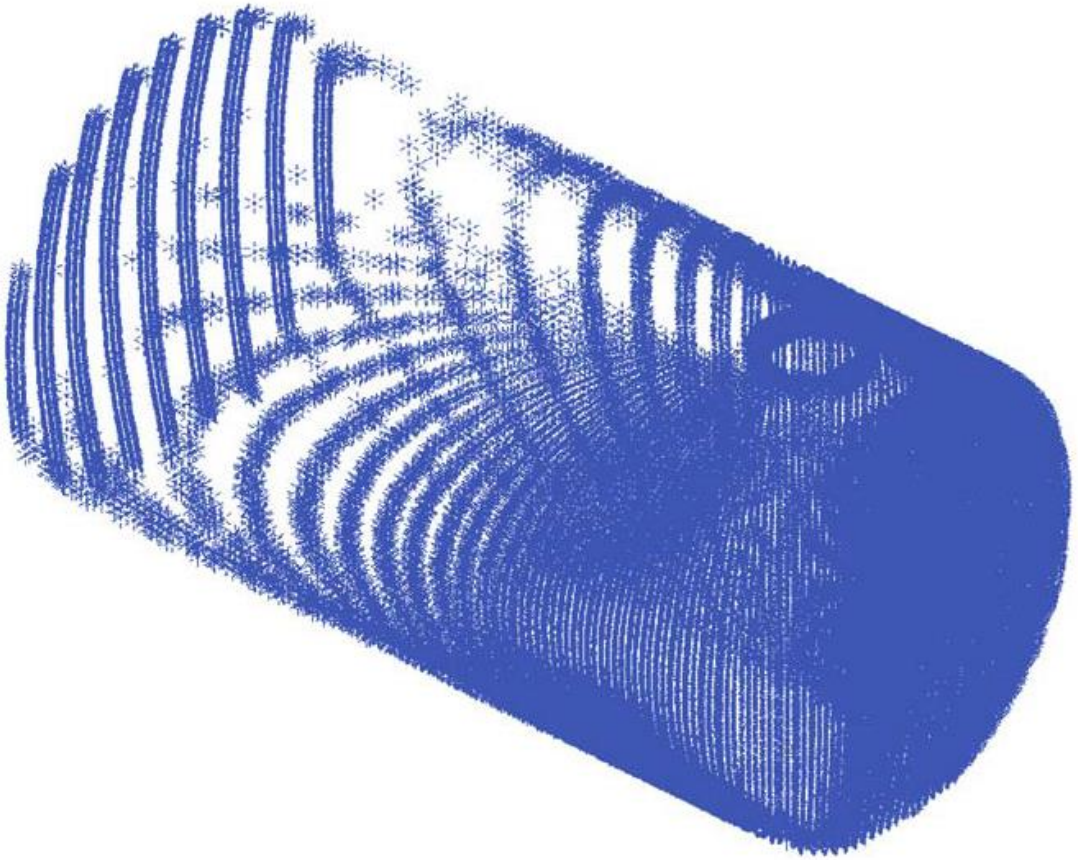
# 3D LASER TANK CALIBRATION



**Very Short time**
**For scanning process**

**72.000 POINTS**
**Just in 24 MINUTES**

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# 3D LASER TANK CALIBRATION

## ABILITY TO WORK ON ANY GRADIENT


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# 3D LASER TANK CALIBRATION


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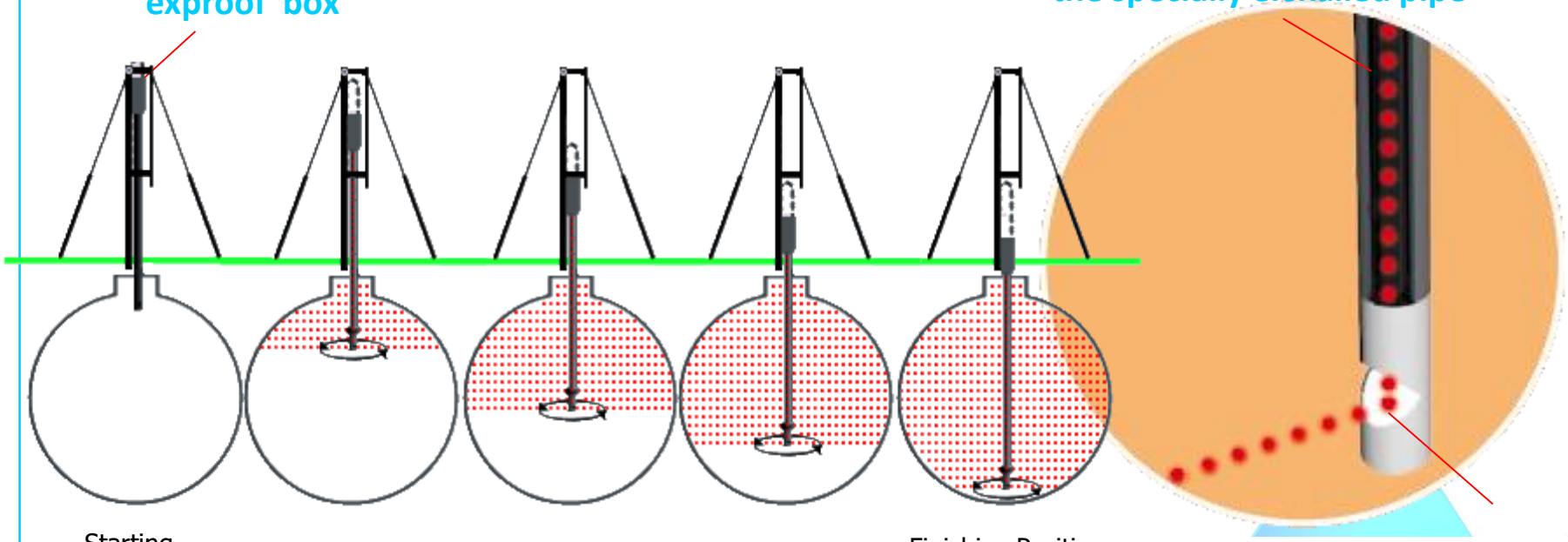
# 3D LASER TANK CALIBRATION

Laser source is inside of exproof box

Laser beam goes through the specially eloxalled pipe



Starting Position

Finishing Position

And laser beam reflected by the very special mirror which is like used in surgeries

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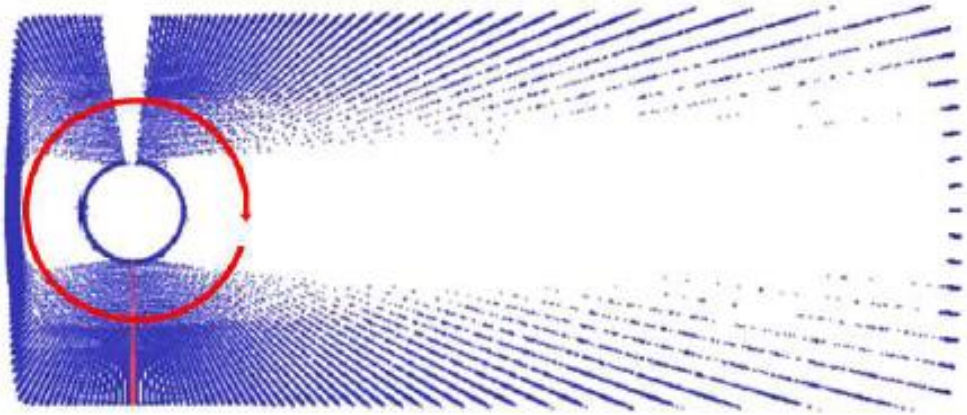
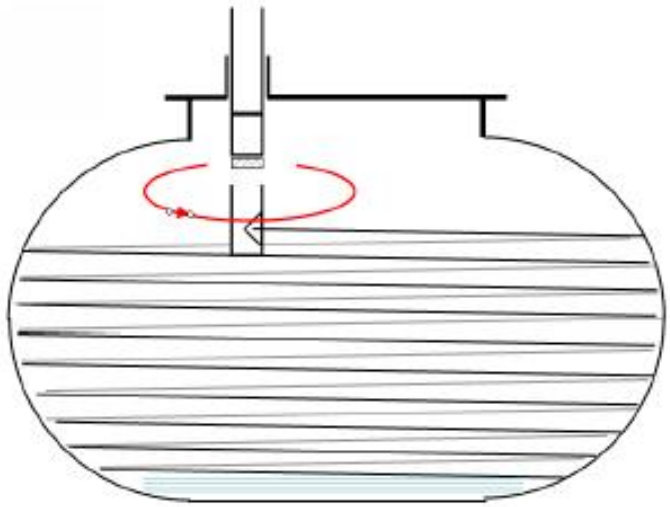
# 3D LASER TANK CALIBRATION





**Due to vertical movement and horizontal rotation of the device, scanning is possible as 360° of each cms even of inclined tanks from top to the bottom**

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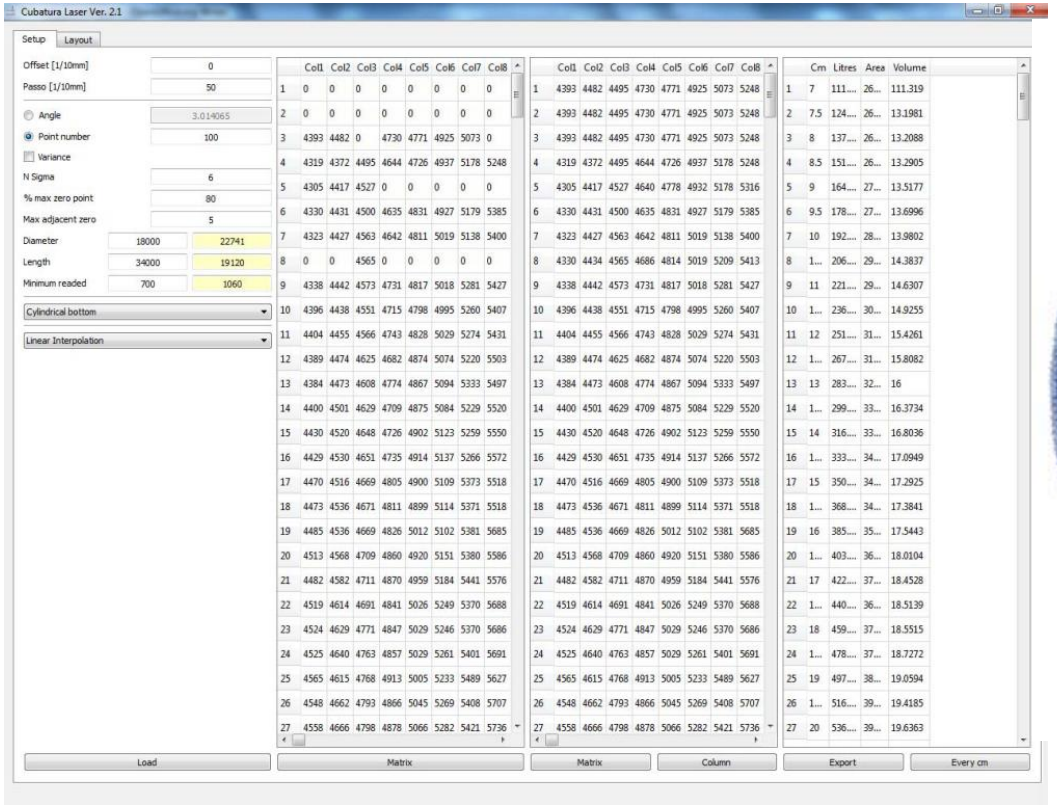
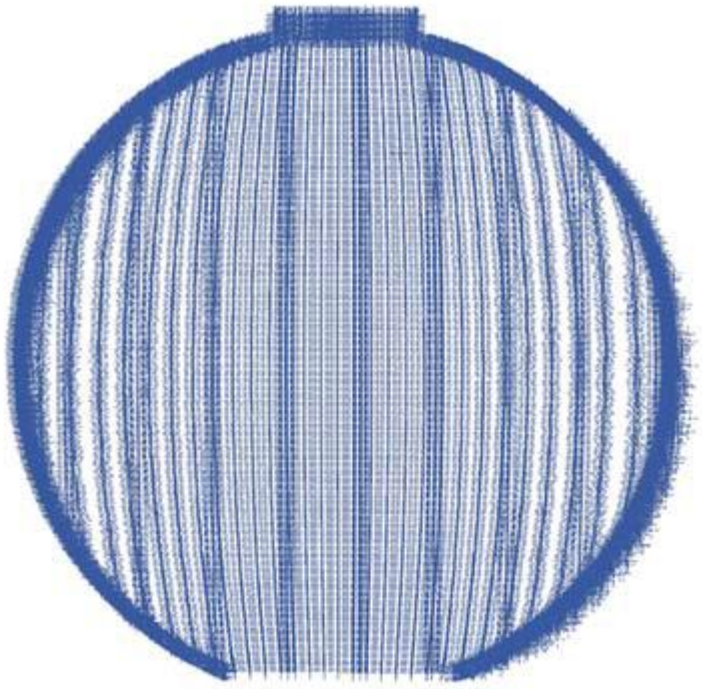
# 3D LASER TANK CALIBRATION



**Special sofware calculates the matrixes and generate the 3D tank map by using the datas which is recieved from sites**

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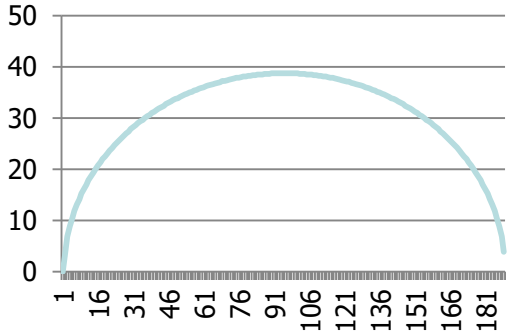
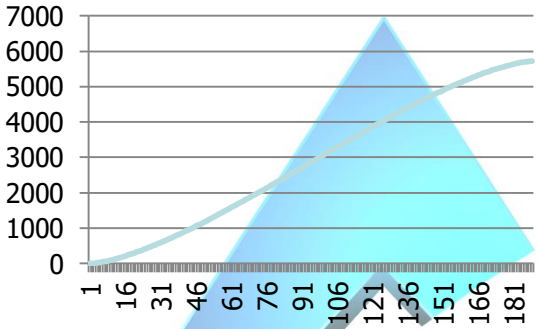
# 3D LASER TANK CALIBRATION

| CM | LT | CM | LT | CM | LT | CM | LT | CM | LT |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 41 | 2294 | 82 | 5999 | 123 | 10010 | 164 | 13580 |
| 1 | 9 | 42 | 2375 | 83 | 6096 | 124 | 10106 | 165 | 13654 |
| 2 | 26 | 43 | 2456 | 84 | 6194 | 125 | 10201 | 166 | 13727 |
| 3 | 48 | 44 | 2537 | 85 | 6291 | 126 | 10296 | 167 | 13799 |
| 4 | 74 | 45 | 2620 | 86 | 6389 | 127 | 10391 | 168 | 13870 |
| 5 | 104 | 46 | 2703 | 87 | 6487 | 128 | 10485 | 169 | 13941 |
| 6 | 136 | 47 | 2786 | 88 | 6584 | 129 | 10579 | 170 | 14010 |
| 7 | 171 | 48 | 2870 | 89 | 6683 | 130 | 10673 | 171 | 14078 |
| 8 | 209 | 49 | 2955 | 90 | 6781 | 131 | 10766 | 172 | 14145 |
| 9 | 249 | 50 | 3041 | 91 | 6879 | 132 | 10860 | 173 | 14211 |
| 10 | 291 | 51 | 3127 | 92 | 6977 | 133 | 10952 | 174 | 14276 |
| 11 | 335 | 52 | 3213 | 93 | 7076 | 134 | 11045 | 175 | 14340 |
| 12 | 381 | 53 | 3300 | 94 | 7174 | 135 | 11137 | 176 | 14403 |
| 13 | 429 | 54 | 3388 | 95 | 7273 | 136 | 11228 | 177 | 14464 |
| 14 | 479 | 55 | 3476 | 96 | 7371 | 137 | 11320 | 178 | 14524 |
| 15 | 530 | 56 | 3564 | 97 | 7470 | 138 | 11411 | 179 | 14583 |
| 16 | 583 | 57 | 3653 | 98 | 7568 | 139 | 11501 | 180 | 14640 |
| 17 | 638 | 58 | 3743 | 99 | 7667 | 140 | 11591 | 181 | 14696 |
| 18 | 694 | 59 | 3833 | 100 | 7766 | 141 | 11680 | 182 | 14751 |
| 19 | 751 | 60 | 3923 | 101 | 7864 | 142 | 11770 | 183 | 14804 |
| 20 | 810 | 61 | 4014 | 102 | 7963 | 143 | 11858 | 184 | 14855 |
| 21 | 870 | 62 | 4105 | 103 | 8061 | 144 | 11946 | 185 | 14905 |
| 22 | 931 | 63 | 4197 | 104 | 8160 | 145 | 12034 | 186 | 14953 |
| 23 | 994 | 64 | 4289 | 105 | 8258 | 146 | 12121 | 187 | 14999 |
| 24 | 1058 | 65 | 4381 | 106 | 8357 | 147 | 12207 | 188 | 15043 |
| 25 | 1123 | 66 | 4474 | 107 | 8455 | 148 | 12293 | 189 | 15085 |
| 26 | 1189 | 67 | 4567 | 108 | 8553 | 149 | 12379 | 190 | 15125 |
| 27 | 1256 | 68 | 4661 | 109 | 8651 | 150 | 12464 | 191 | 15163 |
| 28 | 1324 | 69 | 4755 | 110 | 8749 | 151 | 12548 | 192 | 15198 |
| 29 | 1393 | 70 | 4849 | 111 | 8847 | 152 | 12631 | 193 | 15230 |
| 30 | 1463 | 71 | 4943 | 112 | 8945 | 153 | 12714 | 194 | 15260 |
| 31 | 1520 | 72 | 5228 | 115 | 9238 | 156 | 12959 | 197 | 15325 |
| 32 | 1589 | 73 | 5420 | 117 | 9432 | 158 | 13119 | TANK1 | |

## DEVIATION




## VOLUME/CM

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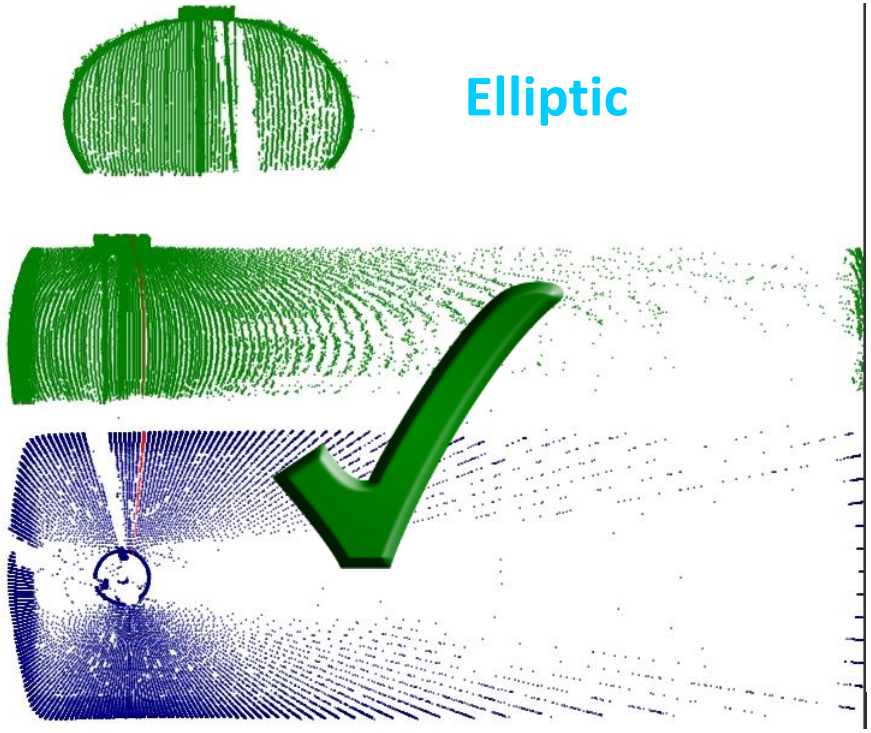
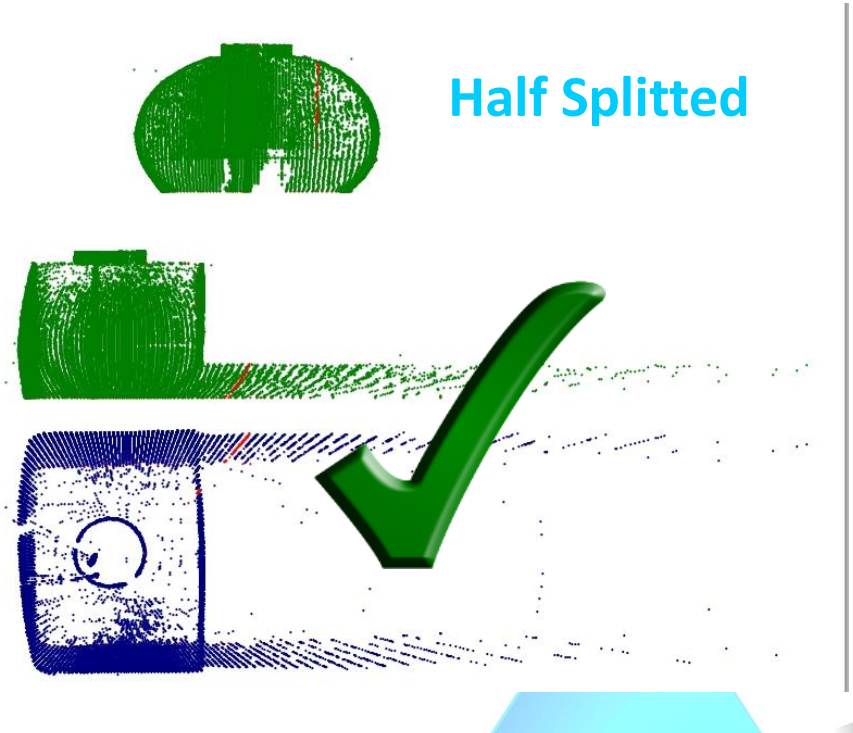
# 3D LASER TANK CALIBRATION




**Thanks to working principle of the device and special software to calibrate very different tank shapes**

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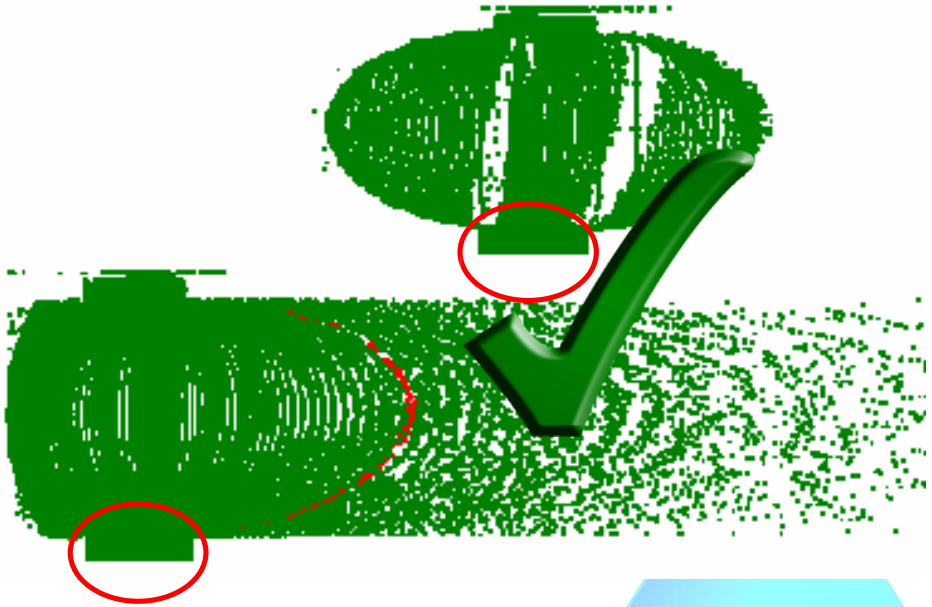
# 3D LASER TANK CALIBRATION

Very deep and too narrow manhole

Additional parts even on the bottom



Thanks to working principle of the device and special software to calibrate very different tank shapes

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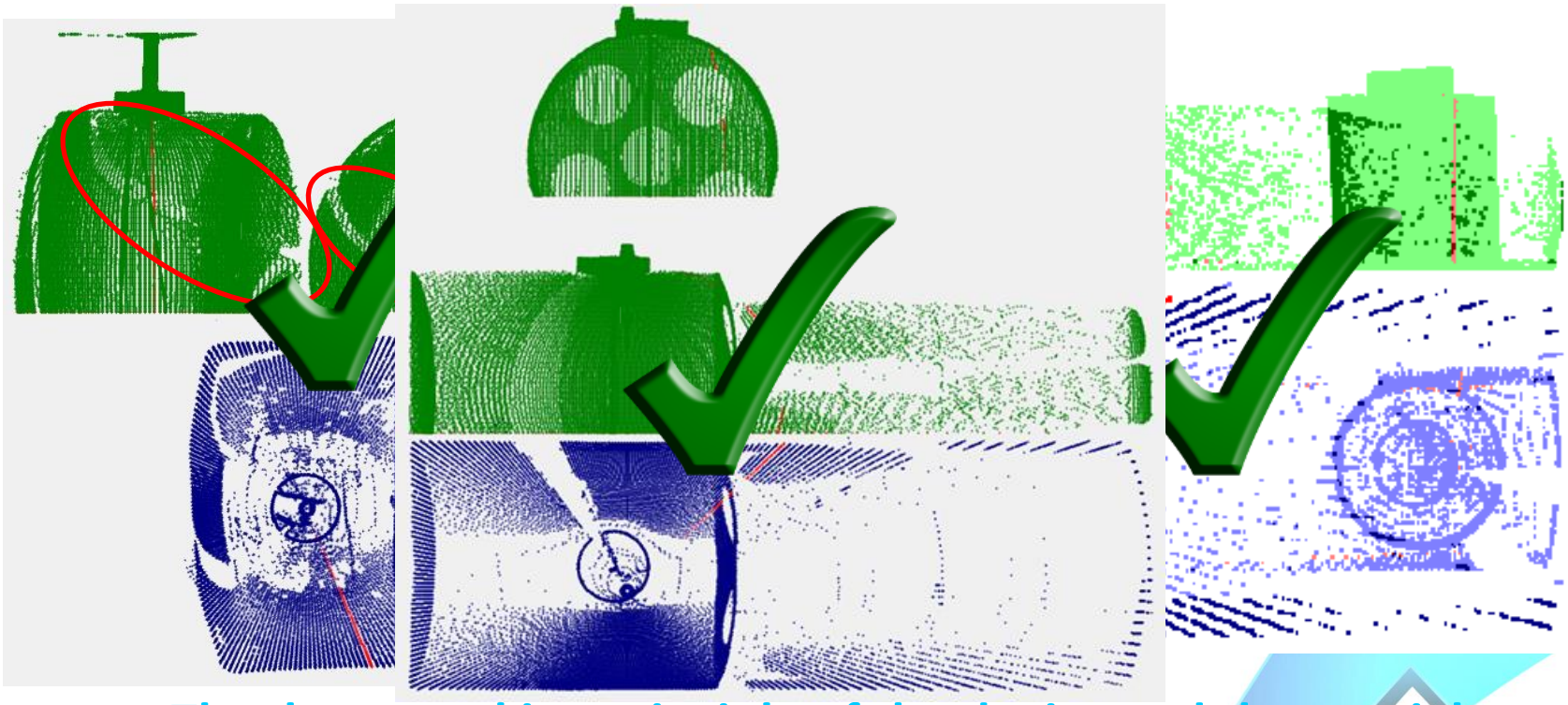
# 3D LASER TANK CALIBRATION

Additional pipes  Different splitted  Tank in tank



Thanks to working principle of the device and the special software to calibrate very different tank shapes

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# 3D LASER TANK CALIBRATION

bp

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# 3D LASER TANK CALIBRATION

Shell

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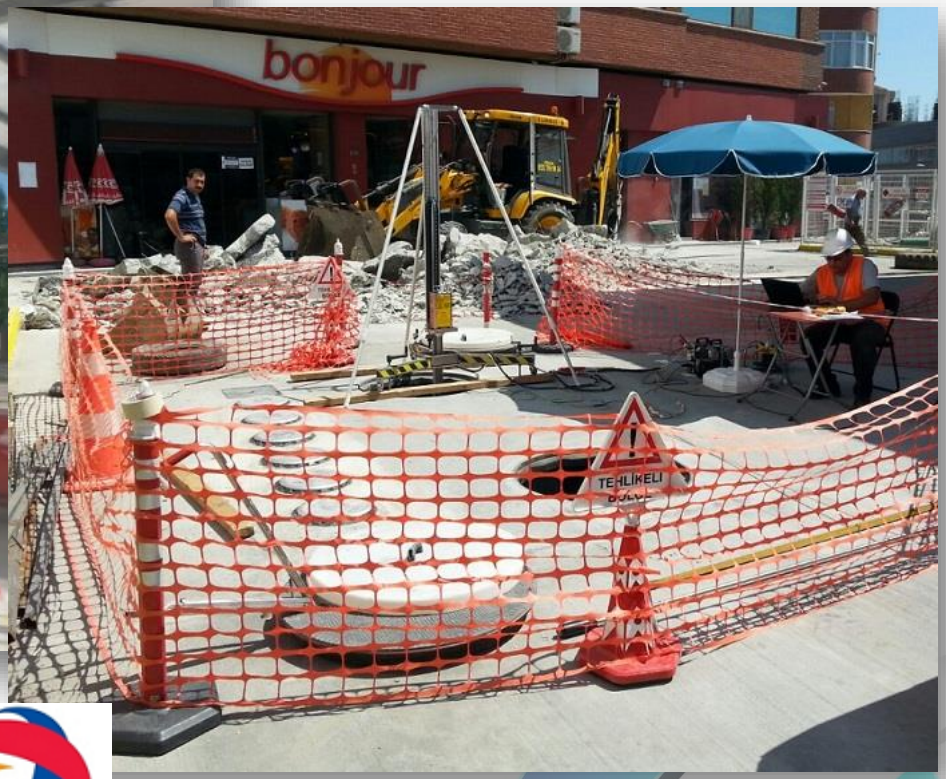
# 3D LASER TANK CALIBRATION

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TOTAL

# 3D LASER TANK CALIBRATION


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# 3D LASER TANK CALIBRATION


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# 3D LASER TANK CALIBRATION



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# 3D LASER TANK CALIBRATION


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# 3D LASER TANK CALIBRATION TRAINING

| | | | |
|---|---|---|---|
| TOKHEIM | **3D LASER Calibration - Training Dakar 21 to 22 July 14** (By ADIL ERIG & ROSARIO RANDAZZO) | | |
| | | Date: 29 July 14 | Author: Abdoulaye DIOUF |
| ***Calibration 3D Laser / Operation AME*** | | | |

**Attendance from AME**

- Paulo MIRANDA (TSA)
- Anicet Ngoundba BIDOUT (SOCATAM)
- Hatem EL HENI (COTTAM)
- Maboye NDIAYE (COSETAM)
- Mouhamadou BA (COSETAM)
- Khalid SERGHINI (MATAM)
- Costa MUNUO (TPS)
- Abdoulaye DIOUF (

**Objective:**

- Teach Technical tea
  Processing Data – V
  What should be tak

**Agenda :**

- **July 21 :**
  Presentation of equ
  On site (Total Patte
- **July 22**
  Processing data fro
  Explanation of how th

## Training in Senegal to technicians from 6 countries

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# THANK YOU!

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