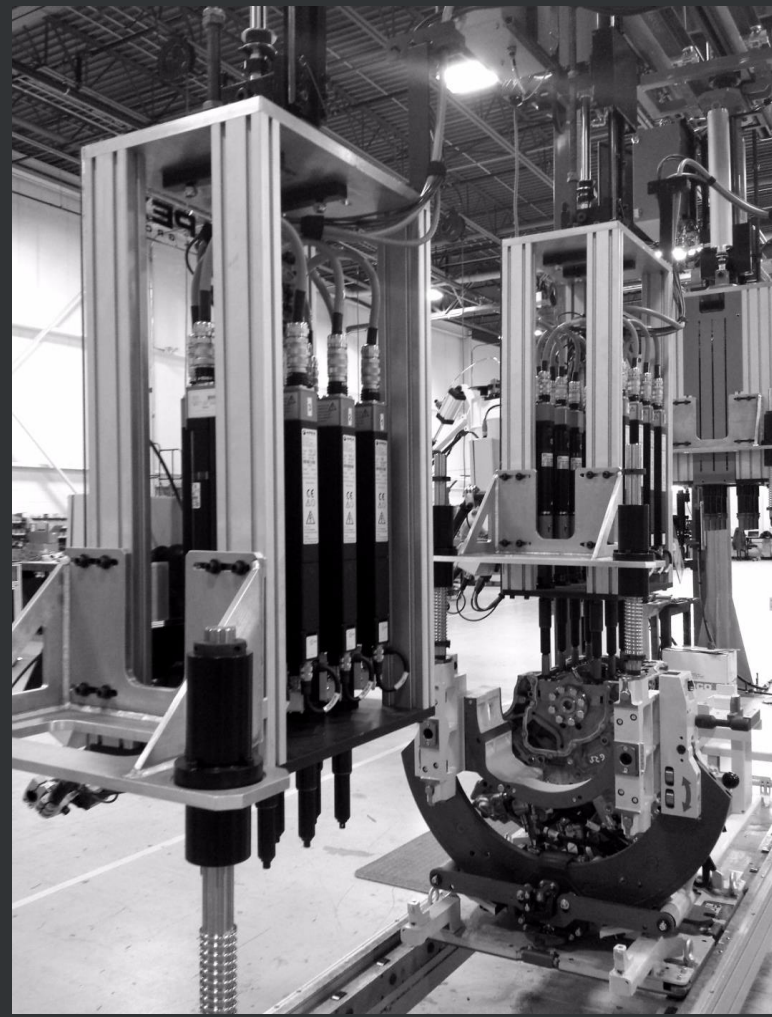


# Aerospace Tightening



**Innovation that  
Drives Productivity**

**Date January 2015**



- A leading global manufacturer of professional hand and power tools, industrial assembly solutions and services
  - Revenues of \$1.5 billion in 2012 with over 8,500 associates
  - Manufacturing in 27 locations in the Americas, Europe, Asia, Australia
- Diversified sales profile and strong relationships with global OEM's, industrial distributors, and retail customers
  - Commercial operations in over 120 countries
- Strong end-user focused product development culture delivering relevant innovation
  - Over 200 engineering and R&D associates globally
  - Design centers in Germany, France, US, and China
- Globally managed with the Apex Business System (ABS)
  - Enables us to provide innovative solutions with outstanding operational excellence and consistent earnings growth
- Owned by Bain Capital since February 2013

## *Our Vision*

The focused leader in Assembly and Repair Tools delivering smart productivity and smarter results.

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## *Our Mission*

To be the first choice for industrial and professional customers by delivering outstanding innovation, productivity solutions and exceptional service around the globe

---

## *Our Values*



## Motor Vehicle

## Aerospace

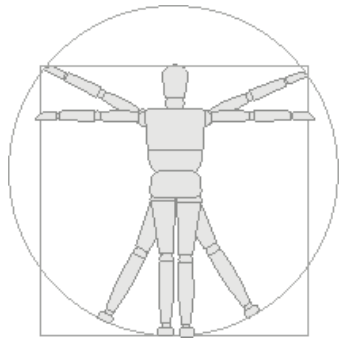
Material	Standoff: 75"	Standoff: 25"	Standoff: 5"
Air	27.3	27.9	21.9
Ti	59.2	27.9	47.6
CFRP	-	-	134.7
Adaptive	-	-	77.1
Conventional	-	-	134.7

Time (sec) vs RPM chart showing Adaptive vs Conventional performance.

## General Industry

## Electronics

## Ergonomics



*Contributable Benefits  
in Operational Savings  
from 10 to 35% +*

## Assembly Techniques



*CAPEX savings 15 to 40%  
TCO over 3yr life ↓ by 40%*

## Intelligent Products



*CAPEX Reduction by 30% +  
Operational Benefits ↑ by 30% +  
TCO over 3yr life ↓ by 40%*

**Major  
automotive  
OEMS**

*Operational Reduction  
in cost by ≥ 30%*

*Cost Avoidance in Post Sale and  
Warranty Campaign Actions  
from 10 to 40% less*

*Variable Savings  
based on Program  
or Combo Prod Selected  
Est. 20 to 35% + in Savings*



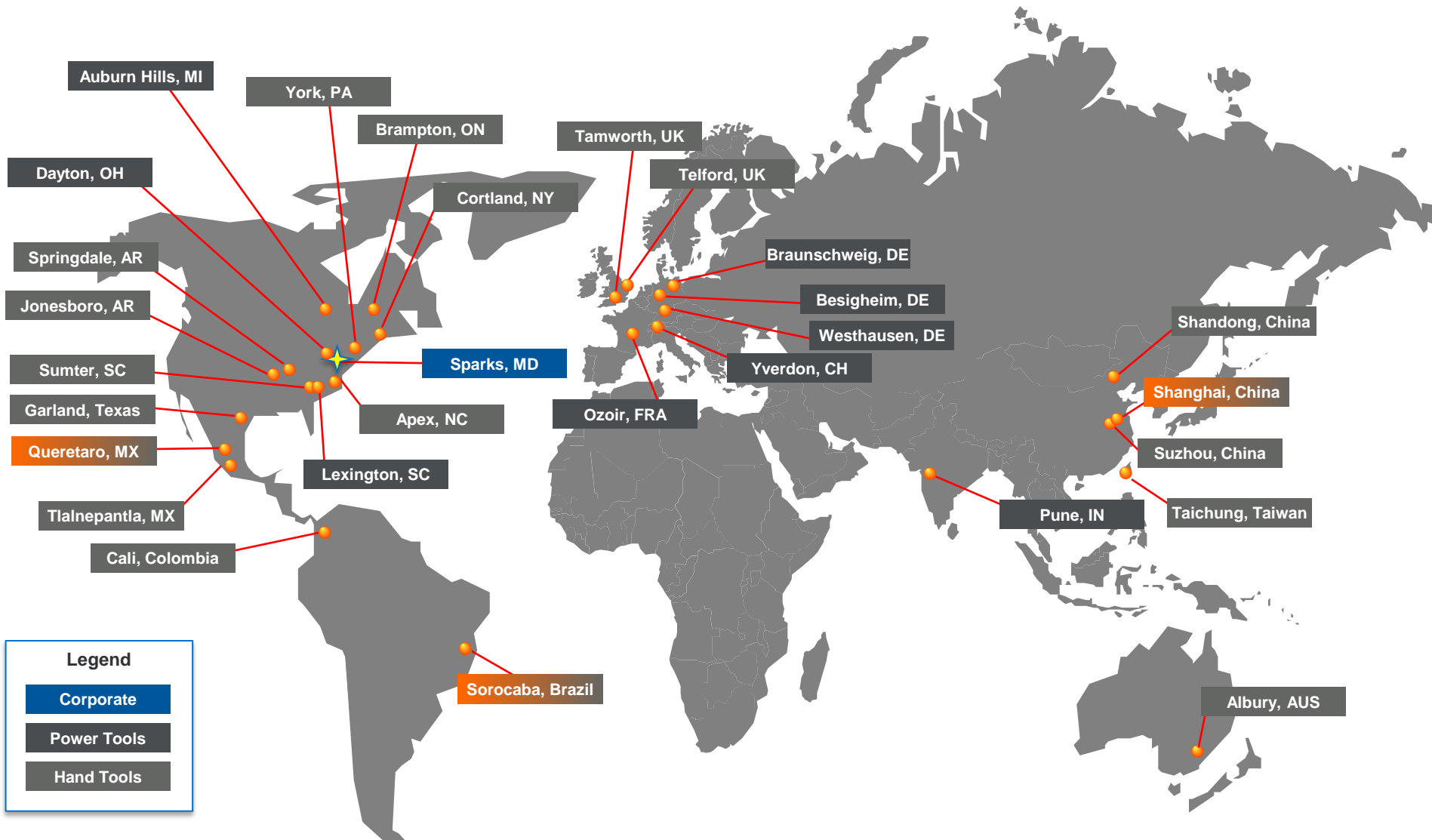
## Quality Programs

## Commercial



## Service & Support

# Broad Operations Footprint



# 60+ Years in Aerospace



For decades, Aerospace production facilities all over the world have depended on Recoules, Quackenbush, Cleco, Dotco, and Apex products to deliver powerful, reliable, safe, efficient, and user-friendly performance. These products have been designed to bring exceptional value with durability, ergonomics, ease of integration and increased aero build rates in mind.



Advanced drilling equipment, Cutters, and Microstop cages



Pneumatic and Electric Fastening Tools and Systems



Tough, long lasting bits and sockets



Precision Material Removal air tools



Creating durable products for years that last for years.

# Aerospace Customers



Global Provider For Global Customers



## Equipment

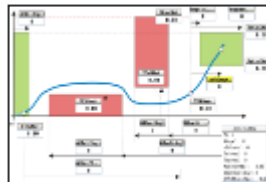
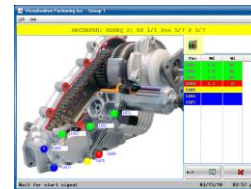
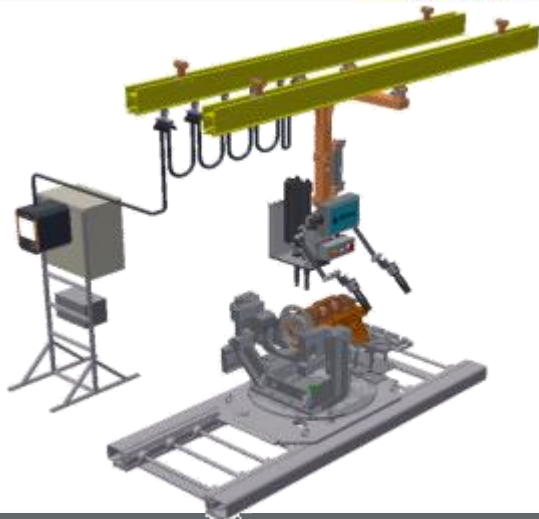
- Fastening
- Controls
- Material Removal
- Drilling
- Soldering
- Accessories
- Quality Assurance
- Torque Management

## Solutions

- Automated Solutions
- Error Proofing
- Data Management
- Fastening Strategies
- Process Improvements
- Reduced Total Cost of Ownership

## Support

- Project Management
- Turnkey Install & Startup
- Automated Solutions
- Field Service/24-hr hotline
- Repair, Calibration, Optimization Services
- Total Production Maintenance



We enable customers to more easily manufacture their products





## IN-HOUSE REPAIR NETWORK

- USA:**
  - Norwalk, California
  - Redmond, Washington
  - Houston, Texas
  - Auburn Hills, Michigan
  - York, Pennsylvania
  - Lexington, South Carolina
- CANADA:** Mississauga, Ontario
- MEXICO:** Queretaro, Mexico
- BRAZIL:** Sorocaba, Brazil
- CHINA:** Shanghai, China
- INDIA:** Pune, India
- ENGLAND:** Staffordshire, UK
- FRANCE:** Ozoir, France
- GERMANY:** Westhausen, Germany
- HUNGARY:** Győr, Hungary



With a full range of tools for every production and maintenance operation, we are your ultimate productivity solutions partner. Our global service network can provide the level of professional repair and maintenance required to keep you up and running. No matter what your current tool repair capabilities are, we can maintain and manage your entire fleet of tools, even those built by other brands. You can rely on our in-house service centers and global distributor-based service network to deliver world-class support.

# General Product Review



# Assembly Tool Portfolio Overview



ATG has a complete portfolio for all fastening needs.

## Pneumatic Tools

Cleco screwdriver



Cleco impact tool



Cleco pulse tool



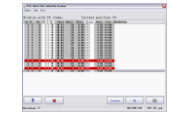
Cleco pulse tool verifier



## DC Tools



Cleco mPRO400GC common controller with error proofing, traceability and reporting



TorqueNet Software



DGD Intelligent Spindle



DGD Mini Spindle



Cleco Live Wire Tool



DGD conventional spindle



DGD current control



Cleco 18,48 and 67 series tool



Cleco I wrench





## Pneumatic Tools



## H-Series Pulse Tool

- 45 Years of Pulse Tool Design Evolution
- Built in Germany
- Industry Leading Pulse Unit Design



## Quality

- Advanced Design
- Unmatched Repeatability

## Reliability

- **Best-In-Class Reliability**
- **~700K pules cycles between oil changes**

## Productivity

- **Best-In-Class Productivity**
- **Highest Repeatability**
- **Fastest rundown time**
- **Operate as low as 4 Bar**

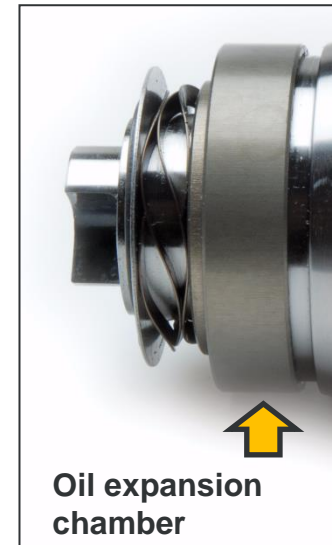
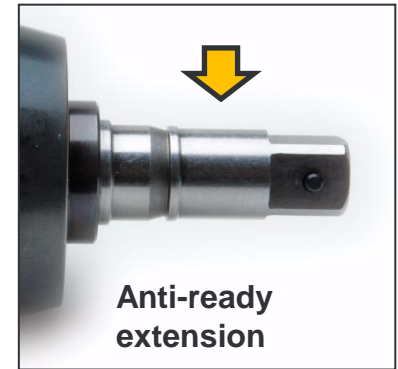
## H-Series Pulse Tool





# H series Pulse Unit

- Simple to service
- World class reliability
- >700,000 pulse cycles (90,000 rundowns) before oil change
- Dual chamber provides stronger pulses than the competition
- Patented oil reserve system
- Bearing supported output drive



## H-Series Options

- Shut-Off
  - 4 - 120 Nm of Torque
- Non Shut-Off
  - 7 - 120 Nm of Torque
- Square Drive
  - 1/4" - 1/2"
- Internal Hex Drive
  - 1/4"



- Air on Top
  - Shut-off/ non shut-off models



# Cleco Engineered Pulse Tool System

**Cleco**<sup>®</sup>



## In line tools

- 3-25 NM
- Lever start
- Push to start
- Quiet
- Very low torque relations
- Fast

## Non-shut off

- 3-400 nm
- Easy set-up and service
- Adjustable torque control
- Lightweight
- Very low reaction
- Air from top option
- Quiet
- Fast

## Shut off

- 3-400 Nm
- World class accuracy
- Easy set up and service
- Air from top option
- Lightweight
- Very low reaction
- Quiet
- Fast

## Qualifiers

- Error-proofing process qualifier
- Batch and cycle counting
- I/O for process flow control
- No tool modifications required
- Easy set-up



**Cleco Offers a full Array of Parts and Accessories**

# Product Overview



## Accuracy

Lower Cost of Quality

- Industry-leading accuracy reduces costly rework
- Longer time between calibrations

## Durability

Lower Cost of Operation

- Designed and tested to over 1 million cycles
- 5-year clutch warranty

## Customizability

Higher Productivity

- Torque multiplier compatibility for large structure joints
- Specialty head compatibility for access limited applications
- Over 100 variations, including custom-built configurations

## Ergonomics

Higher Productivity

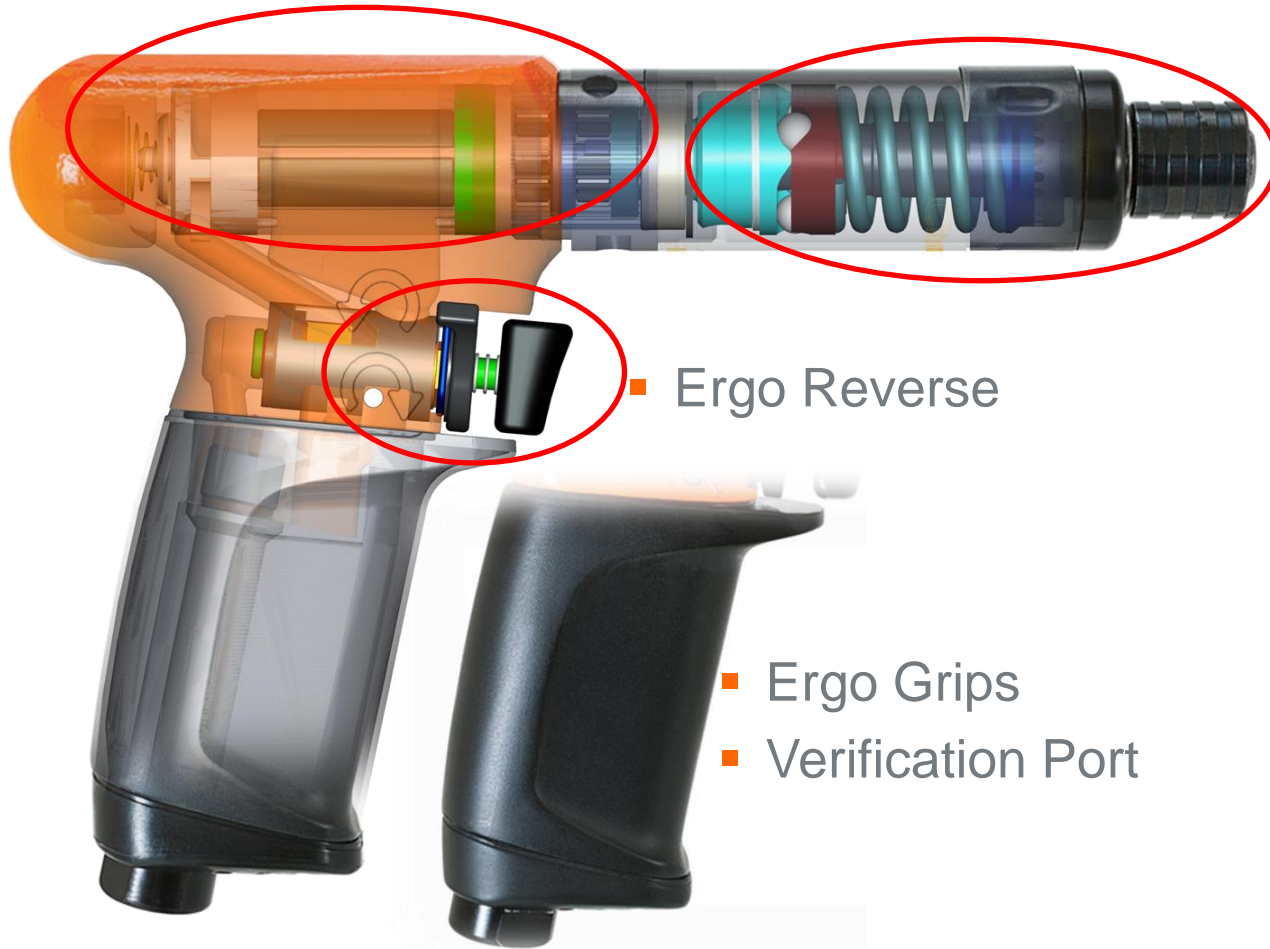
- World-class ergonomics and comfort

## 19 Series



- Powertrain

- Clecomatic® Clutch

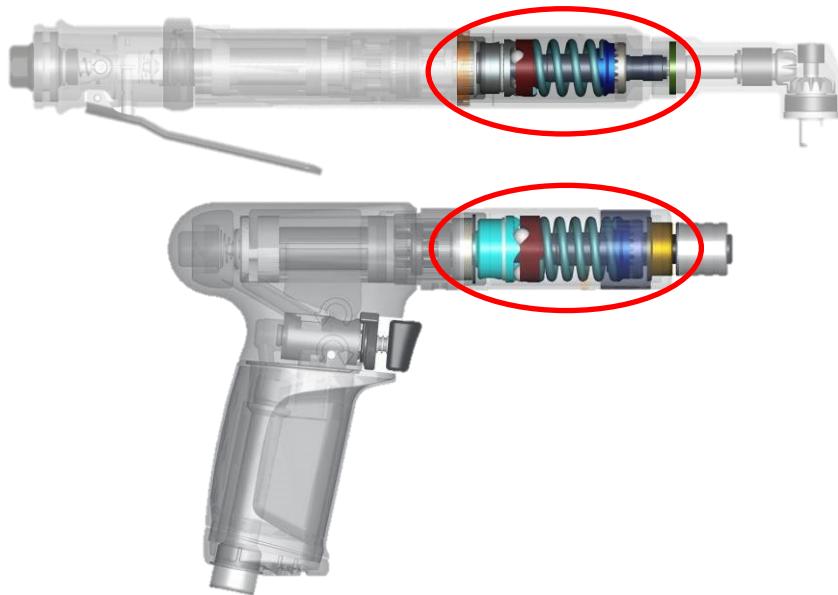


- Ergo Reverse

- Ergo Grips

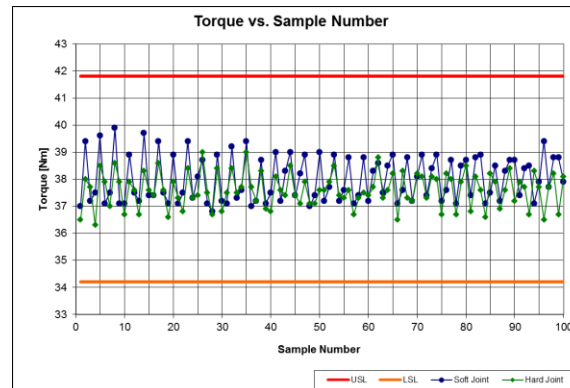
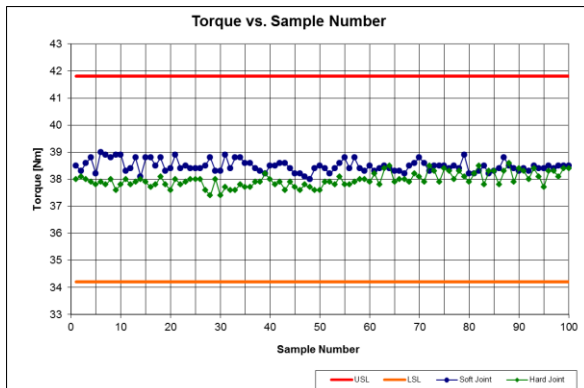
- Verification Port

## Clecomatic® Clutch - Accuracy and Repeatability



- Industry leading accuracy
- Industry leading repeatability
- Less time between calibration
- Clutch 5 year warranty

### 19 Series Clecomatic® Clutch vs Competitor A

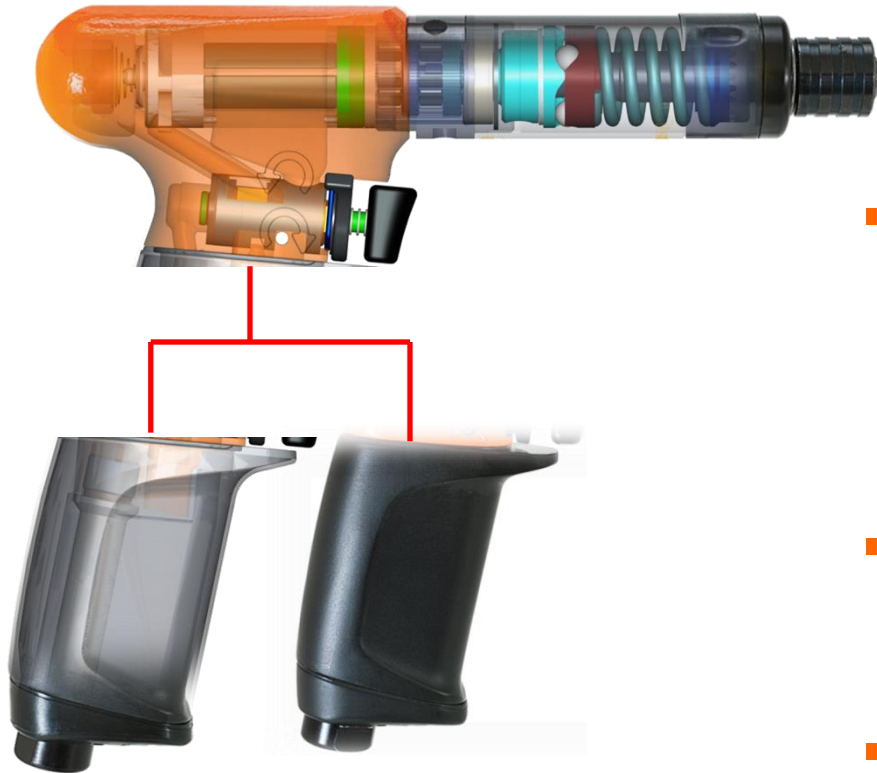


## Power Train – Ergonomics and Spares Inventory



- Advanced material yield up to 50% weight reduction against competitor tools
- Common power train components across the range minimize spares requirement
- Efficient planetary design >95% maximizes torque output

## Ergonomic Reverse, Grip Options and Torque Verification Port



- Two interchangeable pistol grip handle sizes to customize to operator increasing operator comfort and productivity
- Soft-touch grip delivers superior protection against temperature, oil, grease, vibration, and slip meaning improved ergonomics and reduced fatigue
- Adjustable reverse lever offers true one-hand operation and adaptability for left-or-right-handed users
- Easy access torque verification port parallel to the main air line for streamlined hose management









# VS



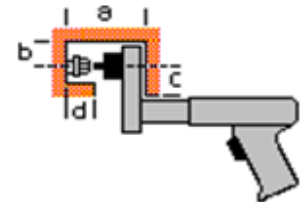
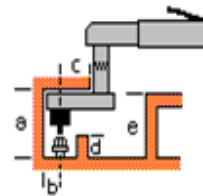
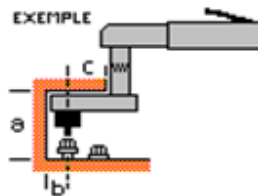
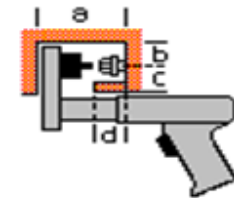
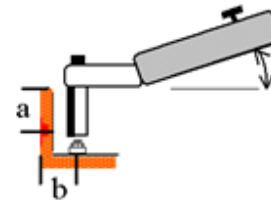
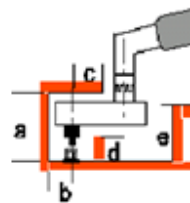
Industry-leading accuracy and repeatability	✓	
5 year warranty on auto shut-off clutch	✓	
Torque verification port as standard	✓	
2 Interchangeable handle sizes to provide comfort to a range of users	✓	
Torque Multiplier Compatibility	✓	
Over 100 variations offered, based on configuration, RPM, and torque range	✓	✓
Innovative materials yield one of the lightest weight tools on the market	✓	✓

# Configurations & Options



Configuration	Shut Off Types	Torque Range	Speed Range RPM	Options
"P" Handle 	Torque Control  Stall	5 ~130 in-lb 0.6 ~ 14.7 Nm ~ 40 in-lb ~ 4.5 Nm	260 ~ 2800  1100 ~ 2800	Trigger/Push to Start Specialty Heads TVP Torque Verifier
"T" Handle 	Torque Control  Stall	5 ~130 in-lb 0.6 ~ 14.7 Nm ~ 40 in-lb ~ 4.5 Nm	260 ~ 2800  1100 ~ 2800	Trigger/Push to Start Specialty Heads TVP Torque Verifier
Right Angle 	Torque Control  Stall	5 ~100 in-lb 0.6 ~ 11.3 Nm ~ 55 in-lb ~ 6.2 Nm	260 ~ 2800  850 ~ 1700	Specialty Heads TVP Torque Verifier Torque Multiplier
In Line 	Torque Control	5 ~130 in-lb 0.6 ~ 14.7 Nm	260 ~ 2800	Push to Start Lever/Push to start Quick change/Bit & Finder TVP Torque Verifier

Specialty heads are commonly used for applications with access challenges. Integrated with the 19 series fastening tool, we provide **Complete Fastening Solutions** for your **Aerospace Applications**.





## DC Tools

DC Hand Tools



Global Controller



Intelligent Spindle



## Cleco mPro400GC (Global Controller)

**ONE** Controller for:

- Cleco Corded DC Hand Tools
- Cleco Cordless DC Hand Tools
- Cleco Cordless Intelligent Wrenches
- DGD Fixtured Multiples



# Apex Modular Tightening System

**Cleco**<sup>®</sup>



Corded Hand Held Tool



Fixtured Intelligent Spindles



Cordless Hand Held Tools  
Up to 16 Tools



I-Wrench

- Single controller to multiple tool solutions
- Corded DC Electric Tools
- Cordless DC Electric Tools
- I-Wrench

# The Livewire – Up to 16 Cordless Tools

**Cleco**<sup>®</sup>



# LiveWire Battery Tool - Cordless Technology **Cleco**<sup>®</sup>

**Torque Range: (5-70)Nm**

- ✓ On-Board Controller
- ✓ Integrated Servo
- ✓ Intelligent Power Management



Scanner  
Option



Traceability for Safety Critical Fastening up to 70 Nm



# LiveWire Battery Tool - Live Operator Display **Cleco**<sup>®</sup>



- ✓ Real-time Interface
- ✓ Redundant (LCD/LED)

## Feedback

- Green LCD = OK
- Green LED = OK
- Yellow LCD = Running
- Red LCD = NOK / Errors
- Red LED = NOK



**Cordless  
Freedom**



*or*

**Tethered  
Speed...**



**The Choice  
Is Yours.**



**vmax**<sup>™</sup>

# Livewire - Benefits



- ✓ Eliminate Cables and Cable Management
- ✓ Increase Operator Efficiency and Productivity
- ✓ Reduce In-System Damage Costs





**Cleco  
Cordless**

**Cleco Cordless  
LiveWire 2**

**360 grams  
lighter**

- Broad Range of Torque and Tool Configuration Offerings
- Common controller for all tools
- Best-in-Class Cable Life

## Corded Electric Tools In-line, Pistol, Angle Offering

- Brushless Motor Technology
- Resolver Speed / Angle Control
- Reaction Transducer
- Ergonomic Comfort Handles
- High Visibility Status LED's
- Tool Memory Chip
- Serviceable Motor Technology



**Serviceable Motor Technology**

## Automatic Head Recognition Feature



## Color Touch Screen Navigation

- Tq. & Angle Data
- VIN used
- Application/ P-Set Selected
- Event status update

## Programmable Correctional Tq/Angle Factor for Special Head Attachments



## Software



- Customer Protocols
- Production Server
- Data Base

## Plant Network



WLAN 2.4 & 5Ghz

## Integrated Bar Code Scanner



Operator Guidance Visual & Tactile



## Operate via -

- mPro400 GC
- PC / HMI w/ mProRemote software

- Measurement of Angle of Rotation Independent from Temperature
- Rechargeable Li-Ion battery
- Operator Guidance through vibration notification



- New Process Quality Assurance Product from ATG
- 2 Models of I-Wrench:
  - Production (PRW)
  - Quality (SPC)
- Quality and Productivity Focused Features
- mPro400GC Programmed
- Replacement of existing “mechanical” torque wrenches
- True angle control without fixturing
- Multiple torque targets assigned to single wrench

## I-Wrench



## Productivity

- Wi-Fi Communication for Industry Leading Uptime to GC or Standalone PC program
- Integrated Scanner for Product ID
- Auto head recognition for error proofing
- Color touch screen for easy of use

## Ease of Deployment

- 1.5 Nm to 1500 Nm Torque Range
- Wireless and Wired Installation
- Multiple tools to a Single Controller
- Wi-Fi and Bluetooth Wireless Communication

## Ergonomic

- Operator Display for Feedback
- Li-Ion Battery (up to 9 hours of run time)
- Lighter than traditional Click style tools
- Audible, visual and tactile user feedback

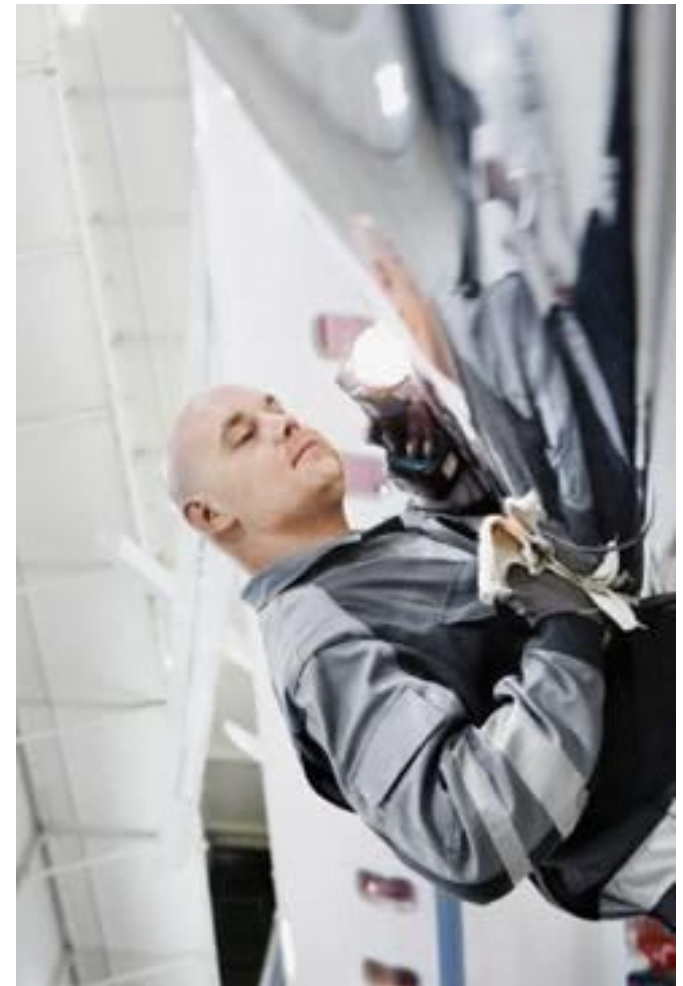
## I-Wrench





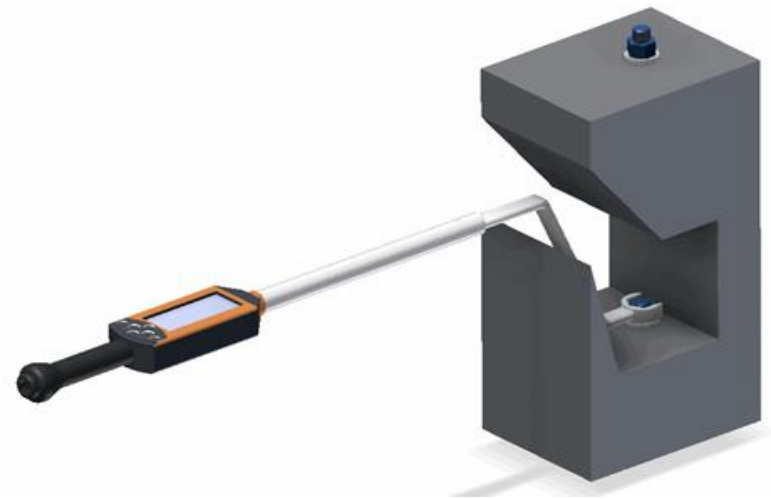
- Organization of quality control testing w/ SQnet
- Automatic data and trace storage for QC checks
- Process Verification & Torque Angle Validation Routing
- Trace capture and analysis of QC checks
- SPC Reporting
- CW and CCW Testing

### I-Wrech: Quality Applications

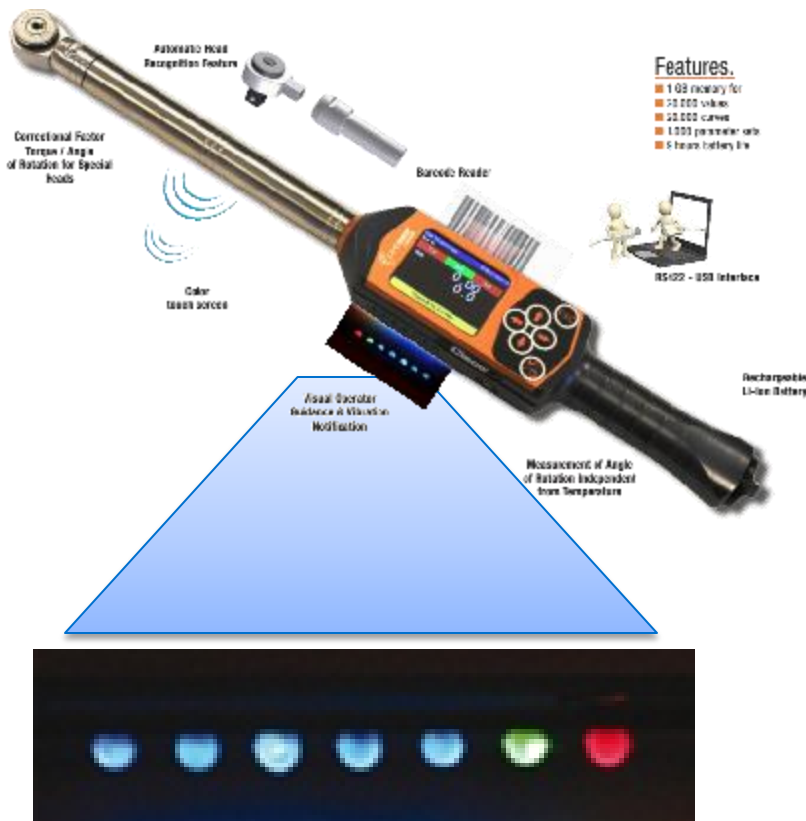


- Difficult access or limited space and complex applications
  - Brake, hydraulic, fuel lines
  - Offset applications
- Hand tool applications with requirement for HIGH torque and angle accuracy
  - Torque Control, Angle Monitoring
  - Angle Control, Torque Monitoring
- Low production or pilot builds
- Applications requiring high torque without reaction

## Critical and Complex Tightening

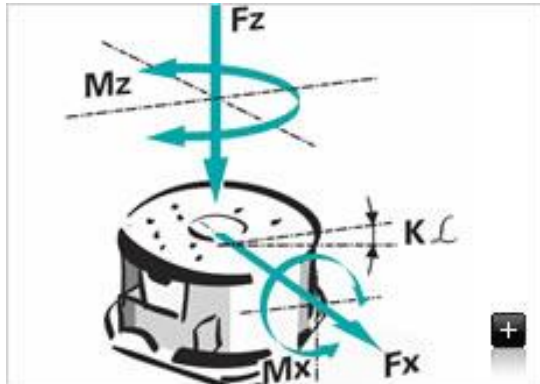


## Operator Guidance



- LED progression display
- Buzzer and vibration alarm
- Alerts operator when approaching and reaching tightening targets
  - Blue LED 1 = 30%,
  - Blue LED 2 = 50%,
  - Blue LED 3 = 70%,
  - Blue LED 4 = 90%,
  - Blue LED 5 = 98% increments (configurable w/ Quality I-Wrench)
- LED target (torque/angle) signal
- LED result (OK/NOK) notification

## Precision & Performance



- Measurement Accuracy
  - +/- 0.5% deviation @100% torque capacity
  - +/- 1% deviation below 20% torque capacity
  - +/- 0.1° angle display deviation
- Fractional Angle Measurement
- Data Storage
  - Internal Memory: 1 GB
  - 20,000 results, 20,000 curves (traces), 1,000 applications (Quality I-Wrench)

## Gyro- Based Calculation



- Strain-gauge Transducer with Dual Bridge
- Gyro, not Accelerometer
  - Higher accuracy
  - Speed-based angle calculation
- Temperature Compensation
  - Removes temperature influence on angle readings

## Auto Head Recognition



- Chip supported head recognition
- Error proof process combining selected head and application
- Torque & Angle Correction Factors
- Integration with mPro400GC Controller

## Head Attachments

- Quick Release Ratchet
- Ratchet Insert
- Ratchet Insert – fine tooth
- Square Drive Insert (Fixed Position)
- Bit Ratchet Insert
- Bit Holder Insert



## Open End Head Attachments

- Open End Insert
- Open Ring Insert
- Ring Insert
- Extended Ring Insert
- TORX Insert

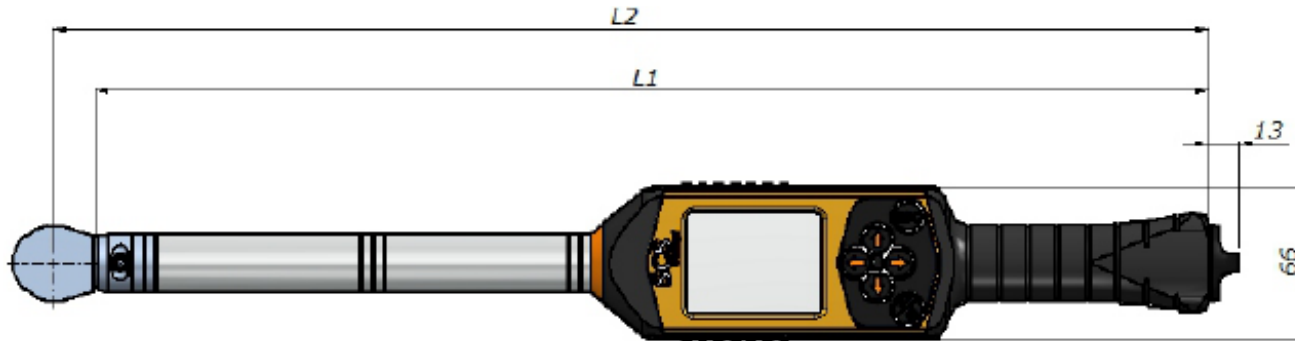




## Available Head Attachments – “Specials”

- Outer Drive 14x18 / Internal Drive 9x12mm
- Outer Drive 9x12 / Internal Drive 14x18mm
- Outer Drive 24.5x28 / Internal Drive 14x18mm
- Lateral Dovetail Profile / Internal Drive 9x12 or 14x18mm
- Blank End Insert - Customization





Torque Capacity (Nm)	Connection (end- Fitting)	L1 (mm)	L2 (mm)	Weight * (kg)
15	9x12 Female	375	393	0,8
30	9x12 Female	375	393	0,86
70	9x12 Female	480	498	0,93
100	9x12 Female	480	498	0,93
200	14x18 Female	604	629	1,5
300	14x18 Female	754	779	1,86
400	14x18 Female	854	879	2
600	14x18 Female	1032	1057	3,65
800	Ø 20	1250	1330	5,1
1000	Ø 20	1530	1610	6,25

\* Listed weight w/o ratchet head



## Productivity

- Wi-Fi Communication for Industry Leading Uptime to GC or Standalone PC program
- Integrated Scanner for Product ID
- Auto head recognition for error proofing
- Color touch screen for easy of use

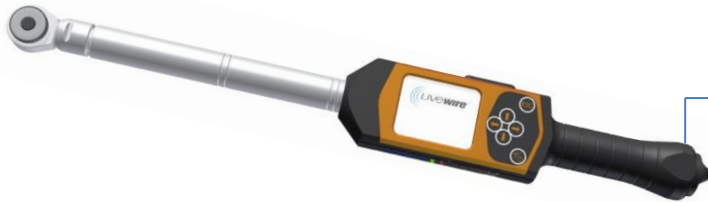
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- Wireless and Wired Installation
- Multiple tools to a Single Controller
- Wi-Fi and Bluetooth Wireless Communication

## Ergonomic

- Operator Display for Feedback
- Li-Ion Battery (up to 9 hours of run time)
- Lighter than traditional Click style tools
- Audible, visual and tactile user feedback

## I-Wrench Cordless Productivity



Download data results and  
Traces/curves to GC



### LiveWire I-Wrench is torque/angle wrench designed to be programmed by the mPro400GC

- One common platform for programming
- Easy to program (application setup like other Cleco DC hand tools)
- For every tightening program LiveWire I-Wrench saves the results and curves/traces directly to the mPro400GC (>10,000 per wrench at GC)
- High Torque Accuracy w/ dual bridge strain gauge (non length dependent)
- High Angle Accuracy with Gyroscope (w/ Temperature Compensation)
- Operator Guidance – Visual & Vibration Notification
- Color Display Screen (Touch)
- Wi-Fi connection to mPro400GC (supports 2.4 & 5 GHz)
- Connect up to 16 LiveWire tools to mPro400GC (I-Wrench and LW Power Tools)
- No extra hardware to unlock features



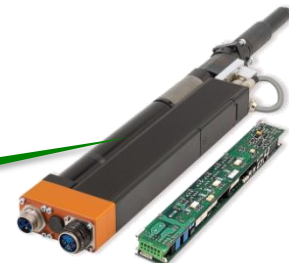
- Torque Range : 2 – 2800 NM
- Patented Single-Cable Design
- Compact on-board intelligence
- Modular Construction – Ultimate Versatility



- High Productivity
- World class durability (MTBF 3 Mil cycles @80%)
- World class accuracy (Cmk >1.67 @ +/- 5%)

- Over 25,000 nutrunners installed
- European Homologation Compliance
- Complete product portfolio
- Proven lower cost of ownership

On-Board Servo  
Module



### Easy Access, Compact Flash, <1 Minute Boot



- Low Mean Time To Repair
  - CF (Compact Flash) – allows installation of complete operating software including application parameters
  - Rapid Controller Swap
  - Boot Time Less than 1 Minute
- Serviceability
  - Ease of Access
  - Ease of Troubleshooting
  - Full Cover Removal for Bench Repair

## Software / Hardware Supports All Customer Protocols

- Cooper
  - Standard/ Standard Plus – Serial / Ethernet
- TorqueNet
  - Data Server - Ethernet
- Daimler MBUSI
  - Click/Plus\*
- Chrysler
  - PFCS – Serial / Ethernet / Fixtured Bundling
- Volkswagen
  - XML – Ethernet – Open Protocol\*
- General Motors
  - Common Controller (Rev. J) – Q4-2010
  - GM Powertrain Gen V - Q4-2010
    - Q-DAS Statistical Package - Complete
- BMW
  - Kiss Q\*
- Harley Davidson
  - AVIS/WIN-SPC – Serial/Ethernet

\*available with special application software versions



- Apex produces the industry's largest selection of industrial fastening tools:
  - Bits, Bit Holders, Sockets, Nutsetters, Extensions, Adapters, Anti-mar products, and Custom Solution Specialty Fastening Tools



**U-Guard  
Safety and  
Anti-Mar  
Products**

- 80 Years of production and product experience.
- World's leader in providing Custom Solution Specialty tools for the fastening industry.
- Known for breadth of selection, superior industrial performance, lower total cost of ownership and unmatched quality.
- Apex branded fastening tools have over a 80% share of business in the BRP Sturtevant plant with most spinning tools covered in U-Guard.
- Growing presence in other North American plants.



Process  
Quality Assurance  
Solutions by  
APEX Tool Group

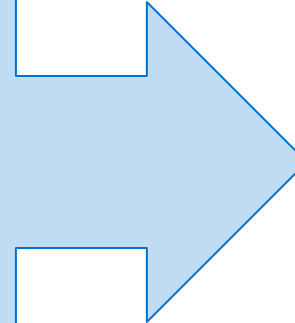
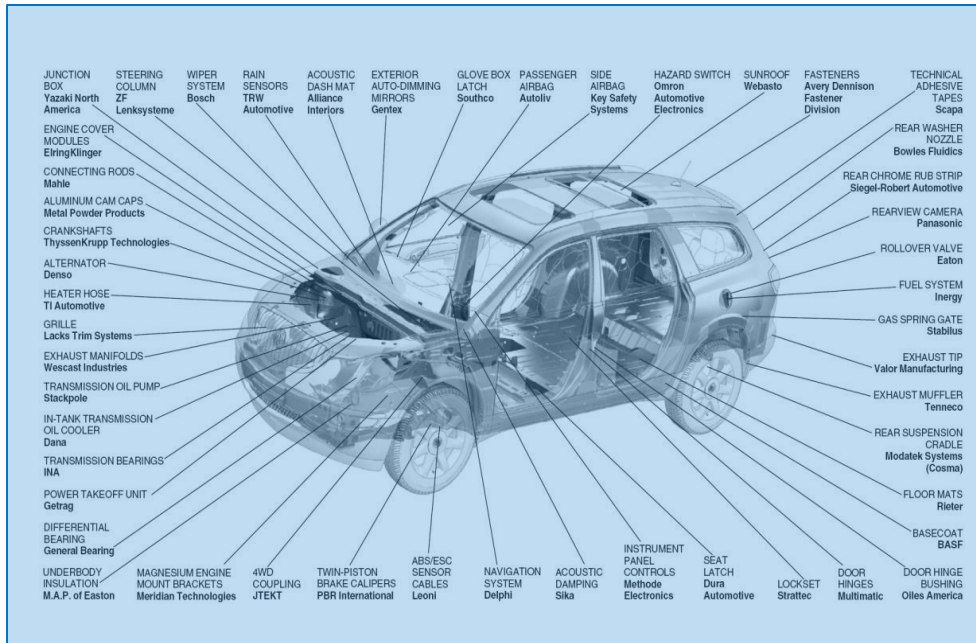


## Dynamic Fastening System



- Repair Bays
- Pilot Build
- Mobile “crash” cart
- Online production build of new models
- Cellular Build

# DFS: Mobile, Programmable, Fastening System



All assembly applications in a central location  
 Battery Powered (8+ hours)  
 DFS cart has preformed over 700 tightening stations in the  
 field

# Data Transfer & Process Control



# Overall Hardware / Software Architecture

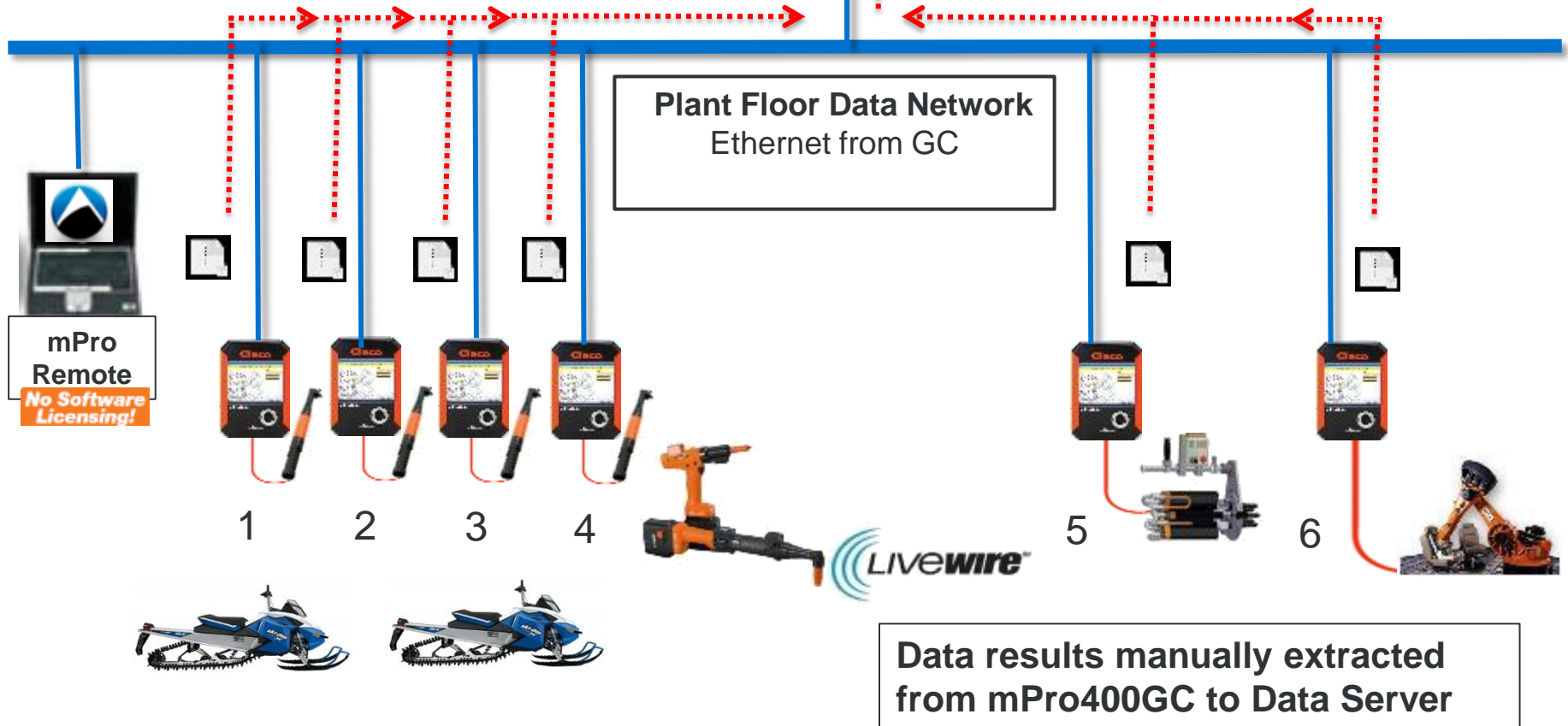


## Option 1: Manual Operation

Data Server



Data Result Export (CSV file format)



# Overall Hardware / Software Architecture



## Option 2: Automated Operation

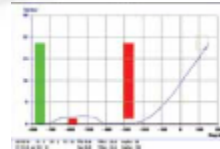
**TorqueNet** Server



Data Server



Rundown & Trace Archive  
w/Reporting



Plant Floor Data Network  
Ethernet from GC



Data from controller sent via mPro400GC  
file format after each rundown

# Overall Hardware / Software Architecture



## Option 3: Automated Operation

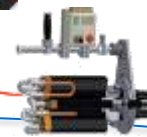
Data Server



Plant Floor Data Network



mPro Remote  
No Software Licensing!



PLC

3<sup>rd</sup> party data driver

Rundown Data Protocol

1

2

3

4

5

6

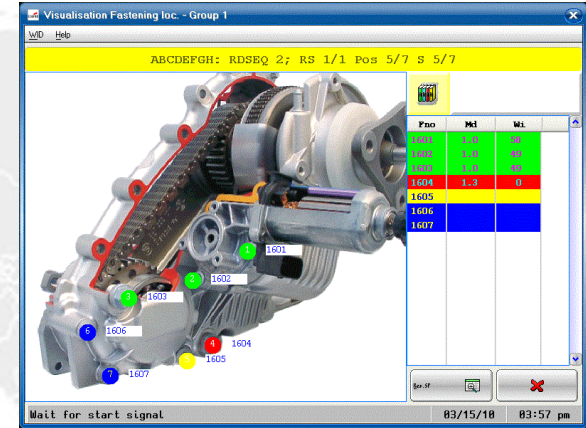
Ethernet from GC or Ethernet from field bus

# Full Line of Error Proofing Offerings



## ■ Communication medium

- Line PLC
- Discrete
- Devices
- Light stack
- Active Line stops
- Socket Trays



Digital  
Process  
Error Proofing



# TorqueNet Data – Simple view



## Search Result (27 values)

Controller	Ident.-No.	Addition	Grp	Sp	Stp	JNo	App	Stg	SEQ	TQact	ANact	GDact	Error	Code	Tool Serial#	Date / Time	Details
VIM351				1	1	1	0	1	2	50	0.00	100			RI4849	6/20/2011 9:20:49 AM	
Anton SE		OFFLINE PG01		2	2	1		1	3	50	0.23	51			657600	6/20/2011 10:50:49 AM	
Anton SE		OFFLINE PG01		2	3	1		1	3	50	0.00	50			657600	6/20/2011 10:50:49 AM	
Anton SE		OFFLINE PG01		2	2	1		1	3	50	0.12	51			657600	6/20/2011 10:50:52 AM	
Anton SE		OFFLINE PG01		2	2	1		1	3	50	0.12	51			657600	6/20/2011 10:51:03 AM	
Anton SE		OFFLINE PG01		2	3	1		1	3	50	0.00	50			657600	6/20/2011 10:51:03 AM	
Anton SE	AI110620105454			2	2	1	121001	1	3	50	0.12	51			657600	6/20/2011 10:55:03 AM	
Anton SE	AI110620105454			2	3	1	122001								657600	6/20/2011 10:55:03 AM	
Anton SE	AI110620105454			2	2	2	221001	1	3	50	0.23	51			657600	6/20/2011 10:55:10 AM	
Anton SE	AI110620105454			2	3	2	222001	1	3	50	0.05	50			657600	6/20/2011 10:55:10 AM	
Anton SE	AI110620105510			2	2	1	122001	1	3	50	-0.03	50			657600	6/20/2011 10:55:13 AM	
Anton SE	AI110620105510			2	3	1	122001	1	3	50	-0.03	50			657600	6/20/2011 10:55:13 AM	
Anton SE	AI110620105510			2	2	2	221001	1	3	50	0.12	51			657600	6/20/2011 10:55:16 AM	

Tool / Spindle Serial Number

Event Details

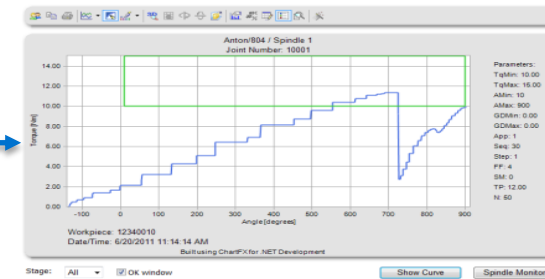
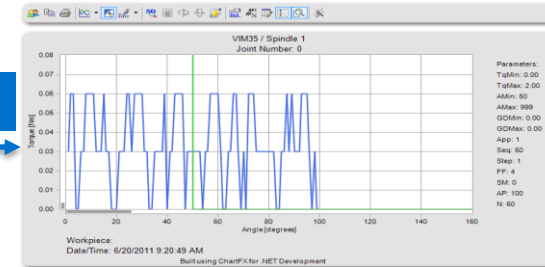
Application Details

Operation / Application Name

Controller Name

Date & Time Stamp

## Tightening Traces



Controller: VIM35	Total: 35	OK: 35	NOK: 0											
Date/Time: 6/20/2011 9:20:49 AM	Workpiece:	App: 1	Sp: 1 Grp: 1 St: 1											
Step	JNo	App	Stg	SEQ	TP	Tq(Nm)	Tq-OT	Ang(deg)	A-OT	GD	GD-OT	Time	Error	Code
1	0	1	1	11	0.00	0.03						9:20:49 AM		
1	0	1	2	50	100.00	0.00		100				9:20:49 AM		

## Tightening Details / Data

Stage	Error	Code	Meaning
Controller: VIM35		App: 1	Sp: 1 Grp: 1
Stage 1			
Sequence		11	
Trigger moment	0,00 (Nm)	Speed	40 (1/min)
Shut off torque	0,00 (Nm)	Damping factor	1
Stage 2			
Sequence		50	
Trigger moment	0,00 (Nm)	Speed	60 (1/min)
Threshold moment	0,00 (Nm)	Damping factor	4
		Shut off angle	100 (grd)
Minimum moment	0,00 (Nm)	Minimum angle	50 (grd)
Maximum moment	2,00 (Nm)	Maximum angle	999 (grd)





# Last 25 Rundowns Detail

Every thing you want or need to see is but only a mouse click away to drill down into data and status's of your fastening operations

Controller: ENT/Anton		Total: 49	OK: 45	NOK: 4
Date/Time: 9/8/2011 10:40:55 AM	Workpiece: 12345678	App: 1	Sp: 1	Grp: 1

Step	JNo	App	Stg	SEQ	TP	Tq(Nm)	Tq-OT	Ang(deg)	A-OT	GD	GD-OT	Time	Error	Code
4	104	1	4	50	50.00	1.10		50				10:40:55 AM		

Tightenings for Workpiece.: **12345678**

Controller	Ident.-No.	Addition	Grp	Sp	JNo	App	Stg	SEQ	TQact	ANact	GDact	Error	Code	Tool Serial#	Date / Time	Details
VIM351	12345678		2	2	1	3301	1	2	50	0.00	101			662313	7/20/2011 2:30:33 PM	Phy
VIM351	12345678		2	2	2	3302	1	2	50	0.00	101			662313	7/20/2011 2:30:35 PM	Phy
VIM351	12345678		2	2	1	3301	1	2	50	0.00	101			662313	7/20/2011 2:37:31 PM	Phy
VIM351	12345678		2	2	2	3302	1	2	50	0.00	101			662313	7/20/2011 2:37:34 PM	Phy
VIM351	12345678		2	2	1	3301	1	2	50	0.01	101			662313	7/20/2011 2:38:29 PM	Phy

Click on the spindle icon

Tightening Curve

Stage	Error	Code	Meaning

Controller: ENT/Anton	App: 1	Sp: 1	Grp: 1
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Stage 4

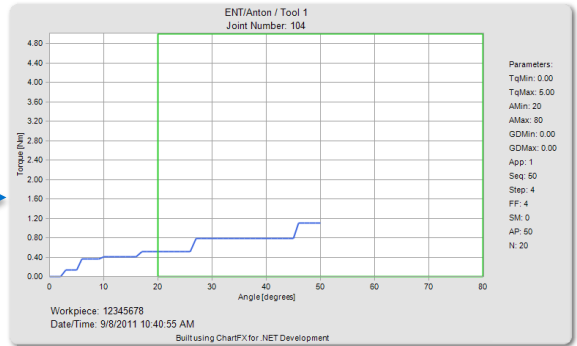
Sequence	Value	Unit	Parameter
Trigger moment	0.00	(Nm)	Speed
Threshold moment	0.00	(Nm)	Damping factor
			Shut off angle
			50 (grd)
Minimum moment	0.00	(Nm)	Minimum angle
			20 (grd)
Maximum moment	5.00	(Nm)	Maximum angle
			80 (grd)

Ident.-No.	Addition	JNo	Sp	App	Stg	SEQ	TQact	ANact	GDact	Error	Code	Tool Serial#	Date / Time	Details
12345678		104	1	4	1	4	50	1.10	50				9/8/2011 10:40:55 AM	Phy
12345678		103	1	3	1	4	50	1.28	50				9/8/2011 10:40:53 AM	Phy
12345678		102	1	2	1	4	50	0.78	50				9/8/2011 10:40:52 AM	Phy
12345678		101	1	1	1	4	50	0.82	50				9/8/2011 10:40:51 AM	Phy
12345689		104	1	4	1	4	50	0.91	50				9/8/2011 10:27:19 AM	Phy
12345689		103	1	3	1	4	50	1.14	50				9/8/2011 10:27:17 AM	Phy
12345689		102	1	2	1	4	50	1.79	50				9/8/2011 10:27:15 AM	Phy
12345689		101	1	1	1	4	50	0.64	50				9/8/2011 10:27:14 AM	Phy
12345688		104	1	4	1	4	50	0.96	50				9/8/2011 10:17:37 AM	Phy
12345688		104	1	4	1	4	50	0.32	3	SA	002		9/8/2011 10:17:30 AM	Phy
12345688		103	1	3	1	4	50	0.78	50				9/8/2011 10:17:28 AM	Phy
12345688		102	1	2	1	4	50	0.41	11	SA	002		9/8/2011 10:17:25 AM	Phy
12345688		101	1	1	1	4	50	0.45	11	SA	002		9/8/2011 10:17:22 AM	Phy
12345687		104	1	4	1	4	50	0.78	50				9/8/2011 10:16:41 AM	Phy
12345687		103	1	3	1	4	50	0.82	50				9/8/2011 10:16:39 AM	Phy
12345687		102	1	2	1	4	50	0.91	50				9/8/2011 10:16:36 AM	Phy
12345687		101	1	1	1	4	50	1.14	50				9/8/2011 10:16:33 AM	Phy
12345686		104	1	4	1	4	50	1.79	50				9/8/2011 10:14:15 AM	Phy
12345686		103	1	3	1	4	50	0.64	50				9/8/2011 10:14:11 AM	Phy
12345686		102	1	2	1	4	50	0.96	50				9/8/2011 10:14:06 AM	Phy
12345686		101	1	1	1	4	50	0.41	50				9/8/2011 10:14:02 AM	Phy
12345684		104	1	4	1	4	50	1.70	50				9/8/2011 10:06:42 AM	Phy
12345684		103	1	3	1	4	50	1.10	50				9/8/2011 10:06:40 AM	Phy
12345684		102	1	2	1	4	50						10:06:38 AM	Phy
12345684		101	1	1	1	4	50						10:06:36 AM	Phy

Click on the tightening data icon

Click on the trace icon

NOK rundowns are hi-lighted in RED for quick visualization



# Statistics Set Up Screen

**TorqueNet**

**Generate statistics**

From: 6/13/2011 2:30 PM  
 Until: 6/20/2011 2:30 PM  
 Controller: Anton/804  
 Statistics: NOK Statistics by Joint Numbers

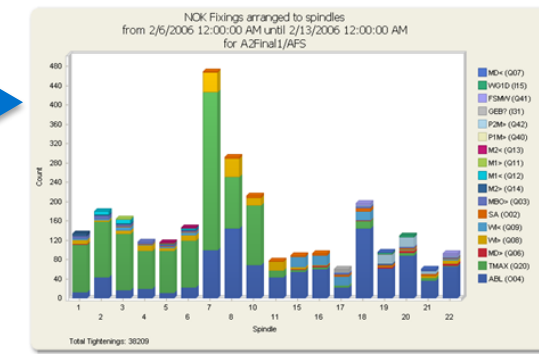
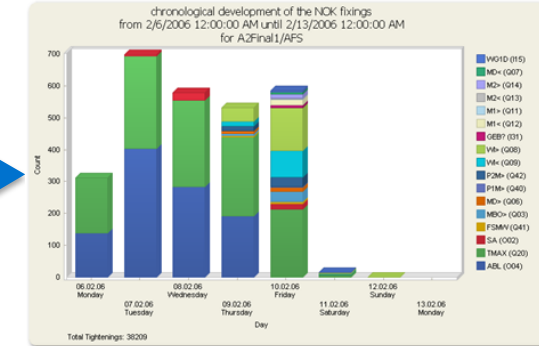
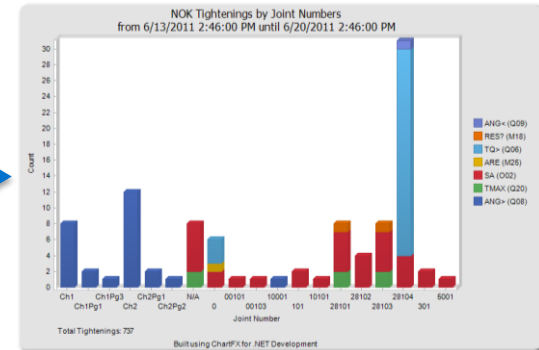
Add. Identity no.:  
 JNo: 121001  
 App:  
 Group: 2  
 Spindle: All  
 Step: All

Include "No evaluation":  
 Error:  
 Error code:  
 Stage evaluation: Shut off stage  
 Calculation in %:  
 Apply Stage Filter to Stage Statistics:

Calculate Statistics

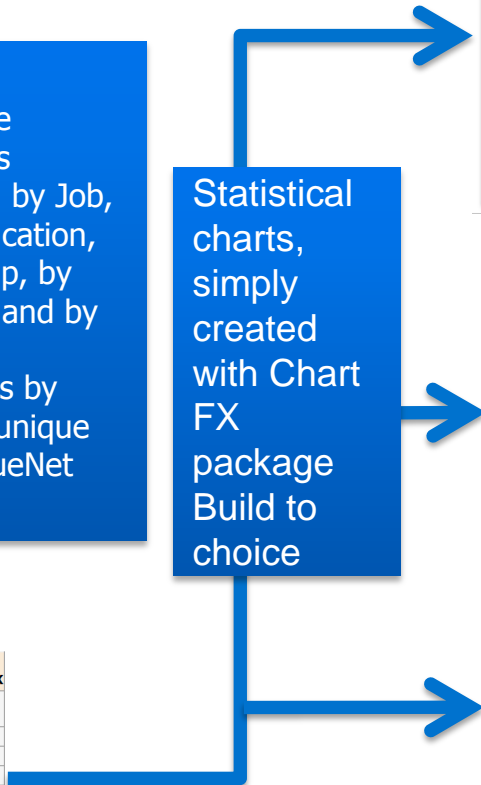
Note the statistics options, by Job, by Application, by Group, by Spindle and by Step. Statistics by Step is unique to TorqueNet

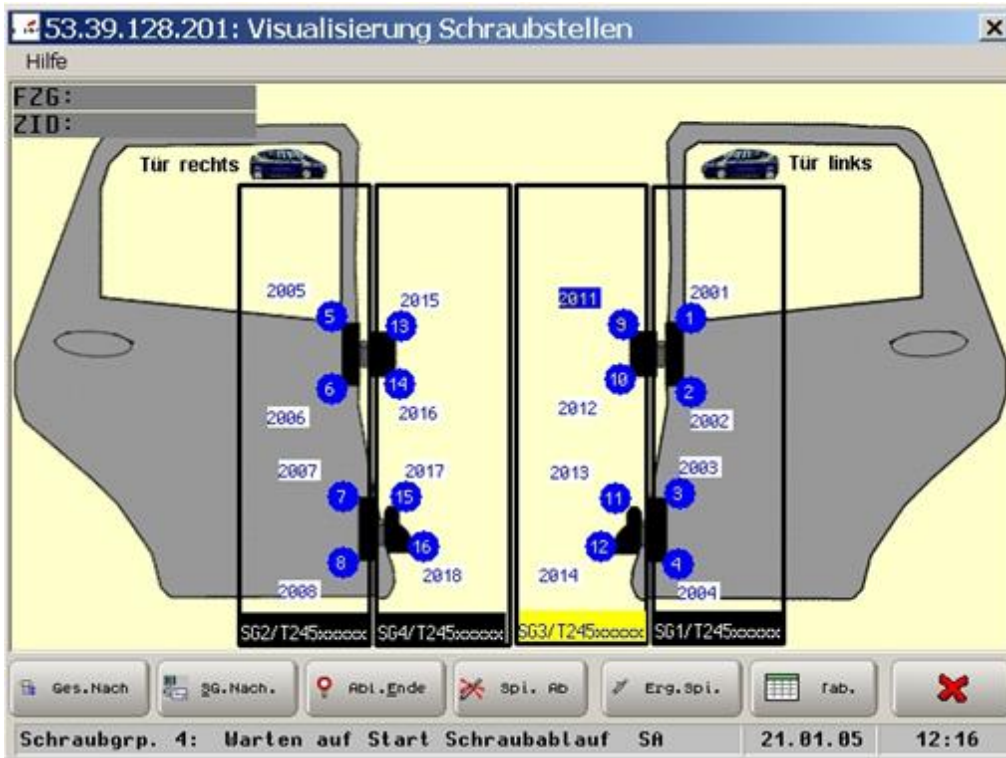
Statistical charts, simply created with Chart FX package Build to choice



**Process Statistics**

Controller	Grp	App	JNo	Parameters				Torque [Nm]				Angle [degrees]				Count	OK	NOK	% NOK					
				ID	Min	Max	Min	Max	Ø	Cr	Cp	Cpk	Min	Max	Ø					Cr	Cp	Cpk	Min	Max
Anton/804	2	1	N/A	347	0	5	0	100	0,08	8,45	2,36	0,25	0,0166	0,2344	50,50	30,43	3,29	30,12	50	51	6	6	0	0
VIM35	1	1	0	346	0	2	50	999	0				0	0	100				100	100	1	1	0	0
Anton/804	1	1	10001	349	10	15	10	900	11,57	0,74	2,93	0,46	9,88	12,18	666,75	0,87	2,51	0,46	495	901	4	3	1	25
Anton/804	1	1	10002	349	10	15	10	900	12,03	72,17	3,46	58,70	12,02	12,04	578,33	1,48	3	1,07	477	678	3	3	0	0
Anton/804	2	1	121001	350	0	5	0	100	0,12				0,1172	0,1172	51				51	51	1	1	0	0
Anton/804	2	1	121001	347	0	5	0	100	0,12	11785,11	4,24	552,72	0,1172	0,1173	51				51	51	2	2	0	0
Anton/804	2	1	122001	350	0	5	0	100	-0,02				0,0166	0,0166	50				50	50	1	1	0	0
Ani									-0,02	70,99	4,24	-0,71	0,0332	0,0166	50				50	50	2	2	0	0
Ani									12,18	4,08	3,23	3,55	12,03	12,41	598,33	1,07	3,44	0,73	439	680	3	3	0	0
Ani									0,18	10,06	4,24	0,71	0,1172	0,2344	51				51	51	2	2	0	0
Anton/804	2	1	122001	347	0	5	0	100	0,03	35,50	4,24	0,47	0,0166	0,0498	50				50	50	2	2	0	0





## Process Visualization

- User defined
- Load an image of the application / assembly
- See / follow the tightening sequence
- Enables operator guidance capabilities
- Enables Production & Manufacturing engineering the ability to monitor process efficiency

## Tool Maintenance Advisory

- Can be user defined
- Or system defined
- Enables greater uptime / availability of product where it belongs, on the assembly line.
- Delivers best (TCO) Total Cost of Ownership

### TorqueNet

Controller	Location Description	Channel	Tool SerNr	STATE	Tool type	As of	Total No. of rundowns	Maintenance Counter	Rundowns since Service	Rundowns until Service	Last Service	Maintenance State	Details
<a href="#">Test S16804</a>	235	3	53479	176,9%	2BB-2B150A-2K2M-27A-v	14.06.2011 13:19:02	1330371	230	1330371	-100		Send for maintenance	
<a href="#">Test S16804</a>	235	4	*****	116%	*****	14.06.2011 13:19:02	1090589	232	1090589	-32		Send for maintenance	
<a href="#">Test S16804</a>	235	1	654105	99,8%	1BB-1B030A-1K1M-1ZA	14.06.2011 13:19:02	1304624	49610	1304624	90		Warning before maintenance	
<a href="#">Test S16804</a>	235	2	654102	38,8%	1BB-1B030A-1K1M-1ZA	14.06.2011 13:19:02	1141403	442	1141403	698			
<a href="#">Anton SE</a>	Anton/804	2	0815	0,3%	2BUA1702KV2	20.06.2011 14:53:43	219881	1682	219881	498318			
<a href="#">Anton SE</a>	Anton/804	3	8543668	0,1%	17EA22AM3	20.06.2011 14:53:43	15604	383	15604	499617	06.07.2009		
<a href="#">4 HL2 Cockpitmontage</a>	Anton/SE_186	1	657600	0,1%	2BUB-2B150A-2K2M-2VK2M	20.06.2011 07:44:04	102552	2157	102552	2997843			
<a href="#">4 HL2 Cockpitmontage</a>	Anton/SE_186	4	649042	0%	1BB-1B050A-2/1K2M-1ZA	20.06.2011 07:44:04	48016	254	48016	2999746			