



MPI Interconsulting
ULTRASONICS - SONOCHEMISTRY - INNOVATION

WIDEBAND MMM ULTRASONIC EXTRACTIONS & LIQUIDS PROCESSING

Advanced Multifrequency, Sonic and Ultrasonic
Wideband White-Noise SONOCHEMISTRY

Main Web Site: <http://www.mpi-ultrasonics.com>

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MMM *Technology for Ultrasonic Cleaning* ***Generations ahead!***

- **Multifrequency, Multimode, Modulated Sonic & Ultrasonic technology.**
- No other manufacturer has yet achieved and matched **MMM** exciting standards in Sonochemistry and precision cleaning. **MMM** is not **only** more efficient and effective than any other ultrasonic liquids processing technology, it is **UNIQUE**.
- **Seeing is the believing!** Try the [aluminum foil test](#) for yourself ([next pages](#))! Place the foil sample into our ultrasonic bath and hold the foil for approx. 5 - 10 seconds and you'll discover why there's simply no comparison with any other conventional ultrasonic liquids processing machine!

Aluminum foil perforation test



- *Perfectly, uniformly perforated aluminum foil, after 5 to 10 seconds of exposure to MMM ultrasonic vibrations in a ultrasonic reactor.*
- ***Acoustic Frequency Range: From Hz to MHz; From Infrasonic to Supersonic (MMM technology: carrier signal, specifically multilevel-modulated, is getting wideband with rich harmonics content)***

MMM in Action - 1

Activate the movie files: click & play



Perfectly and uniformly perforated foil. No standing waves. Ask any of our competitors if they can show similar results in maximum of 5 seconds.

Precious Metals Extraction: MMM in Action - 2

Activate the movie file below: click & play



No ultrasonic activity



Minerals with precious metals content in glass vessel with acids mixture. MMM ultrasonic processing switched ON and OFF (see the difference in extracting activity)

MMM Sonochemistry Provides:

- Superior and deep penetration, **independent** of water levels.
- Reliability with extra power spread throughout the bath.
- **Even** distribution of ultrasonic energy throughout the liquid gives uniform and thorough Sonochemistry and efficient cleaning of the surface without the risk of damage to fine and sensitive parts.
- Extremely efficient electronics and transducer coupling to ultrasonic reactor (overall approx. 95% efficiency) eliminates or reduces the additional need for heating.
- Spatial distribution of ultrasonic activity inside of a reactor is homogenous (no dead zones, no standing waves, fast and large frequency sweeping, broadband spectrum, complex modulation).
- **Extracting and Cleaning solvents, acids, detergents and additives can be significantly reduced**, or even eliminated because of the very high cavitation activity which has broadband acoustic spectrum.
- Extraction, Processing or Cleaning time can be several times shorter comparing to traditional ultrasonic (fixed frequencies) technologies.
- **Fast liquid conditioning and degassing** because of very large regulating zone between maximal and average ultrasonic power and because of the ability to switch instantaneously between acoustic spectrums.
- Smooth Ultrasonic, PWM-power regulation from 1% to 100%. Ultrasonic energy can be easily adjusted in order to clean very fine and sensitive parts without damaging them.
- **Fast and automatic ultrasonic-power and high-activity recovery after liquid mixing** and after introducing ultrasonic load (after introducing parts to be cleaned).
- **“White-noise Cavitation content”** can be smoothly controlled from very low to very high (by changing signal-processing parameters of MMM generator).
- Ultrasonic erosion and mechanical damages to reactor baths and vessels, as well as on the parts under ultrasonic processing is significantly reduced (compared to traditional technology) because of uniform distribution of ultrasonic activity.
- **Very aggressive and accelerated Sonochemistry** can be realized by increasing effects of cavitation.
- MMM Ultrasonic Power Supplies can drive any traditional piezoelectric transducer/s, using less energy and producing superior Sonochemical effects, comparing them to traditional, single frequency, multiple frequency, and frequency sweeping Power Supplies.
- Several levels of overload/s protection are implemented.

More about MMM

- Until now, conventional ultrasonic liquids processing reactors and cleaning tanks have been very power hungry and power inefficient, only about 5-25%. Larger industrial units could become power hungry monsters, making the unit not only inefficient but also ineffective. Often as a last resort, heaters are used to "assist" liquids processing and cleaning.
- There have been conventional "sweep frequency" ultrasonic sources but still based on "fixed frequency" and **narrow** frequency interval sweeping, with a slightly faster response time. "Fixed frequency" is more suitable to work in pre-determined conditions e.g. in ultrasonic welding of plastic parts.
- Conventional fixed/single frequency operation results in "standing waves" being set up in the reactor vessel. A direct consequence of these standing waves is that processing is patchy across the surface being treated. Thus, some areas are excessively treated while other left unaffected. It also makes the effectiveness of conventional ultrasonic processing very variable and subjective to fluid level, fluid temperature and load conditions.
- Using our state-of-the-art MMM technology, these "standing waves" do not exist and the efficiency goes well up!