



A Winning Value Proposition

**Perfect Point Fastener Separation  
Technology- The 21st Century Solution  
to Removing “Hard-Metal” Fasteners**



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## Perfect Point EDM:

### A Winning Value Proposition

#### Executive Summary

Perfect Point has changed the way “Hard-Metal” Fasteners are removed from Airframe and Engine Structure by bringing a disruptive solution to the MRO Market. Perfect Point’s E-Drill and S-Blaster systems yield exponential Productivity and Safety Improvements while Reducing Damage and Material Costs. By miniaturizing what was typically a large-scale immobile EDM (Electro-Discharge Machining) tool, Perfect Point has brought EDM to the work-piece. The hand-held EDM (E-Drill) tool cuts/ separates the head or collar from a fastener and does it 2030X faster than conventional drilling. E-Drill cuts/separates all types of “Hard-Metals” including: Titanium, Inconel, Monel, CRES, and Engine Hot-Section Waspalloy Fasteners with unprecedented speed and accuracy. Whether the application is on a fuselage, wing-spar, or on an engine case, E-Drill provides repeatable processes with unpreceded speed and accuracy.

E-Drill is quickly becoming an industry standard, due to these proven benefits:

**Reduce AOG Time** – \$100s of thousands of dollars per day saved in flight revenue and mission availability

**Reduce Labor Time** – 20-30X faster removing “Hard Metal” fasteners saving time

**Reduce Damage Rate** – Reported damage rates of <1% vs. 20% using a twist drill

**Reduce Material Costs** – Substantial reduction in material costs

**Reduce Training Time Proficiency** – 2 days of training vs. years of experience

**Eliminate FOD** – Closed loop system eliminates the FOD and the cleanup

**Eliminate Injuries** – Forceless Cutting Process reduces Ergonomic Strain on Workers

**Eliminate Exposure to Hazardous Waste** – E-Drill FST’s patented closed loop system captures hazardous waste

**Eliminate Noise Exposure** – Produces <75 DbA and requires no hearing protection to operate

## **Introduction**

Perfect Point's FST (Fastener Separation Technology) is an entirely new application of EDM (Electro-Discharge Machining), developed and patented by Perfect Point EDM Corp. EDrill and S-Blaster were specifically designed to yield exponential productivity improvements in the field of Aerospace Fastener removal. E-Drill FST's patented Electro-Discharge Machining Process, separates hard-metal fasteners in **Seconds**.

E-Drill FST utilizes a tubular electrode to separate fastener heads or collars from a fastener's shank. Regardless of the metallurgy of the fastener, E-Drill FST can cut/separate all fastener types and sizes, including: Solid, Cherry, Huck, Hi-Lok, Composi-Lok, and Taper-Lock, from diameters 3/32- 3/8". Titanium fasteners are separated in 8-10 seconds, versus a typical time of 5-7 minutes for traditional drilling and/or collar separation techniques.

### ***E-Drill FST Yields Several Key Competitive Advantages***

#### **Reduced AOG (Aircraft on Ground) Time**

The most expensive time for an aircraft is the AOG time which restricts aircraft availability and revenue generation. Aircraft maintenance, repair, and overhaul requirements drive these AOG times. The Perfect Point FST solution brings an exponential increase in productivity that will get an aircraft back into service faster. When an aircraft is disassembled for major MRO work, the critical flow path is access under the aircraft skin, and when that skin is permanently installed, fastener removal work is critical to a project's success. E-Drill FST will reduce the fastener removal time by a factor of 30-40X, which shortens project duration, and gets your plane back in the sky faster.

The Airbus A320 Sharklet upgrade program is dependent on E-Drill FST tools to significantly reduce process time to deskin A320 wings. Prior to E-Drill's involvement, the typical teardown of the wing took 14-16 Calendar Days with their best technicians. Airbus approached Perfect Point looking for a competitive solution to the problem. Not only was the E-Drill a perfect fit for this application, it reduced the 16-day de-skin time to 2-Days or an 800% reduction in turnaround time. The result is shorter AOG times, putting aircraft back into revenue status. Airbus has specifically instructed operators to use E-Drill, by incorporating it into the Service Repair Manual for that modification.



*(Fig. 1: E-Drill FST removed A320 Wing Skin, Credit-Airbus©)*

## **Reduced Labor Time and Cost**

The second largest operational expense to an MRO is labor cost. With E-Drill FST, an X-Factor improvement in productivity has been realized. An existing workforce is capable of increased bandwidth, or additional assignments that can be undertaken without any subsequent increase in project labor or staffing. A ¼" Composi/Visu-Lok removed using traditional means takes between 5-7 minutes. The fastener's titanium or steel core makes removal extremely difficult and adds cycle time to the maintenance, repair, or overhaul activity, adding schedule time to the aircraft's return to service date. That same ¼" Titanium ComposiLok fastener is removed by E-Drill in 7-10 SECONDS, which is a reduction in removal time of 30 to 40X.

A customer using E-Drill FST tripled their output in one-month, without a subsequent increase in staff or overtime hours, and maintained this level of productivity for months. When asked by senior management why they were operating at 300% efficiency over another

comparable maintenance group, their answer was simple. **“E-Drill has taken disassembly time to hours, instead of days.”** This resulted in increased throughput, and a quicker product delivery time. Management was so impressed they instructed their other site to procure a system, which then saw similar increases in productivity.

E-Drill FST introduced a paradigm shift in the way a process was performed. A single fastener removed by this customer, before E-Drill FST typically took 7-10 minutes, and with EDrill FST the process was completed in seconds.



*(Fig. 2: E-Drill FST removing Composi-Loks from a wing-skin)*

## **Reduced Damage Rate**

Using the traditional twist drill for fastener removal, aircraft damage occurs due to drill misalignment, drill skid, or drill bit breaking. This damage rate is exacerbated by airframe technician fatigue caused by the manual force (200 lbf.) required by a drill to remove “hard metal” fasteners. Based on industry averages, mechanical removal techniques for hard metal fasteners typically yield a 15-20% damage rate. This means for every 100 fasteners removed, 15-20 holes will be damaged by the removal process. The E-Drill FST reduces that damage rate to less than 1 hole in 100, a corresponding to a 99% reduction in current damage rates! E-Drill’s forceless machining, combined with patented mechanical and visual alignment tools, achieve new levels of controllability to the fastener removal process. This not only reduces overall cycle time, but also reduces the heavy cost of MRB dispositioning.





(Fig.3-: Vacuum-Secured Locator Tools)

A customer using E-Drill stated they had reduced their operational cost by \$100,000 due to a drastic reduction in MRB action for damaged holes. This allowed them to complete a major project ahead of schedule and under-budget.

## **Reduced Material Cost**

The conventional method of removing hard metal fasteners requires a significant material budget for cutting, grinding, and swage removing tools, resulting in recurring expenses. Drill bits typically cost between \$5-30 each, and last between 3-5 fasteners per use. E-Drill FST can cut up-to 60 Fasteners per \$36 electrode\*\*, reducing the cost of material by a significant factor. Additionally, because of the revolutionary handheld EDM process, E-Drill's 60<sup>th</sup> cut will be as effective and accurate as it's 1<sup>st</sup> cut.

*\*\* The number of fasteners removed per electrode may vary depending on electrode type, fastener material, type of fastener, depth of cut, size of fastener, time of cut, operator experience, locator device used, type of structure the fastener is installed, etc. There is no guarantee that the number of fasteners removed per electrode will be the same for all applications.*

## **Reduced Worker Training Requirements**

Vocational and trade schools instill the fundamentals of structural maintenance; however, earning the muscle memory and mastering the craft of fastener removal takes a worker years to achieve. From a quality and productivity perspective, a drill operator's performance is never the same across the shop-floor. The E-Drill FST system was built with the operator in mind, and a focus on removing operator variables from performance. Perfect Point provides a 2-day on-site operator training course which focuses on driving first-pass quality results and increased productivity, even from junior technicians.



*(Fig.4-: E-Drill FST Mechanical Alignment Fixture for Engine Applications)*

## **Eliminates Personal Injuries**

When using traditional drilling/grinding techniques, removing hard-metal fasteners is difficult and strenuous work. On average, it typically takes 150-200 lbf. of force to drill through a titanium fastener. This takes a toll on the workforce and can lead to increased rates of repetitive motion injuries. Comparatively, E-Drill requires less than 15 lbf. of downward force to keep the tool in contact with the workpiece. Coupled with the decreased cycle time for operation, technicians using E-Drill expend less effort and increase their productivity. Overall probability for repetitive motion injuries is dramatically reduced when using E-Drill FST.

Injury Type	Occurrence	Direct Cost	Indirect Cost	Total Cost
Carpal Tunnel Syndrome	1	\$30,509	\$33,559	\$64,068
Inflammation	1	\$36,076	\$39,683	\$75,759
Loss of Hearing	1	\$17,828	\$19,610	\$37,438
Strain	1	\$33,140	\$36,454	\$69,594
Vision Loss	1	\$65,751	\$72,326	\$138,077
All Other Occupational Disease	1	\$49,104	\$54,014	\$103,118

(Fig. 5: Workforce Injury Cost, Credit- OSHA.Gov)

### Eliminates FOD (Foreign Object Debris)

Traditional means of fastener removal generates an incredible amount of FOD in the form of hot shavings, shards, chips, and fastener residue. This increases processing time for cleaning but also creates a major liability if not completely removed. E-Drill FST's revolutionary closed-loop system flushes and vacuums debris away while the electrode cuts and separates the fastener head or collar.



(Fig. 6: Encapsulated FOD Produced by removing One 1/4" Dia. Hi-Lok.  
Note-E-Drill FST example right-hand side)



Not only is the fastener cool to the touch, but there is NO FOD, other than the separated head and shank. This dramatically reduces cycle time for cleanup and reduces overall risk of damage to critical components from FOD.

## **Eliminates Exposure to Hazardous Waste**

Many aerospace fasteners are chemically treated with chromium or cadmium for corrosion resistance purposes. Removing these fasteners by drilling or grinding increases exposure of workers to these damaging chemicals. E-Drill FST's closed loop system not only removes FOD from the work-piece, but also keeps these dangerous chemicals contained in a sediment tank. This alleviates the required Personal Protective Equipment (PPE) needed for drilling or grinding on certain aerospace structures. E-Drill FST's closed loop process limits technician exposure, and keeps them safe from chronic exposure to dangerous chemicals.



(Fig. 7: Photo of Sediment Collection Tank)

## **Eliminates Hazardous Noise-Levels**

Typically, a drill motor produces ~110dBA (Source, [www.who.int](http://www.who.int)) during standard operation, which over time even with protective equipment, may damage workers hearing. Companies that are OSHA compliant, are required to maintain hearing conservation programs, and train their work-force how to use hearing protection. Numerous customer organizations have conducted studies on the noise-production of E-Drill FST for their applications. The Decibel Level produced by an E-Drill FST operation is less-than the standard requirement for mandatory hearing protection devices to be worn. E-Drill FST will not remove all the noise from a shop floor, but when compared to traditional pneumatic drill motors, it significantly reduces the cumulative noise exposure on the shop floor, and provides a better and safer environment.



(Fig. 8: E-Drill FST in-work on a wing spar project)

**CASE STUDIES**

Perfect Point Customers are the biggest advocates we have. Listed below are some examples how we have helped clients reduce operational costs, and drive their competitive advantage.

**Case Study-1: Titanium: Hi-Lok, CRES: Cherry-Max\***

Project Name- H-60 Fuselage Overhaul (Qty. 50) Scale- 3,800 Fasteners/ea.	Mechanical Drilling	E-Drill	Savings
Labor Time/ Fastener	3 Minutes/Fastener	30 Seconds/Fastener	\$5.25/Fastener
Labor Cost/ Fastener (\$100/HR Rate)	\$ 5.00/ Fastener	\$0.84/ Fastener	
Consumables Cost/ Per Fastener	5 Fasteners/Cutter (\$6.25/Bit)	45 Fasteners/Electrode** (\$36.00/Electrode)	\$0.45/Fastener
	\$1.25/Fastener	\$0.80/Fastener	
Project Schedule	9,500 Hours	1,584 Hours	7,916 Hours Saved
Project Cost	<b>\$950,000</b>	<b>\$158,400</b>	<b>\$791,600</b>

**Case Study-2: Titanium Composi/Visu-Lok\***

Project Name- A320 Control Surfaces (Qty. 20) Scale- 1,980 Fasteners/ea.	Mechanical Drilling	E-Drill	Savings
Labor Time/ Fastener	6 Minutes/Fastener	30 Seconds/Fastener	\$9.16/Fastener
Labor Cost/ Fastener (\$100/HR Rate)	\$ 10.00/ Fastener	\$0.84/ Fastener	
Consumables Cost/ Per Fastener	4 Fasteners/Cutter (\$6.50/Bit)	40 Fasteners/Electrode** (\$36.00/Electrode)	\$0.73/Fastener
	\$1.63/Fastener	\$0.90/Fastener	
Project Schedule	3,960 Hours	330 Hours	3,630 Hours Saved
Project Cost	<b>\$460,548</b>	<b>\$68,904</b>	<b>\$391,644</b>

\*Customer Supplied Data

\*\*The number of fasteners removed per electrode may vary depending on electrode type, fastener material, type of fastener, depth of cut, size of fastener, time of cut, operator experience, locator device used, type of structure the fastener is installed, etc. There is no guarantee that the number of fasteners removed per electrode will be the same for all applications.

### Case Study-3: CRES: Huck Lockbolts\*

Project Name- F-22 Engine Nozzle (Qty. 48) Scale- 400 Fasteners/ea.	Mechanical Drilling	E-Drill	Savings
Labor Time/ Fastener	4 Minutes/Fastener	30 Seconds/Fastener	\$5.25/Fastener
Labor Cost/ Fastener (\$90/HR Rate)	\$ 6.00/ Fastener	\$0.75/ Fastener	
Consumables Cost/ Per Fastener	8 Fasteners/Cutter (\$4.75/Bit)	60 Fasteners/Electrode** (\$36.00/Electrode)	\$-0.01/Fastener
	\$0.59/Fastener	\$0.60/Fastener	
Project Schedule	1,280 Hours	160 hours	1,120 Hours Saved
Project Cost	<b>\$115,200</b>	<b>\$14,400</b>	<b>\$100,800</b>

### Case Study-4: Inconel: Blind Cherry-Max Rivets\*

Project Name- 777 Thrust Reverser (Qty. 40) Scale- 750 Fasteners/ea.	Mechanical Drilling	E-Drill	Savings
Labor Time/ Fastener	5 Minutes/Fastener	30 Seconds/Fastener	\$7.50/Fastener
Labor Cost/ Fastener (\$100/HR Rate)	\$ 8.34/ Fastener	\$0.84/ Fastener	
Consumables Cost/ Per Fastener	5 Fasteners/Cutter (\$7.00/Bit)	30 Fasteners/Electrode** (\$36.00/Electrode)	\$0.20/Fastener
	\$1.40/Fastener	\$1.20/Fastener	
Project Schedule	2,500 Hours	250 Hours	2,250 Hours Saved
Project Cost	<b>\$292,200</b>	<b>\$61,200</b>	<b>\$231,000</b>

\*Customer Supplied Data

\*\*The number of fasteners removed per electrode may vary depending on electrode type, fastener material, type of fastener, depth of cut, size of fastener, time of cut, operator experience, locator device used, type of structure the fastener is installed, etc. There is no guarantee that the number of fasteners removed per electrode will be the same for all applications.

## **KEY TAKE-AWAY**

Perfect Point is changing the way structural maintenance is performed in the 21<sup>st</sup> Century, by providing a **Faster, Safer, and More Accurate** method of removing “Hard-Metal” Fasteners in airframe structures and engines. E-Drill FST enables **Exponential Productivity Improvements**, drives first-pass **Quality, Reduces the Cost of Consumables**, and Protects Workers.

*Contact us to see what Perfect Point can do for you.*

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