Assembly tools
Choosing the right tool for the job
Success means making the right choices

The right systems, the right tolerances, the right quality – there are a lot of choices that affect your bottom line. What is the optimal solution for your productivity, cost-efficiency, reliability? And what about ergonomics? What is the best tool for your assembly process? Pulse tools or nutrunners? Air or electric?

Most tools can do the job; the difference is how well they do it. In today’s competitive market, margins are getting smaller making every nut count. With thousands of joints to tighten, even the smallest gains in productivity can make the difference between success and failure.
The five steps to zero fault fastening

A general rule of thumb is the further into the assembly process a defect reaches, the more costly it is to repair. A worst-case scenario is the defect reaching the end-customer causing irreparable damage to the brand and image of the company.

An assembly line can be divided into five steps to zero fault fastening. The higher on the scale, the more sophisticated the tool and production system must be. Different joints require different levels of safety and quality. Steps 1-3 cover what is referred to as quality critical joints while step 4 is for safety critical joints. Achieving step 5 requires a zero fault fastening philosophy.

This brochure covers the joints that comprise the vast majority of bolts: Steps 1-3, the quality critical joints.

**STEP 1**
To assure correct torque.
Tightening torque is controlled by an assembly tool that delivers a pre-determined torque. A shut-off air tool is usually used which turns off by using a clutch. Electric tools can be used.

- ✔ Torque OK

**STEP 2**
To assure that all screws are tightened.
A common cause of faulty assembly is that screws are forgotten. There are two solutions; either to use an air tool with both pressure and time controlled automatic shut-off with RE-control, or an electric tool.

- ✔ Batch OK
STEP 3
To assure that the joint is correct.
The joint may be improperly tightened due to for example a damaged thread or a missing washer. This can be detected by using an electric tool such as Tensor DS or Tensor DL that monitors the rotational angle of the screw as it is tightened.

STEP 4
To assure safety critical joints are tightened properly.
Tightening of these joints must not only be monitored, but also traceable for error analysis. Torque measurement is done directly via a transducer, using a Tensor S/ST tool or QMX spindle. (These tools are not covered in this brochure.)

STEP 5
To assure zero fault fastening.
Combine the technology in the other steps with an integrated production and quality assurance system. Errors are corrected in the station or stored via the factory network and the work is sent back to the re-work part of the assembly line. (This process is not covered in this brochure.)
Finding the best solution to meet your needs

How do you choose a tool? Productivity, quality and ergonomics are important factors to consider. The relative importance of each factor depends on the application. We understand that you have different priorities and therefore have tools for all your needs.
Productivity – Is free speed a true measurement?

The answer is not the same for all types of applications. Impulse tools are the most productive tools for hard and medium hard joints, while nutrunners are more productive for medium soft to soft joints.

**Tensor DS/DL**
An electric tool is capable of maintaining speed under load throughout the tightening. Strategies and speeds are programmable.
- Doesn’t loose power for soft joints or prevailing.
- Flexibility and quality for productivity.

**ErgoPulse**
The fastest free running tool. It builds up torque through impulses, where it is the most productive between 5-15 pulses. For softer joints, a more powerful tool is preferable.
- Excellent one hand tool, no reaction arm needed.
- A minimum of 3 pulses is required for a reliable results.

**BTV**
No cable is needed. Its flexibility gives increased productivity.
- Productive in areas that are difficult to access.
- Fast and reliable shut-off solution.

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✔✔✔ is the best choice.
Good ergonomics is good economics. Ergonomics awareness has increased in recent years, but there are still improvements to be made.

**Tensor DS/DL**
Electrical tools contribute to a quiet and clean environment. Reaction force for higher torque applications needs to be taken care of by using balancers or reaction arms.

**Note:**
- Correct programming of the tool will help to reduce reaction forces and strain on arm muscles.
- For low torques, the tools have low weight.

**LTV/LUM**
Both nutrunners and screwdrivers work well on most applications. Direct driven motor creates a reaction force, but the fast clutch and powerful motor help to off-set this affect. For high torques, balancer or reaction arm is needed.

**Note:**
- Can handle reaction force well on hard joints.
- For low torques, the tools have low weight.

**ErgoPulse**
The major advantage of using an impulse tool is that there is no reaction force and the power to weight ratio is so high that it can easily be operated one handed, even for very high torques. Easy movements help the operator in daily work. The disadvantages can be vibration and noise.

**Note:**
- Guided sockets can reduce vibration and noise considerably.

**BTV**
Battery tools are suitable for applications that are difficult to reach. The battery adds weight to the tool but the operator will not have to carry a cable.

**Note:**
- Can handle reaction force well on hard joints.
- No cable creates flexibility.
Quality – Reduce your re-work and warranty costs.

Are you having quality problems in your assembly? There are a number of assembly issues that can affect the end customer.

Tensor DS/DL
- High accuracy due to software programming and Atlas Copco DigiTork formula.
- Can monitor the rundown angle to assure no faulty joints (missing washers, cross threads, etc).
- Can easily be programmed to count bolts.
- Tightening strategies minimize the relaxation by a 50 ms pause, which lets the creep stabilize.
- Line integration through relays are available.

LTV/LUM
- High accuracy due to the fast clutch.
- Tools can be connected to a RE-controller to count bolts.
- RE-controller can give feedback through relays.

ErgoPulse
- Accurate enough for the majority of quality critical joints.
- Relaxation can be kept to a minimum through gradually increased torque by impulses.
- Tools can be connected to a RE-controller to count bolts.
- RE-controller can give feedback through relays.

BTV
- High accuracy due to the fast clutch.
- After torque shut-off, LED on the tool indicates that the result has been achieved.

✔✔✔ is the best choice.
The best choice for your quality critical joints

The pros and cons of pulse tools versus nutrunners and air versus electric is a hot topic in the assembly industry.

Atlas Copco offers a complete line of tools. This means we will give you straight advice on what is best for your operation.
Nutrunners

The new LTV range is the most reliable and powerful air nutrunner on the market. There is an electrical alternative with optional features for both basic and advanced applications. Controlling your tightening operation is the key to avoiding costly re-working.

Reduce absentee costs
Absenteeism can be a major expense. Our LTV nutrunner’s lower weight, ergonomically shaped handle and faster shut-off help to create better working conditions. Faster overall operation reduces operator exposure time, which increases productivity and improves ergonomics.

Get rid of your bottlenecks today
With a speed and power increase of up to 50%, the new LTV 9 series can remove production bottlenecks and keep your cycle time to a minimum.
The solution to assembly problems

Warranty costs and rejected parts often cost significantly more than buying the right tool from the start.

An electrical tool allows:

- Multiple torque settings and advanced tightening strategies.
- Easy line integration to contain problems where they occur.
- Operator feedback and batch counting to catch problems as they occur.
- A clean and noise-free working environment.
Impulse tools

Our ErgoPulse tools apply torque to the nut, not the operator's wrist. The impressive power gives a fast, controlled rundown and still leaves one hand free for other tasks. ErgoPulse's perfect balance and small size minimizes operator strain and the tool is still robust enough to handle the toughest jobs.

Reliability in varying conditions
The ErgoPulse PTX has a very reliable shut off mechanism which is based on an inertia mass located outside the pulse unit. This solution gives excellent accuracy and repeatability for the toughest applications. PTX's Auto Trim valve minimizes mean shift for applications with variation in joint hardness.

ErgoPulse PTX

Balanced and robust

A joy to use
With ErgoPulse PTX, operator comfort is always in focus. The weight is extremely low with balance that makes it seem even lighter. The handle is a joy to use and if our guided sockets and extensions are used, vibrations and noise will be kept to a minimum.

Care-free maintenance
Our patented cam guided piston pulse solution means that ErgoPulse PTX has fewer wear parts for longer service cycles. The motors are lubrication free and the tool is designed for easy and economical service. True to the Atlas Copco tradition, both tool and attachment life set the standard for the industry.
Pulse tools vs. impact wrenches
The hammer-anvil solution of impact wrenches gives unbeatable power-to-weight ratio and allows for quick, one-hand operations with low reaction force. However, hydraulic pulse units provide major advantages by eliminating metal-to-metal contact, which gives:

- Improved accuracy and repeatability.
- Reduced sound level.
- Longer life time due to less wear on parts.
- Dramatically reduced vibration.

Shut-off vs. non shut-off pulse tools
Shut-off pulse tools should always be your first choice for their many benefits:

- Accuracy and repeatability.
- Eliminates operator influence.
- Shorter cycle time means less wear on tool and operator.
- Connection to RE-controllers (Poka-yoke) for line feedback.

Non shut-off pulse tools are suitable when the operator must physically evaluate the location on the joint. The dimensions are somewhat smaller compared to shut-off tools.
Screwdrivers

With thousands of man-hours spent on tightening screws, investing in the right screwdrivers is more important than ever. Since every production process is different, we’ve developed a wide assortment of both electric and pneumatic screwdrivers that can boost both speed and quality.

The best productivity, ergonomics and quality...

A toolbox of productivity
Our LUM line has established a new standard for pneumatic screwdrivers. Its small size and impressive speed significantly increase productivity. Designed for tough conditions, the LUM has a lightning fast clutch that eliminates joint sensitivity.

For the best possible ergonomics
Screwdrivers are often used for high-frequency work that creates demanding working conditions. The LUM’s low weight and ergonomic design make it the operator’s choice. The LUM features:

• Lowest weight with great balance.
• Soft grip and soft trigger.
• Widest range on the market.
Electric screwdrivers ensure process security
Zero fault production can save considerable money both in production costs and in customer goodwill. Tensor DL is the most intelligent tool you can get for demanding quality-critical jobs.

- Detects screw errors and gives operator feedback.
- Controlled speed and tightening strategies for demanding applications i.e. sensitive plastic.
Battery tools

The best place for a joint in terms of quality, design and manufacturing costs is not always the best for the operator who tightens that joint. In cramped quarters on the assembly line, battery tools are often the best choice for safety and productivity.

For both productivity and ergonomics
Our BTV models have many of the strengths of hose and cable tools with none of the weaknesses normally associated with battery tools.

• The highest productivity available from a battery tool.
• Excellent ergonomics raise operator performance.
• Metal casing gives the most durable tool, yet is still the lightest on the market.

Innovative design gives you higher quality and a reliable tool
The highly accurate clutch emits an acoustic sound which is detected by a microphone that switches off the power. It is as simple as that! Acoustic Clutch Detection gives you an instant, reliable, non-wearing shut-off function.
Choosing the right tool for the job

In the tables below we summarize the qualities of Atlas Copco’s Assembly Tools. The numbers in the tables (0-3) are meant to give an indication of what the tools can offer and how well they can perform on various tasks.

### Example

<table>
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<th>HARD JOINT</th>
<th>MEDIUM JOINT</th>
<th>SOFT JOINT</th>
<th>PREVAILING TORQUE</th>
<th>EASE OF USE</th>
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The highest value gives an indication of the best option for this application when it comes to quality.

### Quality

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*a) Connected to re-controller

Prioritize the importance with a number between 0-3.
- 3 means very good
- 0 means not applicable

Multiply all the numbers and summarize them, i.e. Tensor DS/DL=0x3+1x3+1x2+1x3+3x3+3x3=26

Multiply the priority with the performance of the specific tool, i.e. Tensor DS/DL=1x3

*a) Connected to re-controller

*a) Hard joint is 3, soft joint is 1. b) For low torques, the tools have a low weight. c) Guided sockets reduce vibrations and noise.

The highest value gives an indication of the best option for this application when it comes to quality.
Wherever fastening takes place
Atlas Copco is there

Customer Centers in approximately 70 countries on five continents.

Distributors in a further 80 countries.

More than 25,000 employees.

49 manufacturing units on five continents.

Revenues of MSEK 48,654.

Listed on Stockholm’s stock exchange.

Established in 1873.