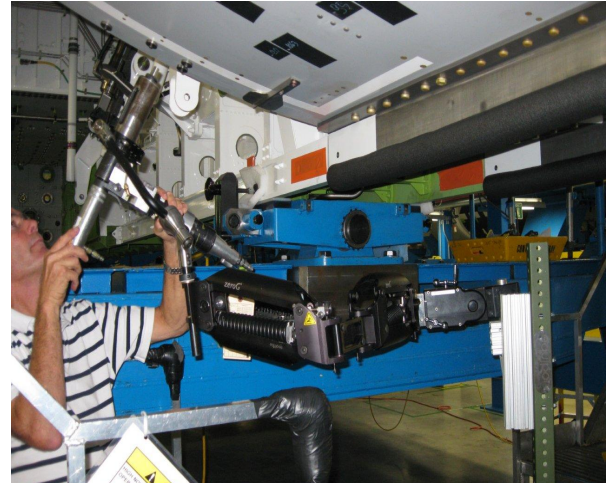


Case Study – Aerospace Manufacturer



A major aerospace manufacturer had a work area where they utilize heavy right angle Quackenbush drills in tight confined spaces. The task required an awkward position for the operators and there were numerous injuries in the area. Due to the location of the operation underneath the aircraft and the small work area, other lifting solutions were simply not feasible.

zeroG® reduced the injury rate to zero while allowing the operator the full freedom of motion required to perform their job efficiently. The system's light weight and flexibility in mounting also allowed the system to mount neatly underneath the drilling area. Separate mounting points for the zeroG arm were then provided at each drilling area so that the arm could simply be transferred to the station versus purchasing a separate system for each work area.

Project ROI Summary

Injury Cost Savings	\$75,800
Quality Cost Savings	\$ 2,500
Other Cost Savings	\$ 500
Total Cost Savings	\$78,800
Less Depreciation	- \$5,000
Less Annual Maintenance	- \$500
Total Net Savings	\$ 73,300

Total zeroG Acquisition Cost – (2) zeroG Systems \$ 20,000

ROI 366%

Payback Period 3.3 months

The use of heavy fixture drills is a typical requirement of most aerospace component drilling activities. It is cumbersome and tiring work that often involves awkward postures and places considerable stress on the user. As a result, areas where fixture drilling is performed often have high injury rates and numerous incidents of tool damage.

The zeroG® from Equipois is a patented, proven solution for drilling that eliminates the weight of the drill while still allowing users to perform the task effectively. zeroG® systems have provided significant costs savings to many of the largest manufacturing companies in the world. Satisfied users include companies such as Bombardier, Spirit AeroSystems, Boeing and Airbus. As a result of their success, many zeroG® customers have gone on to implement the technology as a best practice.

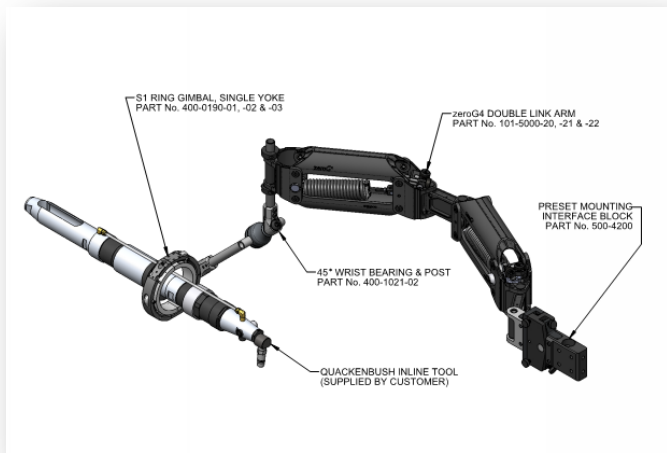
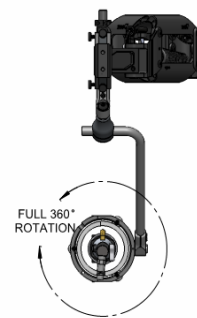
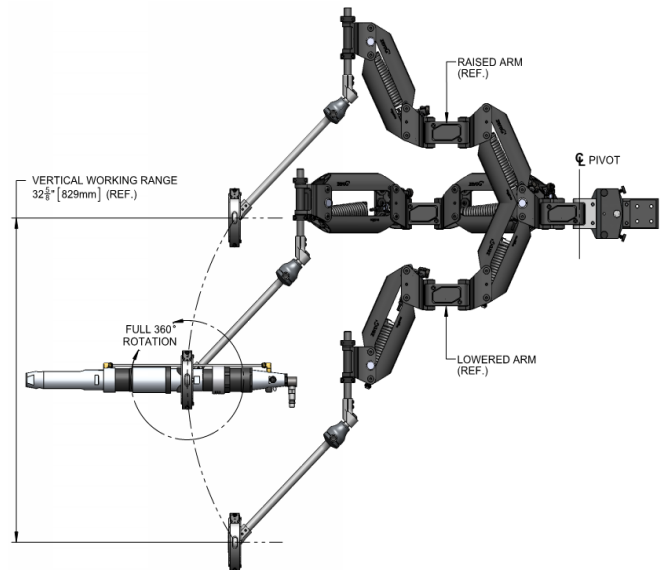
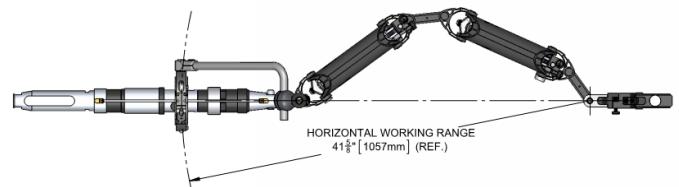
Return-on-Investment

- **Injury Costs.** A primary benefit of a zeroG® fixture drilling system is to reduce operator fatigue and the potential for strain injury. For a typical shoulder injury, the direct medical costs alone can be upwards of US\$20,000. When factoring in indirect costs associated with lost time, retraining, etc., costs can easily exceed US\$40,000 if not twice that figure for a single injury.
- **Tool & Part Damage.** It is not uncommon for heavy fixture drills to be damaged during usage. Damage often occurs when tools are dropped due to their heavy weight and lack of grip locations. Damage to tool itself can run in the hundreds or even thousands of dollars, while damage to the parts being drilled could run in the tens of thousands of dollars.
- **Quality.** In many drilling applications the degree of precision can be made challenging by the use of a heavy tool. zeroG® allows worker to utilize their fine motor skills to be more precise. Accordingly, use of the zeroG® arm can help improve the quality of processes where it is utilized. A reduction in the number of rejected parts is a common occurrence with zeroG® systems.
- **Employee Satisfaction.** Fixture drilling is often a task that is overlooked from an ergonomic point of view. Customers using zeroG® systems have seen immediate improvements in employee satisfaction. In some cases, users have been able to return restricted duty employees to work by using zeroG®.

zeroG® Standard Solution

- **zeroG Arm:** zeroG4 Double Link Arm suitable for payloads 8 lbs to 36 lbs (2.72 kg to 16.33 kg) - Part Number 101-5000-21 (RH Centering), -22 (LH Centering) or -20 (No Centering)
 - Standard Disposable Polyco Double Link Arm Cover – Part Number 300-2100
 - Secure docking kit for securing the tool and arm when not in use – Part Number 400-6200-02
- **Gimbal and Post System:** S1 Ring Gimbal with 45 Degree Wrist Bearing and Post Kit for approved riveters – S1 Ring Gimbals – Part Number 400-0190-01 (Large); -02 (Medium); & -03 (Small) & Post Kit – Part Number 400-1021-02. Both Top Mount and Underslung orientations available (Underslung shown)
- **Mounting Solutions:** Both fixed and portable mounting solution options are available (see Mounting Solutions data sheets):
 - Fixed Mount 2-Axis Pre-Set Interface Mounting Block – Part Number 500-4200 (shown in this document)
 - Fixed mount Linear Rail System with 80/20 post to mount zeroG system to wall or fixture –Part Numbers 500-5710-72, -96 or -144 (72, 96 or 144 inch rail)
 - Portable Gantry System with top mounted linear rail –Part Numbers 500-5420-72, -96 or -144 (72, 96 or 144 inch rail)
 - Portable zeroG4 Quad Stand – Part Number 500-5520

Standard Reach Drawings



Approved Tools List

Feed motors, indexable drills and other fixture drills from the following manufacturers:

- Quackenbush
- Lubbering
- Spacematic
- Peck Feed Motors
- Cooper Tools
- Seti-Tech

