



# Freedom 4 Solution



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Edition 1



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# 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

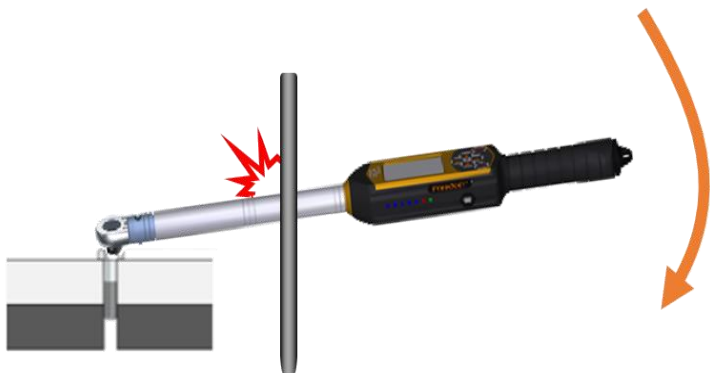
- **Obstacle detection**
  - Eliminate Damage of your parts
  - Protect your wrench
  - Detect automatically if the tools touch an obstacle during tightening





# 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:

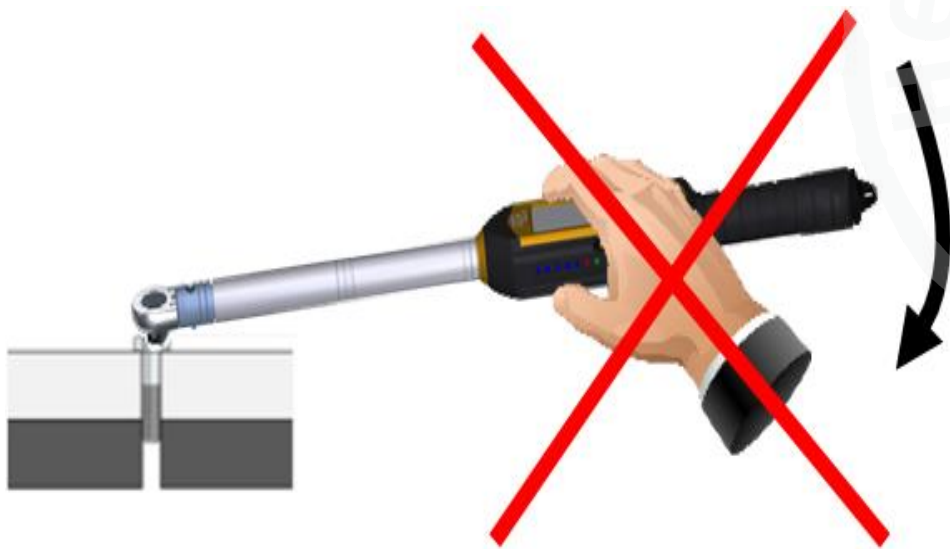
- OFF - NO obstacle detection  
no warning message is shown
- Warning - Obstacle just warn  
warning message OBSTACLE DETECTED is shown
- FULL – Obstacle gives NOK  
warning message OBSTACLE DETECTED is shown  
vibration  
NOK result is given

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

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 :  $\pm 1^\circ$  over 360°
- Memory :
  - 1000 Tightening programs
  - 20 000 results
  - 20 000 curves
- Wireless communication
- Start in less than 5 seconds

Barcode reader  
in option



Wireless charger

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

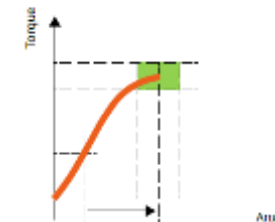
## PRW & LAB

- Production tightening
- Wireless management
- Data traceability
- Barcode reader/Vin management
- Prototype / Joint Analysis

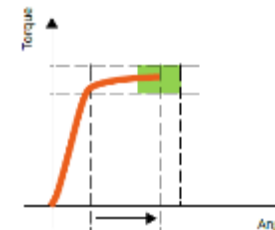
## Tightening Strategy

- Fastening torque driven
- Fastening torque/angle
- Fastening yield
- Fastening yield/angle
- Prevailing torque

Lightening Torque • Angle



Lightening Yield • Angle



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

## SPC

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

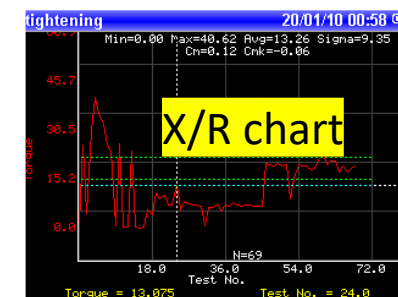


Freedom 4 Quality

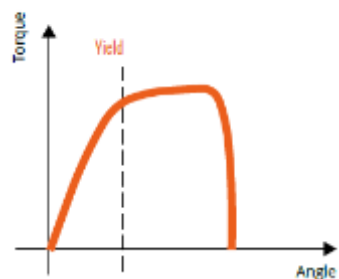
Statistic 20/01/10 00:40

No.	Torque	Angle	M
1	1.44	10.7	
2	25.74	4.8	
3		7	
4		4	
5		10.4	
6	35.37	15.9	
7	32.35	36.3	
8	25.25	17.2	

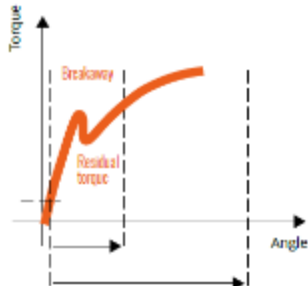
tightening



### Joint Analysis



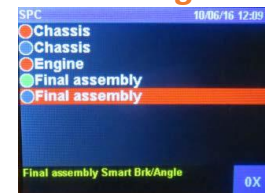
### Smart Breakaway



## Quality Strategy

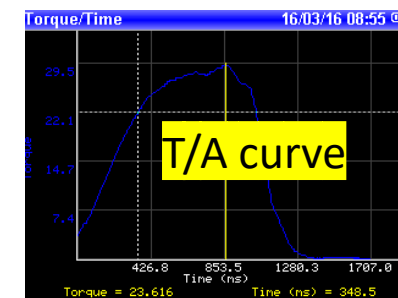
- Smart breakaway
- Breakaway peak
- Breakaway angle
- Loosen/tighten
- Minimum torque
- Loose torque

## Root management



## Statistic

Cm / Cmk  
X/R charts





# Alert Management and new functionalities



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

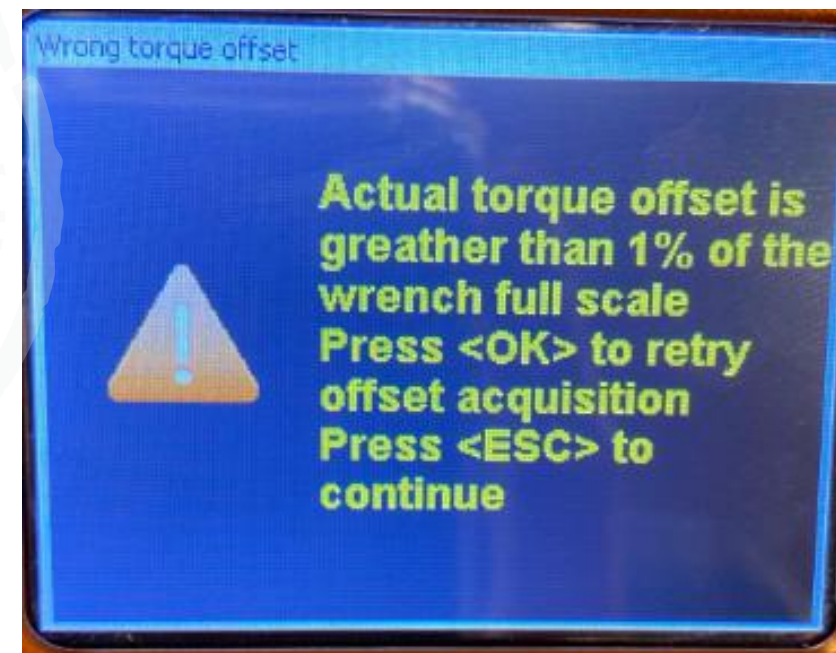
Ability to detect unexpected torque on the transducer

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

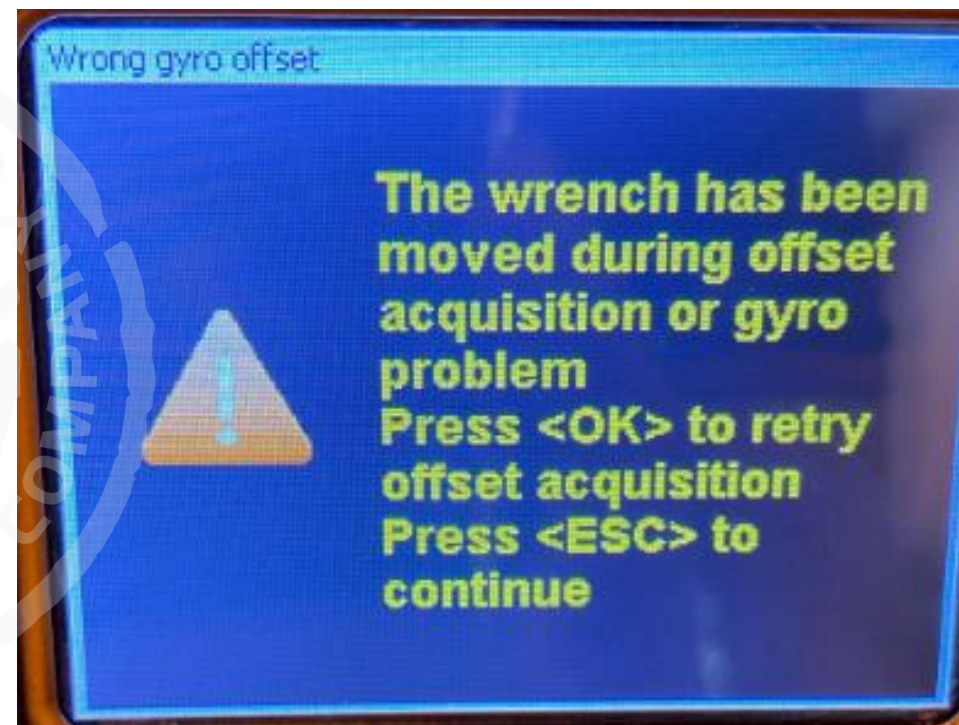
This new function check if the gyroscope is stable or if the operator is moving the wrench during Zero adjustment. This is really important to check this to be accurate on Angle.

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:

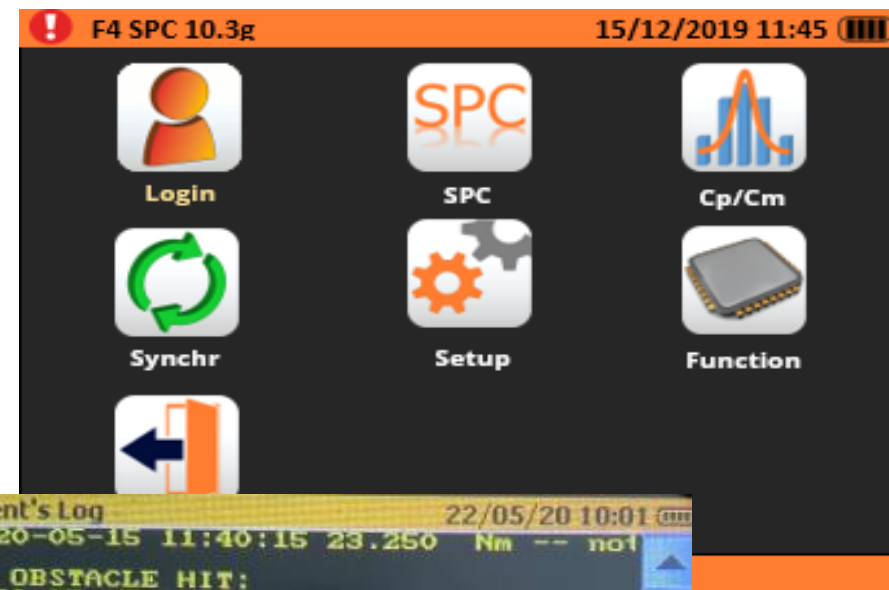
- Torque offset
- Angle offset
- Obstacle detection
- Torque speed
- Overtorque events
- Max overtorque
- Maintenance
- Calibration events

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





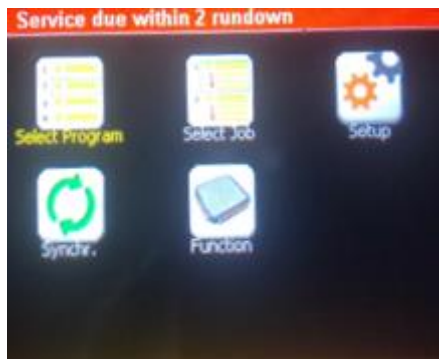
# Maintenance counter

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

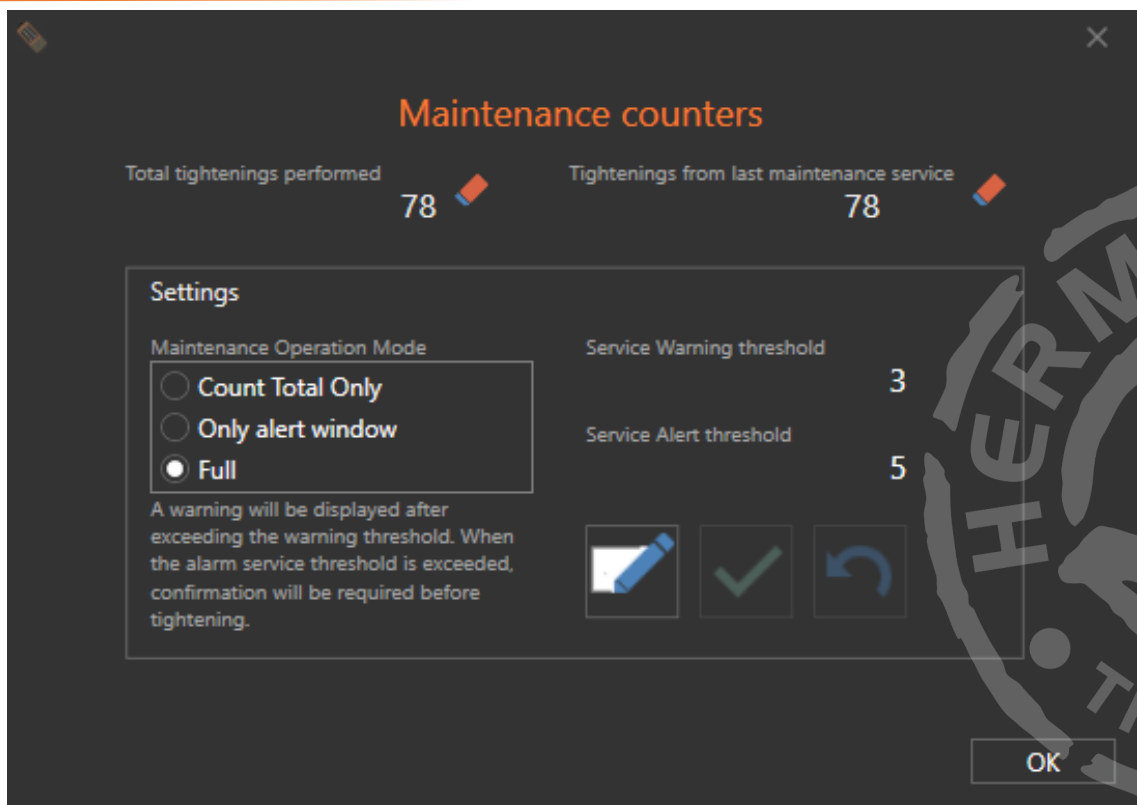
**Rundown since service:** Number of tightening operations executed by the wrench after the last service activity on which this number was reset (for example after calibration or transducer substitution)

**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.

Maintenance data		25/02/20 11:23
Total rundowns	0	
Rundowns since service	0	
Rundowns until service	200000	
Max Rundowns before service	200000	
Warning thresh. before service	10000	
Latest service	00/00/0000	
Latest update	00/00/0000	



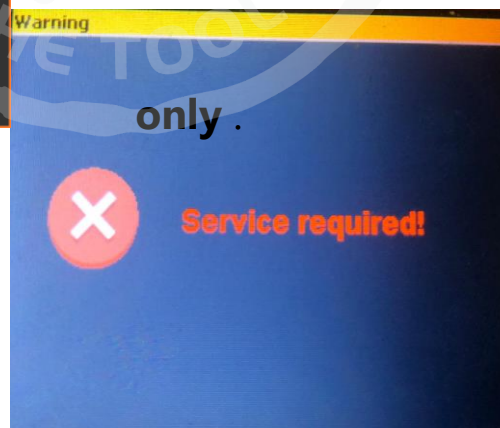


The thresholds achievement event is *always* recorded in the event log

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**





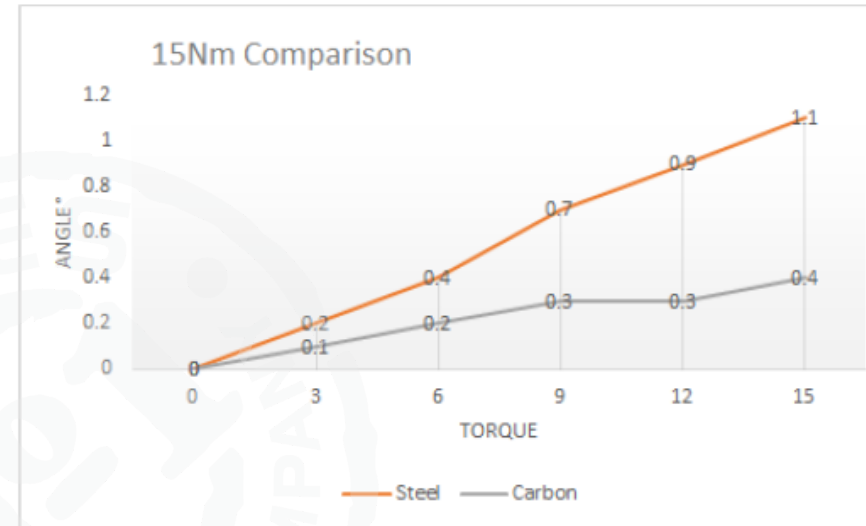


# Freedom 4 : Bending comparison F3/F4

9	0.7°	0.3°
12	0.9°	0.3°
15	1.1°	0.4°

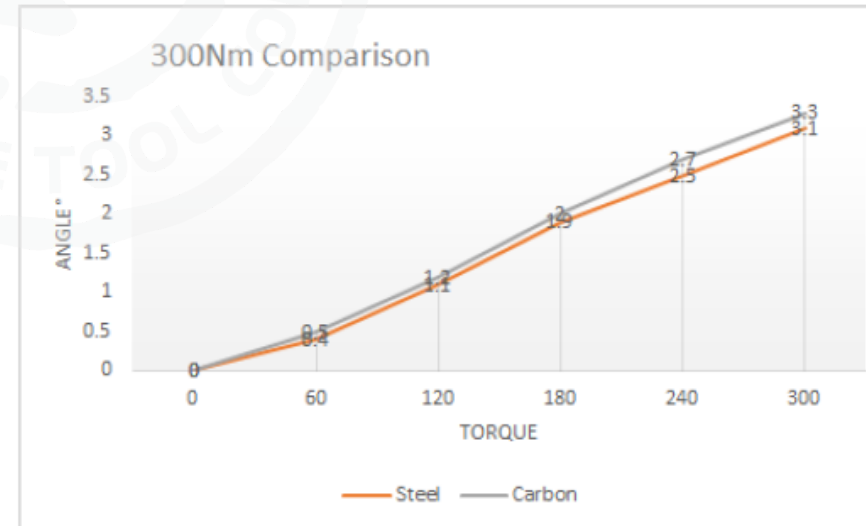
Note:

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



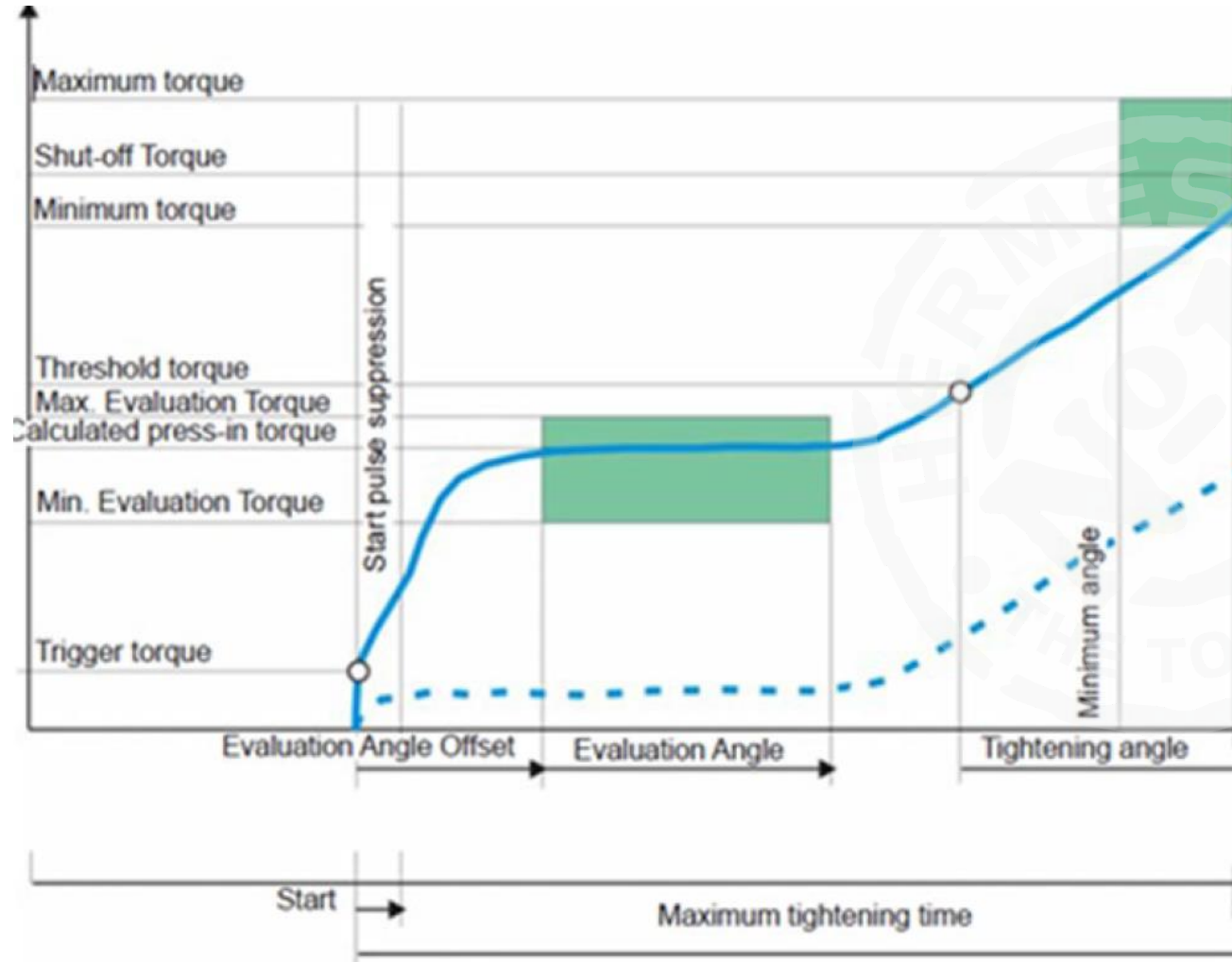
- Test results and comparison of 300Nm wrenches:

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 fonctionnalités



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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