ILG - Industrial Location Guidance

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Overview

ILG - Industrial Location Guidance

The Atlas Copco's Industrial Location Guidance (ILG) is an integrated, stand-alone error proofing system that offers high-level process security for applications ranging from simple to complex.

ILG tracks the exact location of the tool relative to the fastening position, ensuring the correct fasteners are tightened to specification, in the proper sequence.

Comprised of ILG software, positioning hardware and tightening controller, the system combines the functionality of a tightening system with position and process control.

Typical applications for ILG include: low-volume, high-value component assembly, repairs stations and flexible assembly cells.

System

An ILG system is comprised of:

- ILG software
- Positioning hardware
- Tightening controller
- Industrial PC (optional / dependent on application)

The positioning hardware includes high precision rotary or linear position sensors (shown) that are integrated into the pivot joints or linear guides of a torque arm or similar applications.

The position sensors interface with the tightening controller or the Industrial PC via a gateway module. The gateway module communicates with the ILG service using Modbus TCP protocol, while the ILG service communicates with the tightening controller through Open Protocol.

Multiple Atlas Copco tightening controller models are compatible with the ILG system and various positioning hardware configurations are available to suit the different arm types.

AX1 Articulated Arm with
Positioning Hardware

Application

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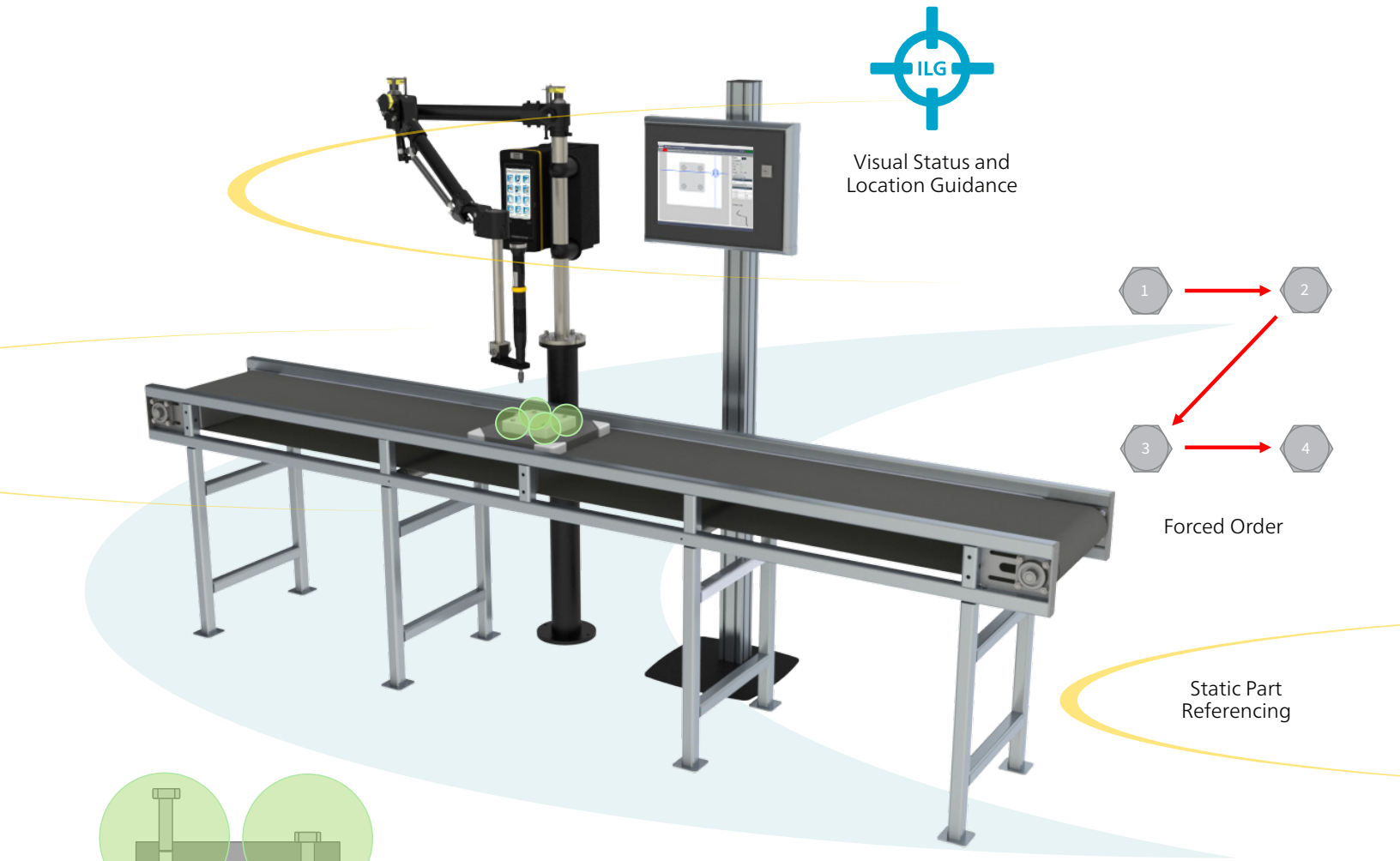
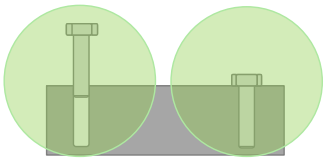
Application

Example application comprised of the following items; one of many application possibilities.

- AX1 Articulated Arm with Positioning Hardware
- PF 6000 with ETD Tool
- HLT HMI
- ILG Industrial Location Guidance Software





Sphere Position Volumes

System possibilities

Embedded solution - Power Focus 6000

- ILG is integrated into the Power Focus 6000 firmware.
- Uses Power Focus 6000 controller to run ILG service.
- Easy setup via web browser.
- ILG is enabled via FMS (same procedure as for virtual stations - 1 virtual station only).

Industrial PC

- Uses Industrial PC (HMI) to run ILG services.
- Visualization of tightening position on Industrial PC (HMI).
- Guides the operator to the next task/position.
- Gives feedback to the operator OK or NOK tightening.

Scalable Quality Solution - SQS3

- Uses HLTQ to run both SQS3 and ILG, together.
- SQS3 process control utilizing ILG location system for a complete error proofing solution.

External devices

- A Stacklight can be used for operator feedback, teach positions and for Workpiece selection.
- A barcode scanner can be used for Workpiece selection.

Requirements & compatibility

Industrial PC / operating system requirements

- Minimum Intel 5 processor or equivalent
- 64 bit Windows 7 or 10
- HLTQ (recommended)
- SQS3.1 when applicable

Controller capability

- Power Focus 4000
- Power Focus 6000 (embedded version only)
- Power MACS 4000

Hardware requirements

- Torque / Articulated Arms with Positioning Hardware*
  - SMC Posi 3
  - SMS / SML
  - AX / AXF

* Positioning hardware includes: angle and/or linear sensors, cables, gateway module, etc. - refer to Torque / Articulated Arms product information for hardware information specifics and ordering numbers.

SMC Posi 3

AX Articualted Arm

AX1 Articulated Arm

Operation & function | Connectivity

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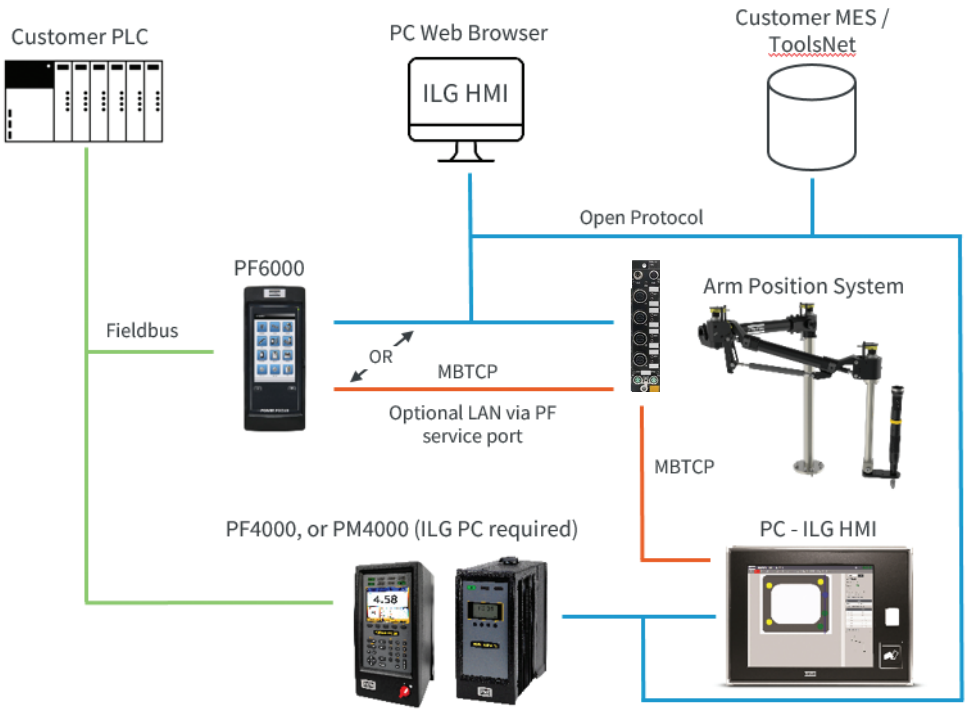
Connectivity

- ILG service functions directly on the PF6000 or a PC.
- PF4000 or PM4000 require a PC for the ILG service.
- ILG system communication on a local network is possible utilizing the secondary LAN port of the controller (not available on PF4000).
- Similar to standard fastening stations, Customer PLC, MES, or ToolsNet communicate to the Controller.



Operation

The ILG service receives the data from the positioning hardware sensors to calculate the tool location in three-dimensional space, in real time. Once the tool is located in the specified position, the ILG service will select the tightening program (P-Set) and enable the tool through Open Protocol. Visual indicators, via a Stacklight, tool LEDs, or the HMI process screen, will alert the operator to initiate the tool start.

Function

- Monitors the location of the tool in the working area.
- Guides the operator through the correct work sequence.
- Automatically selects the tightening parameters for position.
- Ensures the correct fasteners are tightened to specification.
- Unique P-Set selection for each position for full traceability.

Quality

Values | Benefits

ILG - Industrial Location Guidance

Values

- Improved quality through reduction in scrapped parts and implementation of forced order operation
- Reduced job setup and programming time, resulting in reduced costs
- Increased productivity due to improved operator efficiency

Benefits

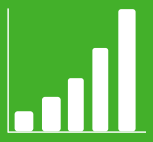
Improves quality

- √ Ensures consistent production quality through process security regardless of operator
- √ Provides tightening data based on location
- √ Provides assembly traceability
- √ Configurable reject management for rework of NOK tightenings

Reduces cost

- √ Quick installation, setup and programming – intuitive design for easy start-up
- √ Saves time with clear diagnostics for ease of maintenance and troubleshooting
- √ Flexible for multiple and varied applications

Increases productivity



- √ Visual indicators for process status and feedback
- √ Operator guidance
- √ Reduces the need for additional quality checks later
- √ Ideal for offline rework or repair stations

Features | Part order control

ILG - Industrial Location Guidance

Features

- Enables tool when in the correct location.
- Free or Forced process order.
- Initiate process from Workpiece (Part) ID on-screen input, barcode scanner, Stacklight, or fieldbus protocol.
- Workpiece process selection by controller identifier via barcode scanner or fieldbus communication protocol.
- Compensation for variable part location relative to the ILG system:
  - Static part
  - 1-Point referencing
  - 2-Point referencing
  - 3-Point referencing
- Configurable reject management – select number of tightening position retry attempts.
- Configurable graphical user interface for operator guidance with Workpiece image(s), live tracking (crosshairs) of the tool's location, visualization of the tightening position status and diagnostics.
- Teaching Mode allows the tightening positions to be set up with a start and finish position. The tool is held in position and coordinates are stored with a touch of a button or tool trigger.
- Programmable Position Volumes (spheres, cylinders, or cones) depending on the application.
- Setup via web browser.
- Password protection available for configuration editing.
- Streamlined, simplified software interface for superior user experience and easy configuration changes compared to legacy positioning systems.

Process order control

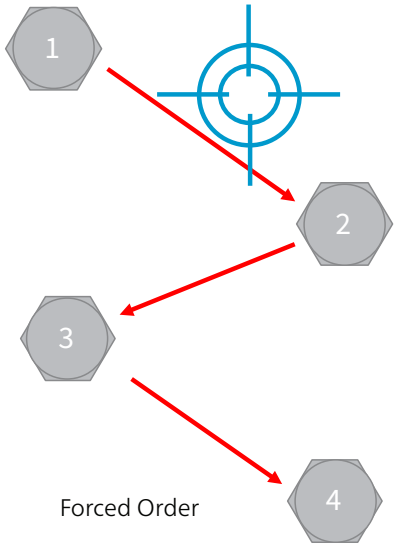
Depending on process requirements and the application, ILG can be configured for certain process order control.

Free order

- The operator is free to choose the tightening sequence (or order) of the positions.
- Visual indication is given when the tool is in a specified tightening position.

Forced order

- The operator is not free to choose the tightening sequence (or order) of the positions. The operator must follow the defined sequence.
- Operator guidance is provided via a blue position indicator at the specified tightening position.
- Visual indication is given when the tool is in a specified tightening position.
- Position indicator displays in red or green, providing operator confirmation of the tightening result.



Forced Order

Part referencing | ILG screens

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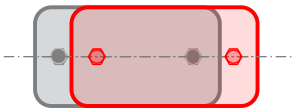
Part referencing

Depending on the application, ILG can be configured to compensate for variable part location relative to the ILG system.

Static

Static

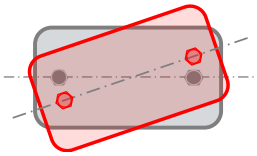
- The part is introduced in the same location every cycle.



1-Point

1-Point referencing

- The part is introduced in different linear locations (allows for linear translation of part across any axes: x, y, and z).



2-Point

2-Point referencing

- The part is introduced in different linear locations and rotated (rotational location in a single axis only).

3-Point referencing

- The part is introduced in variable locations on all axes (allows for linear or rotational translation of part across any axes: x, y, and z).

3-Point

ILG screens

Start

- Displays station information, tool status, position information and sensor data.

Process

- Displays the status of the currently running tightening process; includes tightening process initiation.

Tightening positons

- Defines Workpieces and tightening positions.

Workpieces

- Contains graphical presentation of Workpieces and tightening positions.

Geometry

- Defines mechanics geometry and sensor configuration.

Sensors

- Displays available sensors and gateway modules; allows sensor calibration.

Images

- Contains Workpiece image list; images can be added and deleted.

Configuration

- Defines configuration of the system.

Workflows

- Defines tightening workflows – standard or customized.

Diagnostics

- Displays system diagnostics information.

Messages

- Includes internal view of the messages exchanged in the system.

Help

- Provides instructions and information about how to use.

Information & status | Operation & feedback

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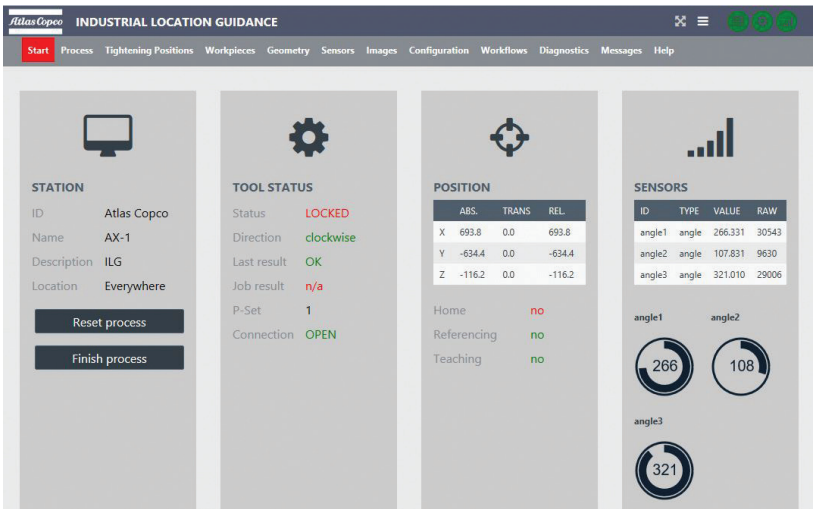
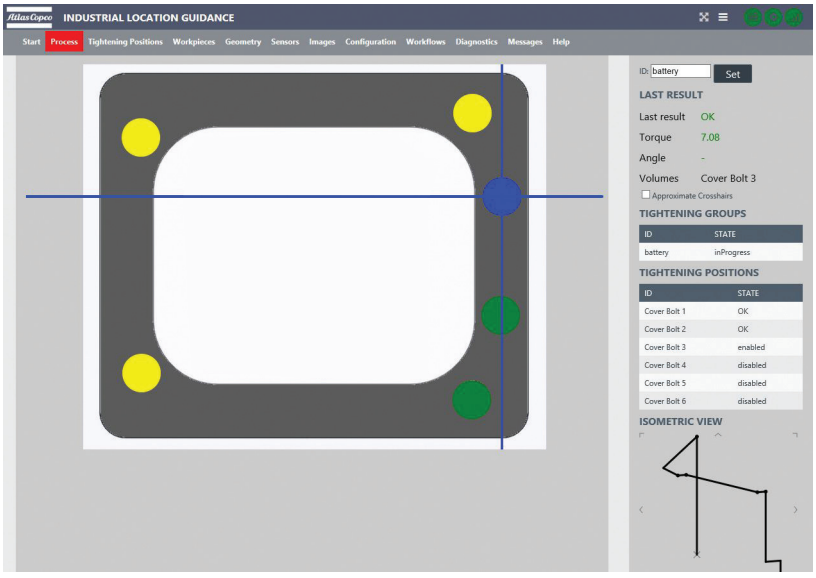
Information & status

- Station status information is displayed.
- Tool information is shown, providing tool lock, direction and P-Set status.
- Tool position information and position status is displayed.
- Live sensor position data is shown with both calculated angle and raw values.



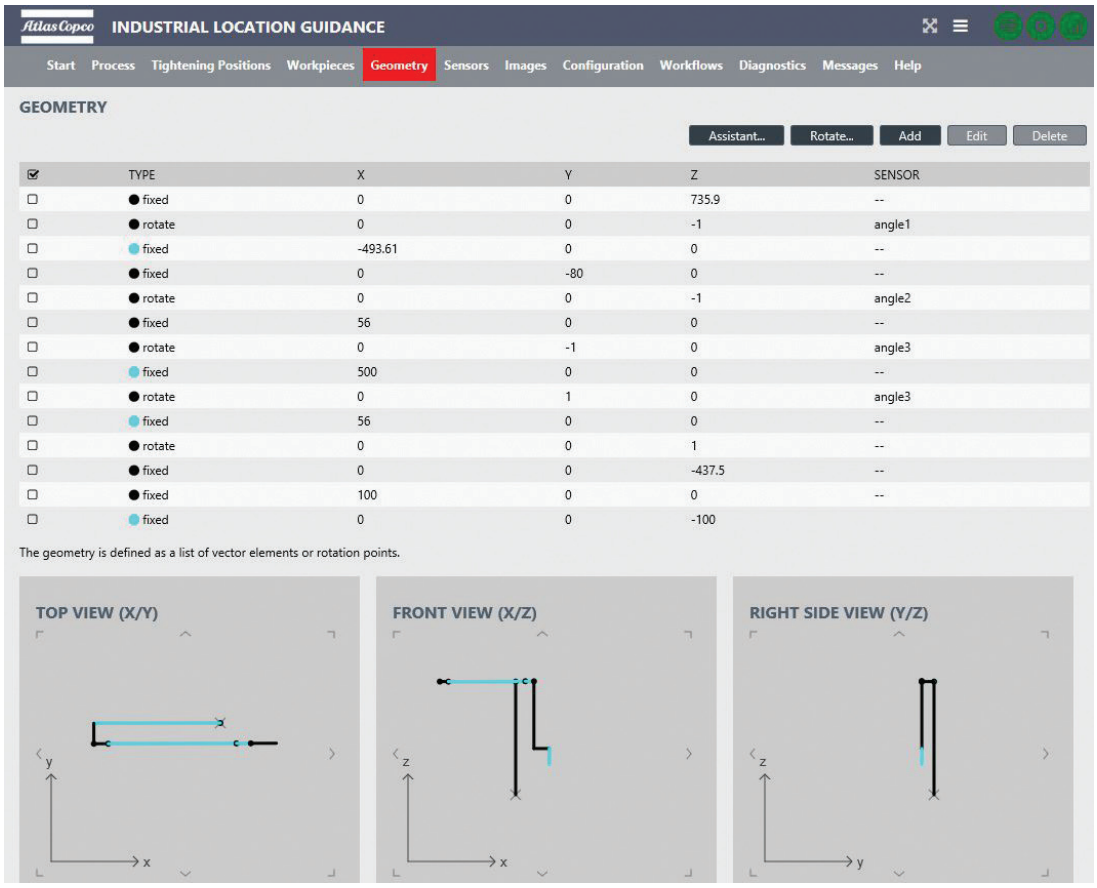
Operation & feedback

- Assembly guidance showing part image, position indicator dots and live crosshair tracking.
- Assembly of different parts and operator guidance in single selected Workpiece.
- Entire Workpiece process viewable in one screen with simple to follow assembly sequence.
- Displays last results (OK / NOK) and status of each position.
- Displays isometric view of positioning hardware.



Information & status

- Simple to define arm geometry and sensors.
- Single mouse click saves entire arm and process configuration in one manageable file.
- Program and teach a home position - no additional hardware needed.



Tightening positions & workpiece

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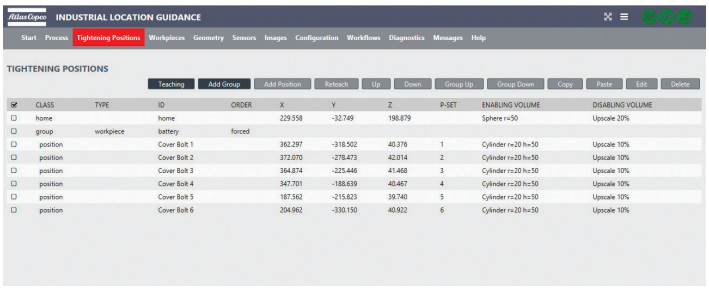
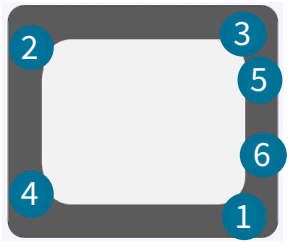
Tightening positions

- Define process tightening positions and Workpieces.
- Copy and paste individual tightening positions or entire Workpiece to create subassembly groups or new Workpieces.
- Move a tightening position or a group up or down in the Workpiece sequence with a single click of a button.
- Create and teach a new Workpiece with a single start trigger at each tightening position on the actual part.
- Reteach a tightening position from various screens, even teach while programming.
- Define tightening position tolerance volumes.

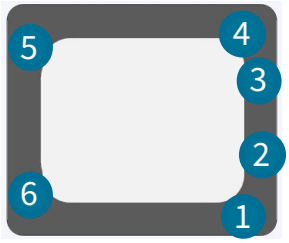
Workpiece

- A Workpiece defines the part and contains the positions to be tightened.
- A Workpiece may also contain a group. This group will contain tightening positions, often used to assemble a part in different tightening stages or a different assembly order.
- A group may be used to assemble additional parts within the same Workpiece.

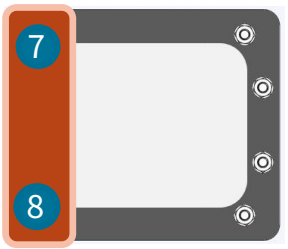




Workpiece
Pretightening



Workpiece
Final tightening



Workpiece
Added part
final tightening

Position volumes

Position volumes are used to enable and disable the tool during the assembly process. A position's volume may be configured to suit the application.

Several volume types are included:

Sphere

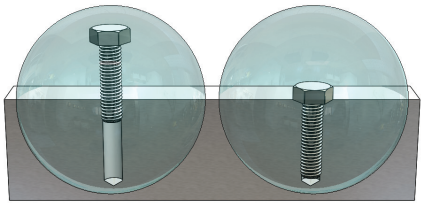
- Used for shorter length bolts or longer length bolts with an increased center-to-center distance.
- To define a sphere, a radius is defined only.

Cylinder

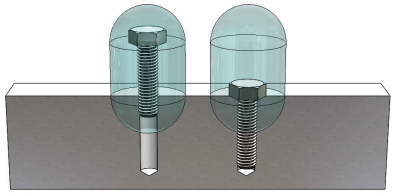
- Used for longer length bolts in close proximity to each other.
- To create a cylinder, the direction, length and radius are defined.

Cone

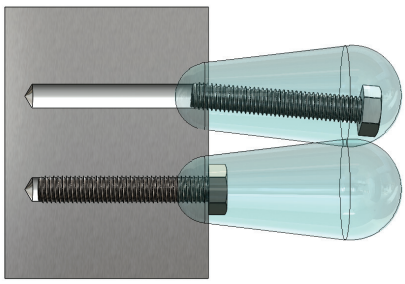
- Used for longer length bolts in close proximity to each other, that may be poorly supported (e.g., horizontal).
- To create a cone, the direction, length, base and top radii are defined.



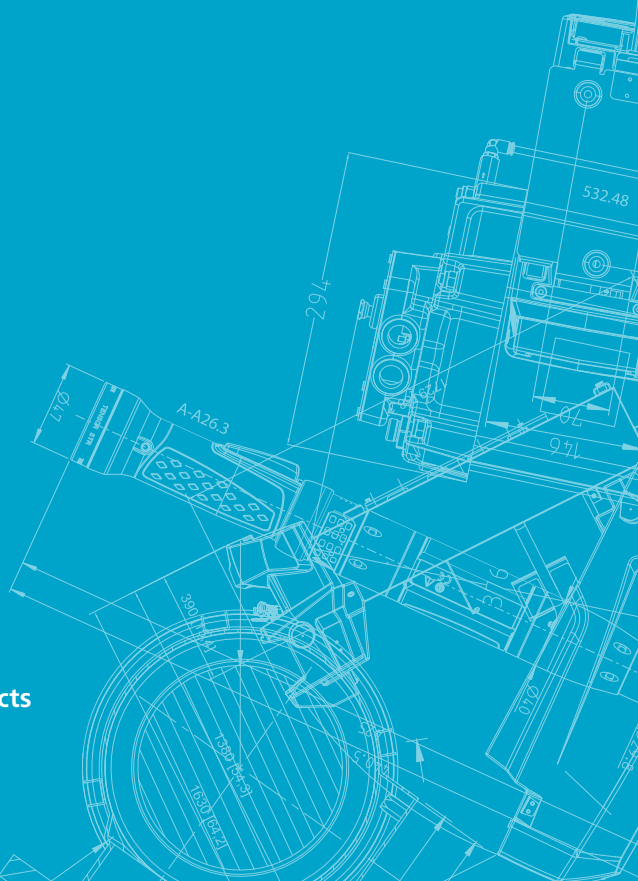
Sphere



Cylinder



Cone



Atlas Copco

Atlas Copco Assembly Systems - Global Projects

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