MPI Sonorod Resume & Advantages

1. MPI Sonorod submersible transducer is producing higher oscillating amplitude compared to competitors (as Martin Walter and Weber Ultrasonics), because of modified mechanical design. Theoretically, oscillating amplitude of MPI sonorod could be until 4 times higher compared to products from competitors.

2. MPI Sonorod submersible transducer is naturally (by its design) able to accept certain level of frequency and amplitude modulations, and to create spatially and randomly distributed ultrasonic activity (in a more significant way compared to similar transducers from competitors).

3. MPI Sonorod power supply (ultrasonic generator) has much wider frequency window for tuning to different sonorod transducers compared to competitors (until 5 kHz, and competitors have frequency window close to 1 kHz). Such ultrasonic generator is also very good and applicable to drive all other, similar transducers from competitors (like Weber Ultrasonics, Martin Walter, Telsonic...). Every user who already has similar Sonopush/Push-Pull/Tubular submersible transducers can benefit from using MPI Sonorod generators, but operating frequency range will strongly depend on submersible transducer design. Slightly modified MPI Sonorod generators will be applicable to drive all kind of traditional transducer arrays like multiple transducers for ultrasonic cleaning baths. All cleaning parameters and settings are available in the software of MPI Sonorod generators (degassing, frequency, amplitude and phase modulation, fast cavitation control, very fast ultrasonic cleaning...).

4. Here, we are not talking only about traditional, ordinary ultrasonic cleaning applications, but much more about very modern and innovative approach to ultrasonic cleaning and liquids processing (or Sonochemistry). Here, we address much more advanced and different applications, compared to existing worldwide competition. In MPI publicity, this is promoted as MMM technology.

5. MPI Sonorod transducers and generators are totally protected from short and open load situations, from no-cleaning liquid situations (like operating in air), from high thermal frequency drift situations (including all standard ultrasonic generators protections).

6. We can produce Sonorod radiating sonotrodes from Titanium alloy, Stainless steel alloys, Duplex steel, Composite ceramics etc. Steel sonorods are generally producing lower amplitudes and dissipating more heat, compared to titanium sonorods, but operating life and resistance to cavitation and erosion is much longer/better in cases of steel sonorods… Holed sonorods and sonotubes are producing higher oscillating amplitudes, compared to compact/solid sonorods. Mentioned ultrasonic generators and transducers are applicable to all kind of ultrasonic cleaning transducers, to

Sonochemistry and to different liquids processing technologies. MPI ultrasonic generators can be applied on almost any transducer produced by competitors.

7. If we select acoustically proper steel alloy (like duplex steel 1.4462) sonorods and sonotubes made from such alloy could produce similar results as titanium sonotrodes with smaller thermal frequency shift (because of convenient acoustic impedance). In such cases, we can apply basic piezoelectric converter with titanium front mass, to drive directly duplex-steel sonotube, and reflected energy (from sonotrode back to ultrasonic converter) will be very small, tolerable or negligible. Anyway, steel sonotrodes are heating more, compared to titanium sonotrodes.

8. We can produce sonorod generators to cover frequency ranges such as: 20 to 25 kHz +/-1kHz, 30 to 35 kHz +/-1 kHz, 40 to 45 kHz +/-1kHz, or different frequency ranges (on a similar way).

9. 20 kHz sonorods are stronger and more powerful for heavy duty cleaning of very dirty parts compared to 25/30/40 kHz sonorods… because 20 kHz systems usually have higher oscillating amplitudes…

10. MPI housings of sonorod and sonotube piezoelectric converters are produced from very strong/robust/heavy/massive stainless steel like 316L. If housing is not robust, we will have increased heat dissipation on such converters.

11. MPI has Sonorod systems applicable when processing liquid has very high temperatures (much higher compared to similar systems from competitors).

Other relevant facts...

1. To customize MPI universal ultrasonic generator to be exclusively adjusted for your future ultrasonic cleaning business (for sonorod or sonopush transducers, and for traditional ultrasonic cleaning transducers). You will have very competitive advantage compared to other producers in the world of ultrasonic cleaning. All cleaning parameters and settings will be available (degassing, frequency, amplitude and phase modulation, fast cavitation control, very fast ultrasonic cleaning...).

2. In addition, you can get the total design of optimized (and specifically modified) titanium and steel sonorod or sonopush transducers, with much higher efficiency, compared to Weber, Crest-M-Walter etc.

3. You can get optimized, high power transducers for sonopush-sonorod systems, without any problem, as experienced with Weber, Crest and others...

4. You will also get multidisciplinary consulting, and systematic support, until you start mastering everything regarding cleaning.

5. You will be able to create new patents and to make original publicity regarding new ultrasonic cleaning technology, in order to have big marketing and technological difference compared to worldwide producers of ultrasonic cleaning equipment.

6. We are not talking only about traditional, ordinary ultrasonic cleaning, but much more about very modern and innovative approach to ultrasonic cleaning and liquids processing, where MS group will get something much more advanced and different, compared to existing worldwide competition. In my publicity, this is promoted as MMM technology, and you could build your publicity around similar descriptions (since presently MMM is becoming known technology abbreviation).

7. MS will get new concept of ultrasonic cleaning generators and transducers (meaning complete documentation, drawings, schematics and necessary consulting), that is much more advanced and efficient, compared to competitors, good for all kind of submersible "sonorod-sonopush-push-pull transducers" and for traditional ultrasonic cleaning transducers. You will be able to use titanium alloy sonotrodes, as well as stainless steel sonotrodes, and to apply new (price convenient) technology of assembling mentioned sonorod systems.

8. Mentioned ultrasonic generators and transducers are applicable to all kind of ultrasonic cleaning transducers, to Sonochemistry and to different liquids processing technologies. My ultrasonic generators can be applied on almost any transducer produced by competitors (and this will extend MS group profits, since too many users already have ultrasonic equipment and missing good and almost universal ultrasonic generators). Here I am not talking about traditional, ultrasonic cleaning transducers and baths, since there is very big competition in this field (and this is not complicated to be developed later).

9. Practically, under "Cleaning Technology" MS group will get very powerful and innovative Liquids processing technology (meaning relevant ultrasonic generators and sonorod transducers). In other words, you will get long-lasting and very modern technology, more efficient than you presently can imagine and expect, and you will be proud to present such business arrangement to MS group. I am talking about very

significant technical items, not at all about simple elementary and well-known products (or very simple ultrasonic cleaning generators). Generators in question (offered to MS group) are much more sophisticated and complex compared to what Weber Ultrasonic has, including Martin Walter, Branson, Telsonic etc. (but it is still not a time to completely expose and discuss such items).

10. New cleaning generator, one I am presently preparing for you, is sufficiently well described here (see attached files): **SONOROD_GENERATOR user manual-.pdf.** You could imagine what should be the technical level in order to produce such generators.

11. You will get (before October 2017) an optimized, updated and modified version of mentioned generators (with more options, compared to what is described in here-attached manual), since presently, this older generator (which you can see in my laboratory) is placed in a big and not at all nice, metal case. I asked my R&D people to repack the same generator in a 2 to 3 times smaller box or space, to be ready for packing in MS generator box (and be ready for next international exhibition). Such generators are presently good for single-phase European main supply, also operating (if necessary and when requested) between 200 and 240 Vac, 50/60 Hz, and for American main supply voltage between 2-phase lines, delivering until 2000 W of continuous, load-dependent, stabilized, effective power. Weber Ultrasonics and others are always specifying theoretically maximal peak power, meaning that when Weber is telling that their generator delivers 3 kW, this is effectively until 1.5 kW of continuous input power, if ultrasonic load can accept and operate on such power (but for marketing and for not-well informed users, 3 kW sounds much better).

12. MPI cleaning generator is made for sonorod transducers (like sonopush, push-pull and similar transducers). It is universally applicable for all existing sonopush and push-pull transducers from any of known competitors, and since it is much better compared to Weber and Martin-Walter generators (it has more settings and better controls and protections), you can sell it to any old user who already has transducers from Martin Walter, Weber, Telsonic etc. Mentioned competitors already sold until 100’000 pcs. of such transducers (or maybe much more), during last 25 years, and many of them could become MS clients (only for new MPI generators, or for completed sonorod systems, since you will also get total technology and documentation and consulting regarding MPI sonorod transducers). MPI generator is also applicable for Telsonic tubular transducers. In fact, MPI generator has richer frequency output and produced ultrasonic activity is much better spatially distributed, compared to all existing competitors (no standing waves). It is good to mention that MPI cleaning generator is very much different compared to generators from mentioned competitors. Since MPI is also producing modern welding generators, and one line of generators for scientific applications (where all parameters and frequency can be changed or modulated on many ways), I will introduce some of such new and sophisticated control options (that are good for cleaning and liquids processing) into new generator being prepared for MS group. For my R&D this is not a problem to introduce more control and settings options, since we already have such solutions (from a software and hardware point of view). Practically, MS will have unique and the best cleaning generator, also good for sonochemistry applications. It is maybe not widely known that mentioned MPI sonorod generators are also very good for traditional cleaning transducers (where we apply number of small transducers). Of course, certain impedance matching with output inductive components should always be applied (based on load characteristics, frequency and capacitance).

13. In addition, MS will get new, modified, optimized and versatile sonorod systems that are either very similar or equivalent to sonopush and similar transducers, but 3 to 4 times better by acoustic activity (thanks to relevant design modifications). You will be able to produce stainless steel or titanium sonorod systems, and ***low production price versions*** based on stainless steel tubes radial crimping. MS will get methodology and design principles regarding sonorod transducers design (presently for 20 and 25 kHz, but it is very easy to produce similar 30, 35, 40 kHz transducers).

14. In the same package of technology and expertise transfer, MS group will get high power MPI submersible transducer, applicable for all "sonopush-sonorod-pussh-pull-tubular" systems.

15. Presently I have sonorod cleaning generators only in a big metal box, and in a very short time the same generator, will be packed in a much smaller space, becoming good for MS metal cases. This will be realized by MPI R&D team (before October 2017) and you will be able to present such generator on international exhibitions related to ultrasonic cleaning and sonochemistry. In order to get an idea about generator assembling technology, you could open here attached file "Modified-Generator-Pictures" and you will see that this is the same or similar SMD technology as others are using in our business.