Freedom 4 Solution

SCS Concept, 09 March 2017

Edition 1

Product presentation

- **Industrial Tools**:
  - Light, Robust, Can be use on all circumstance
  - Barcode reader / Positioning System, all option can be integrated
  - Industry 4.0, Full data traceability with our Wireless communication
- **Safety Solution**
  - Obstacle detection, we provide the tools who can detect if the torque is apply on the screw or on an obstacle
  - Hand Position Alarm, we detect if the operator position well is hand on the wrench
  - End Fitting recognition, We can detect if the operator select the right End-fitting
- **Productivity/ Accuracy**
  - High accuracy >0.5% if the read value
  - Ergonomic, we use all your senses to Apply the right tightening
    - Led's / Vibration / Bip / Large screen
- **Easy to use**
  - User friendly software
  - Full functionalities
  - Full compatibility with VPG, FIM and all our software

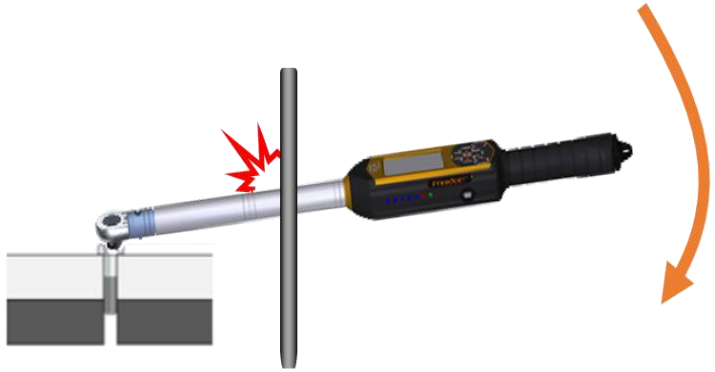
Freedom 4
Obstacle detection

New

- **Obstacle detection**
  - Eliminate Damage of your parts
  - Protect your wrench
  - Detect automatically if the tools touch an obstacle during tightening

Obstacle detection

This new function is used to detect if the wrench Hit an Obstacle during the tightening



On LAB/SPC : The obstacle detection function is always active without possibility to disable it

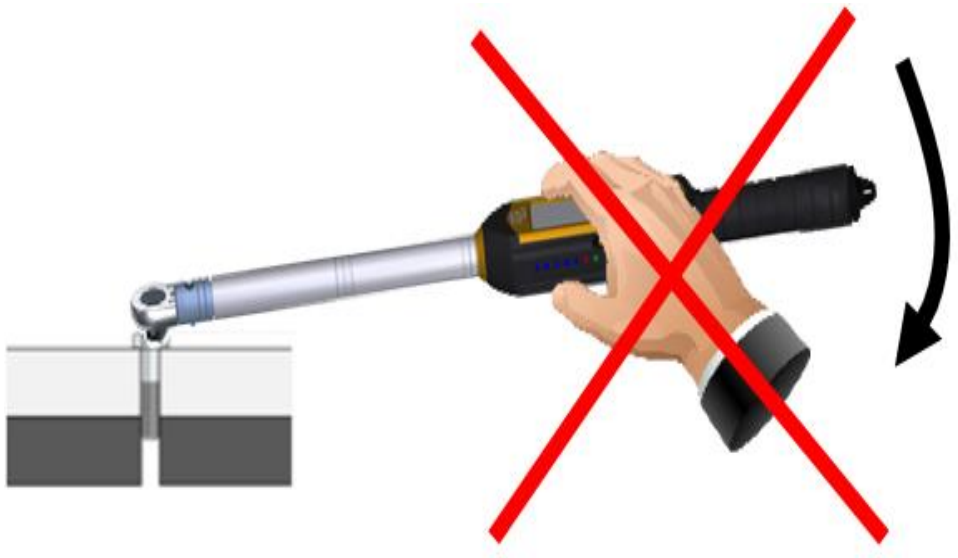
On PRW : 3 available options on Obstacle detection strategy setting:

- OFF - NO obstacle detection
  no warning message is shown
- Warning - Obstacle just warn
  warning message OBSTACLE DETECTED is shown
- FULL – Obstacle gives NOK
  warning message OBSTACLE DETECTED is shown
  vibration
  NOK result is given

The obstacle detection event is *always* recorded in the event log

Wrong Hand position

This new function detect where the operator apply the force on the wrench, if this is not on the Handle, a Wrong position Alarm is shown on the screen.



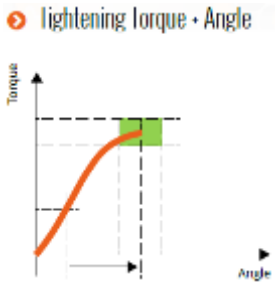
Freedom Production

Hand position detection to ensure correct operation

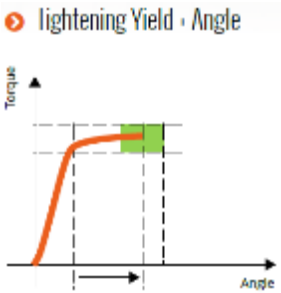
Obstacle Detection "Patented"
Eliminate Damage of your parts and protect your wrench

Guidance solution

PRW & LAB
Production tightening
Wireless management
Data traceability
Barcode reader/Vin management
Prototype / Joint Analysis



Tightening Strategy
Fastening torque driven
Fastening torque/angle
Fastening yield
Fastening yield/angle
Prevailing torque



Standard End-fitting
End Fitting Recognition

Carbon extension

Features
Autonomy : Up to 8 hours
Torque Accuracy : 0.5% of the read value
Torque range : 10 to 100%
Angle Accuracy : +/-1° over 360°
Memory : 1000 Tightening programs
20 000 results
20 000 curves
Wireless communication
Start in less than 5 seconds

Barcode reader in option

USB connection for data traceability

Wireless charger

Large screen, 7 LEDs, vibration and Buzzer to communicate with the operator

Rubber protection

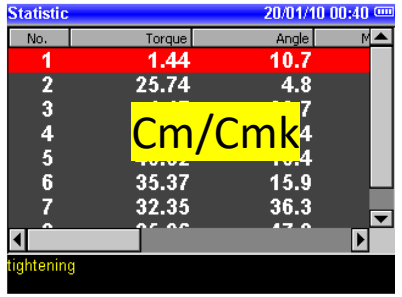
PRW wrench is delivered with :
Rubber protection
Wireless radio wings

Freedom Quality Solution

LAB

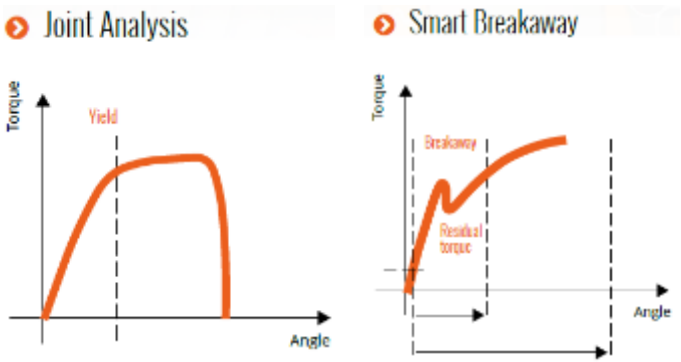
Joint analysis
Production strategy
Prototype
Material studies
Results and trace analysis on SCS explorer software
Production tightening strategy
Data traceability
Barcode reader/Vin management

Freedom 4 Quality



SPC

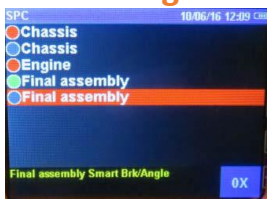
Residual torque check on production line
Route and Job management with Sqnet software
Wireless programming
Data treatability
Statistic analysis
Barcode reader / VIN management



Quality Strategy

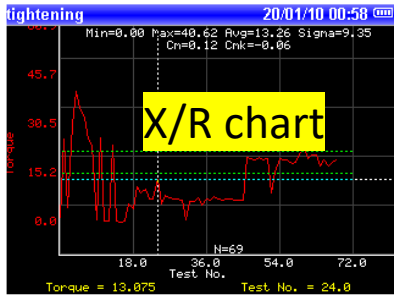
Smart breakaway
Breakaway peak
Breakaway angle
Loosen/tighten
Minimum torque
Loose torque

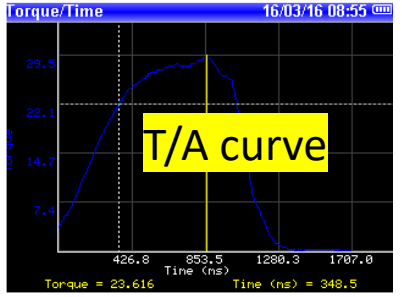
Root management



Statistic

Cm / Cmk
X/R charts





Alert Managment and new functionnalities

Alert management / Auto diagnostic:

- Transducer Alert : Offset comparison
- Gyroscope Alert : Stability of 0 speed
- Over torque Max value
- Over torque List of last 16 over torque & When happen
- Maintenance counter with the Alarm number

For PRW Only, on Open protocol, we add the TRACE with MID900

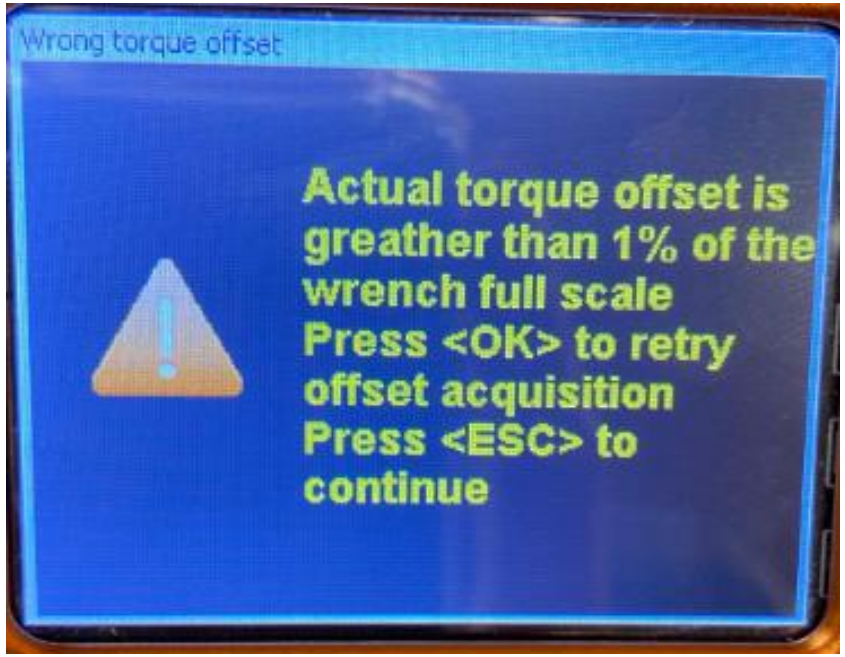
TORQUE OFFSET

Ability to detect unexpected torque on the transducer

This new function give us the opportunity to analyse if the strain gage is okay, if we don't apply a torque (Force) during the start of the wrench.

If turning on the Freedom4, the transducer reads a torque value higher than 1% of the full scale, a warning message is given.

The wrench will give the possibility to retry the torque zero acquisition, if the difference is confirmed or ignored, the event will be recorded.



The torque offset function is *always active*

The torque offset event is *always* recorded in the event log

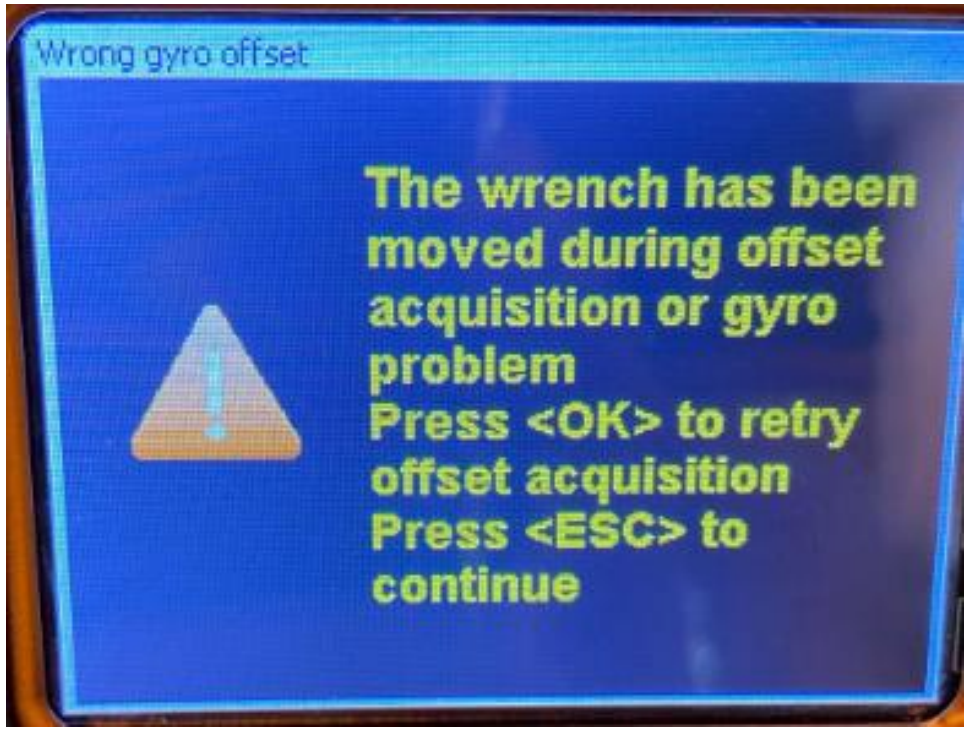
ANGLE OFFSET

Ability to detect unexpected angle reading

This new function check if the gyroscope is stable or if the operator is moving the wrench during Zero adjustment. This is really important to check this to be accurate on Angle.

If turning-ON the Freedom4, the gyroscope is not stable, a warning message is given.

The wrench will give the possibility to retry the angle offset acquisition, if the problem is confirmed or ignored, the event will be recorded.



The angle offset function is *always active*

The angle offset event is *always* recorded in the event log

TORQUE SPEED

Ability to report excessive stress on the transducer during tightening

This new function is used to control if the torque is well apply on the assembly joint, this is really a good way to check if the operator don't use the wrench like an hammer.

Evaluation oF the time during the tightening: if the torque goes from 20% to 80% of the wrench capacity in less than 100 milliseconds, the event is detected.

This function is *active* also if the wrench is not in the test mode.

2 way to setup it :

- OFF – **not checked** - NO warning
  no warning message is shown
  no vibration
- Warning – **checked** - just warning
  warning message TORQUE SPEED is shown
  vibration

The *default option* is Warning – **checked**.

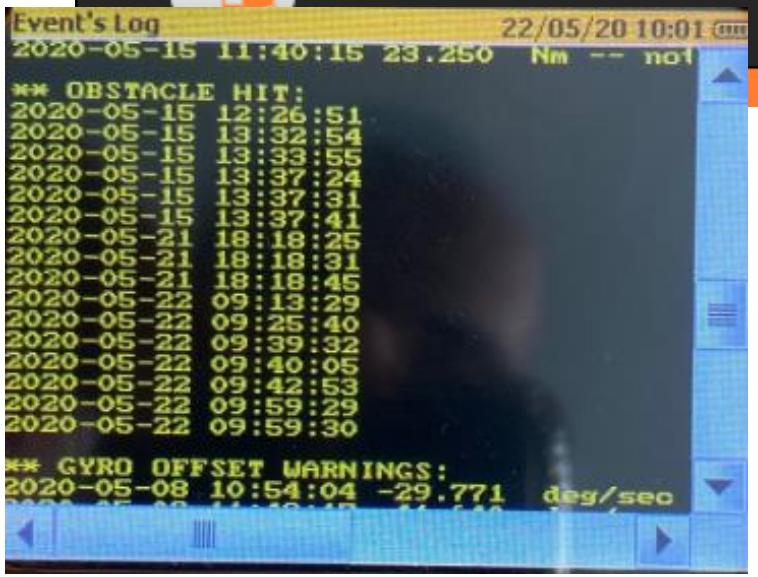
EVENTLOG file

Ability to report the list of events, alerts and warning

The file contains events of:

- Torque offset
- Angle offset
- Obstacle detection
- Torque speed
- Overtorque events
- Max overtorque
- Maintenance
- Calibration events

Just click here



The red/blue icon on the top screen of the wrench indicates some messages are available.

We store the last 16 events of each warning

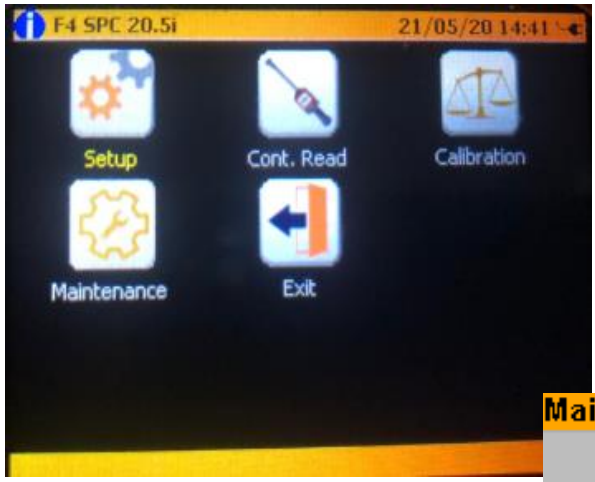
Maintenance counter

The maintenance counter feature provides a total count of tightening operations executed on the wrench.

The counting of tightening operations is *always active*.

Maintenance menu shows the Maintenance data:

- PRW – **Maintenance** on Setup menu
- SPC – **Maintenance** on Setup menu
- LAB – **Maintenance** on Main menu

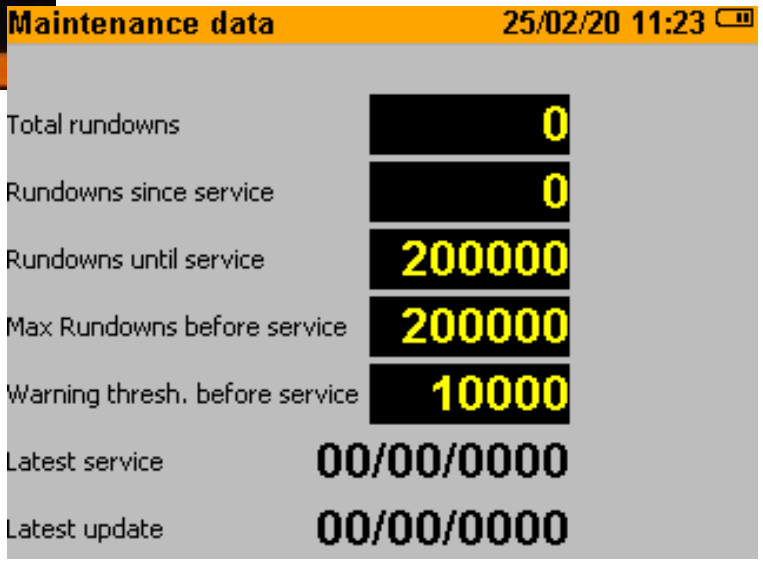


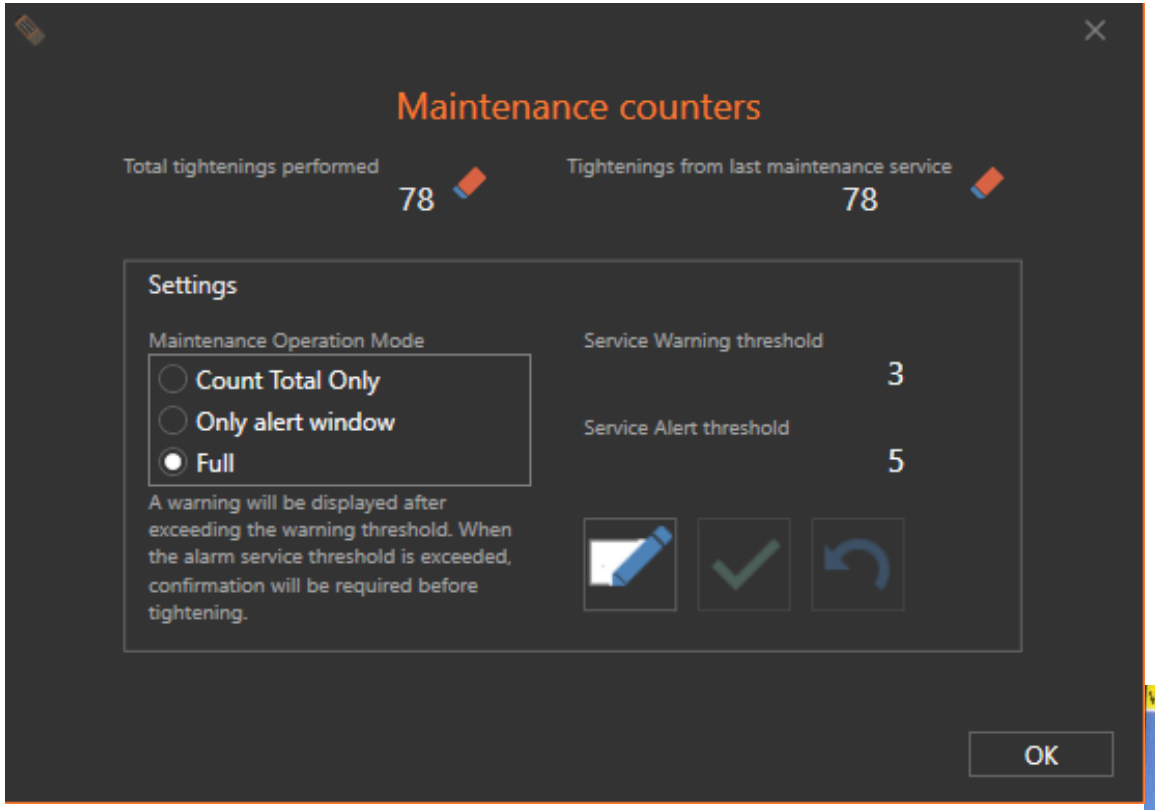
Total rundowns: Number of tightening operations executed by the wrench

Rundown since service: Number of tightening operations executed by the wrench after the last service activity on which this number was reset (for example after calibration or transducer substitution)

Rundown until service: Number of available tightening operations executed by the wrench before the next service.

Max. Rundown before service: Maximum number of tightening operations before two service activities.

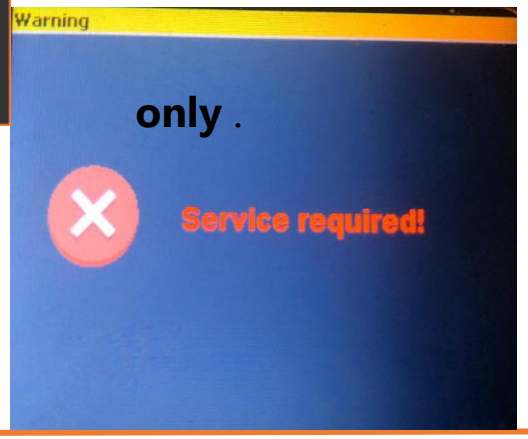




3 *available options* on calibrator software:

- **Count total only** - NO warning
  no warning message is shown
- **Only alert window** - just warning
  Red icon of events is shown after the threshold parameter
- **Full** - just warning
  warning message is shown after the threshold parameter

  a popup message is shown every tightening operation when the Max. Rundown before service is reached



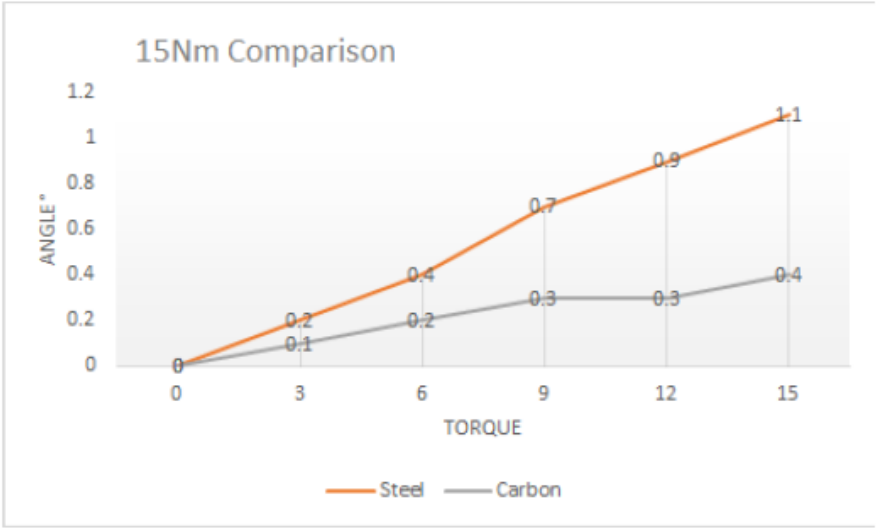
The *default option* is **Count total only** .

The thresholds achievement event is *always* recorded in the event log

Freedom 4 : Bending comparison F3/F4

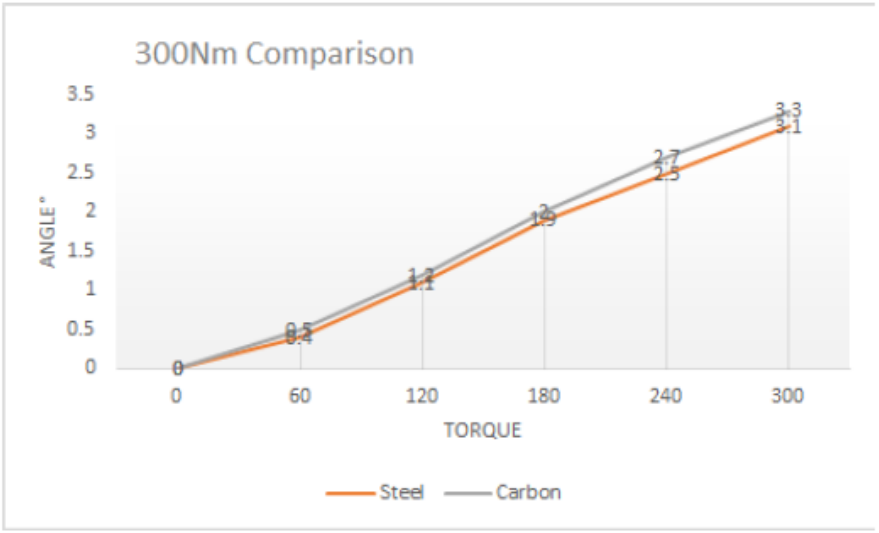
9	0.7°	0.3°
12	0.9°	0.3°
15	1.1°	0.4°

Note:
15Nm Steel tube wrenches have a two-section transducer while 15Nm Carbon tube wrenches have only one, thicker ,section for the transducer

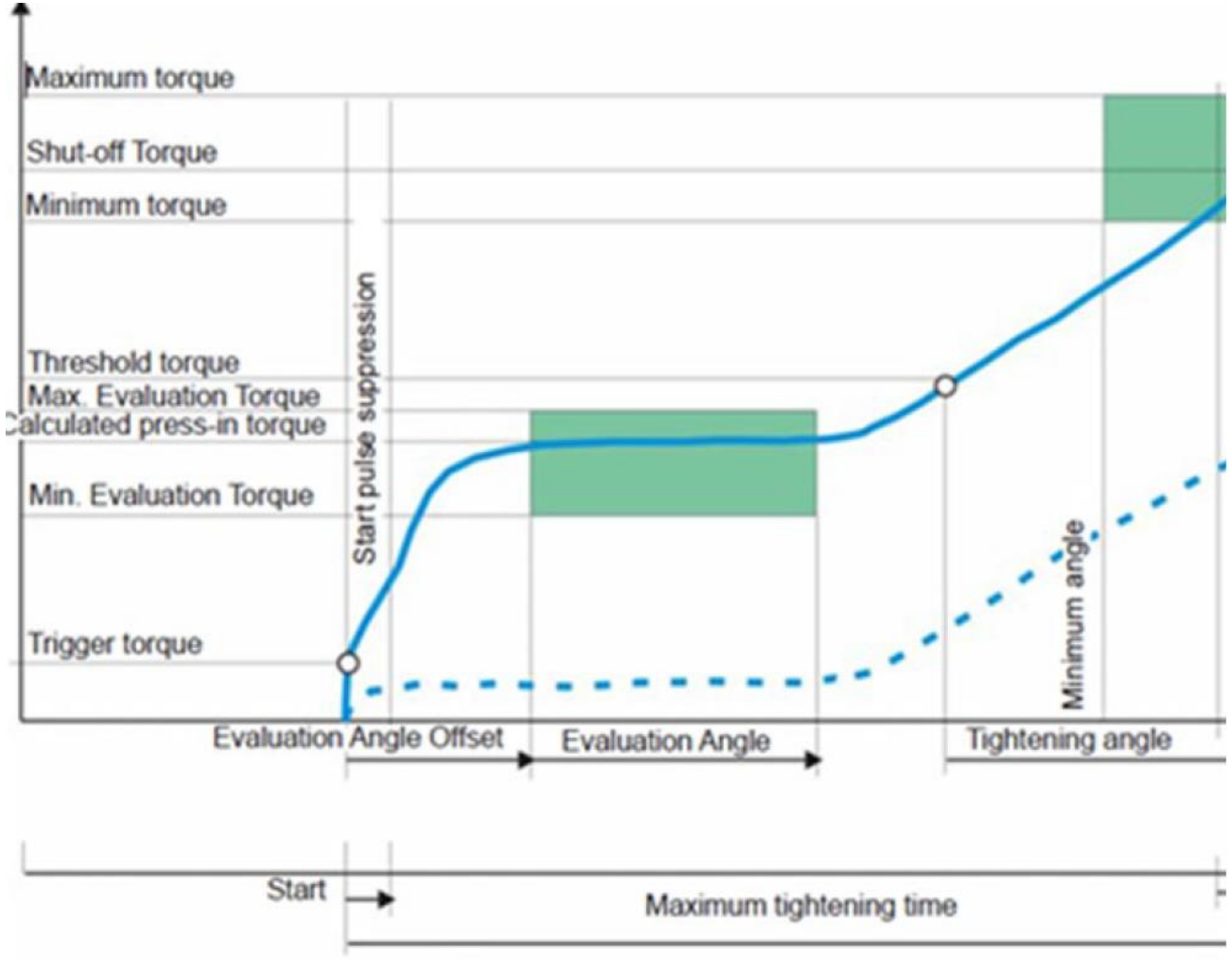


- Test results and comparison of 300Nm wrenches:

Nm	Steel Tube	Carbon Tube
60	0.4°	0.5°
120	1.1°	1.2°
180	1.9°	2.0°
240	2.5°	2.7°
300	3.1°	3.3°



Prevailing torque functionnalities



Prevailing torque solution is requiring on tightening strategy at 90% of aerospace market, we have a simple solution today on the Freedom 3 & Freedom 4 that we will need to improve in the near future to take the market share.

SCS Concept Group

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