

## High Power Ultrasonic Impact Treatment

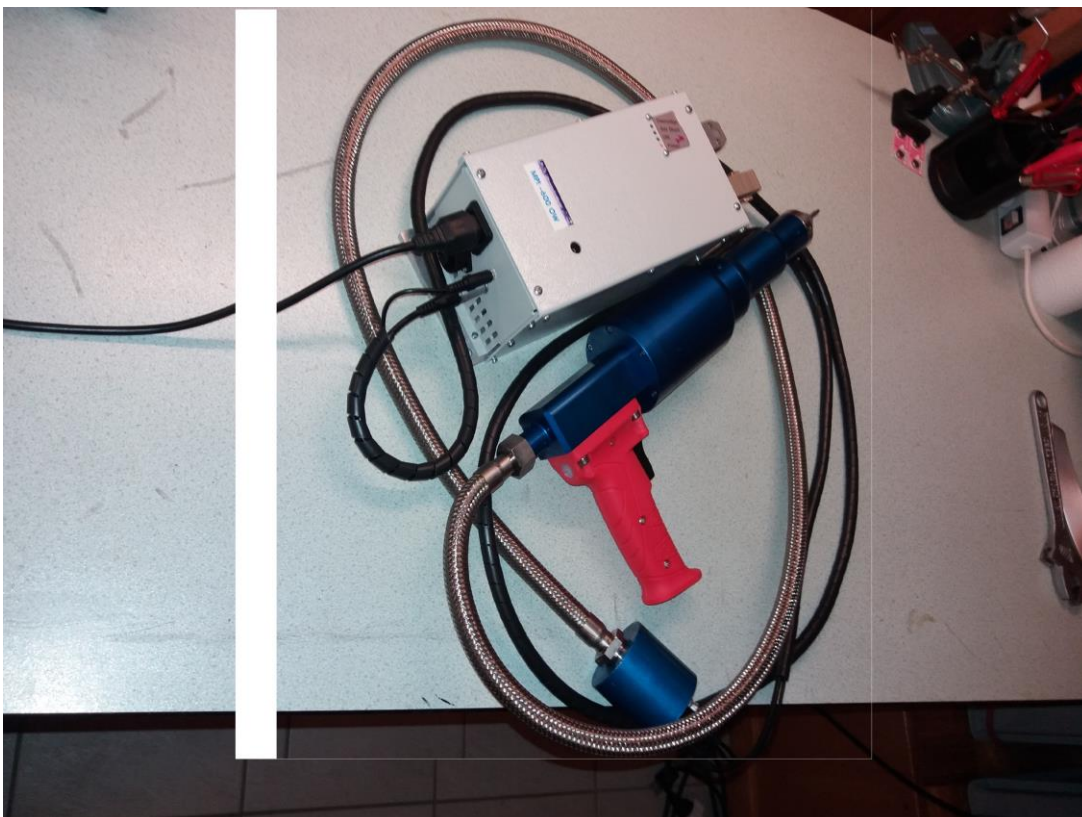
*A new innovative ultrasonic method*

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## OVERVIEW

Ultrasonic Impact Treatment (UIT), Ultrasonic Impact Peening (UIP), Ultrasonic Hammer Peening, Ultrasonic Needle Peening (UNP), Ultrasonic Peening (UP), and High-Frequency Mechanical Impact (HFMI) processes can be used to describe the same technology using high power ultrasonic systems to make surface impact peening treatments.

Ultrasonic Impact Peening is a cold working process that uses high frequency and high-velocity impact of a hard metal tool tip to plastically deform a material in order to introduce beneficial compressive residual stresses. These residual compressive stresses are produced by work hardening with the intent to replace residual tensile stresses in metal surfaces and welded joints. In weld joints, one significant objective is to improve the fatigue strength of welds that may be subject to dynamic stress conditions and susceptible to stress cracking.



## THE PROBLEM

Example: Weld joints on offshore rigs are subject to constant stress and strain due to rough sea conditions. The same is true for Floating Production Storage and Offloading (FPSO) vessels that are additionally subjected to the stresses of the cyclical loading, especially in fatigue prone areas. As the rig and vessel welds approach the end of their known fatigue life our clients are faced with the challenge of repairing and maintaining failing weld joints. Normal repairs to these high stress joints are often temporary and not sufficient for long term operation. By using our Ultrasonic Peening technology to dress repaired welds and also treat undamaged welds in high stress areas our clients can reset the fatigue life and add up to fifteen years of additional service life.



## THE SOLUTION

Ultrasonic peening can be the best option for fatigue life improvement of FSO & FPSO welds in high stress areas. The Ultrasonic peening technique involves the cold working of the weld toe and weld face and can improve the fatigue strength of full penetration weld configurations by up to four times.

Welds identified at particular points of structural integrity are targeted for Ultrasonic Peening treatment. The fatigue life extension of those specific welds will offer a general life extension of the offshore structure or vessel. This type of treatment is currently used to avoid or prevent fatigue cracks in high stressed weld connections in offshore structures.





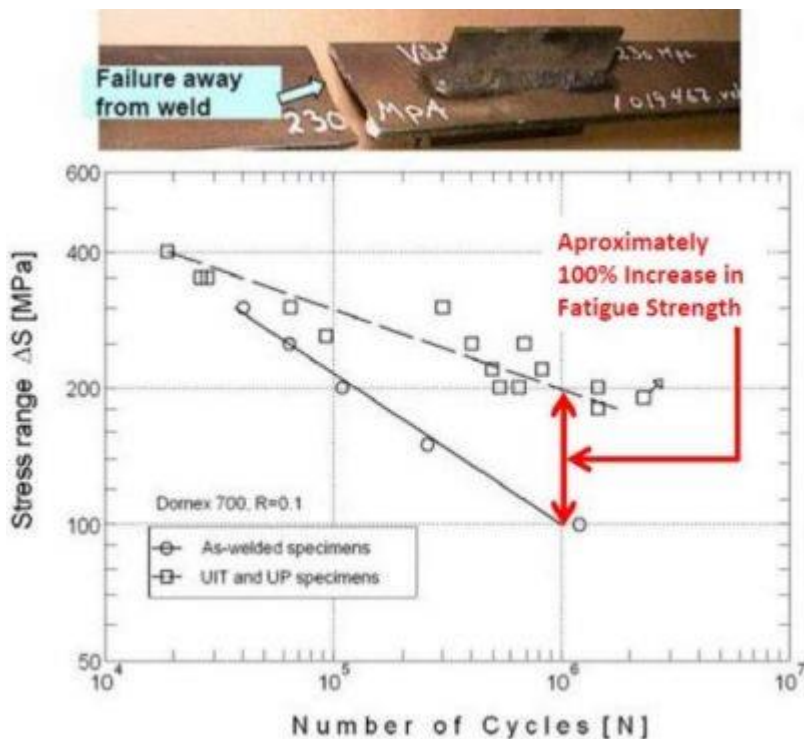
## THE ADVANTAGE

The power supply equipment is the heart of the UP system and is based on proprietary MMM Technology, which produces high efficiency active power in wide-band sonic and ultrasonic vibrations. The peening tool is enabled to produce proprietary “single-piston” peening action, and every other peening tool known from other sources (from competitors) is based on double-piston action. In essence, by utilizing the proprietary peening action, a much deeper metal penetration (up to factor 2) is achieved.

Our design team can provide custom pins and pin holders for almost any application. We offer standard tool designs working at 20 kHz and 35 kHz.

Enhance low and high cycle fatigue and has been documented to provide increases of up to ten times greater than non-treated ultrasonically peened.

Example (non referenced)



## THE PRODUCT

The ultrasonic impact peening system includes an ultrasonic generator power supply connected by a cable hose to the tool housing that contains an ultrasonic transducer assembly and the impact pin(s). The tool-housing tip holding the impact pin(s) is replaceable and can be designed in a wide range of options to allow for one or many pins in various arrangements to address many different applications. The tool housing can be optioned for hand-held operation or mounting to a robotic arm for automated applications.

Our design team can provide custom pins and pin holders for most any application. We offer standard tool designs working at 20 kHz and 35 kHz. Other custom frequency system are available on demand.

