

EXECUTIVE SUMMARY of BEST ELECTRIC MACHINE

www.bestelectricmachine.com

SYNCHRO-SYM Bottom Line Up Front:

Simply retrofitting *any* electric motor or generator system package with the patented brushless real time emulation controller and the only optimal electromagnetic symmetry of a contiguously stable “active” rotor assembly of SYNCHRO-SYM: a) will double the power density, halve the cost, and halve the loss (*with the optimal electromagnetic symmetry of two “active” winding sets tactically placed on the rotor and stator, respectively*), b) will octuple the peak torque (*by holding the air-gap flux density below saturation in accordance to the physics of a symmetrical or dual ported transformer*), and c) will eliminate the “compounding” loss, cost, and size of the field oriented controller and “passive” rotor assembly (*with the asymmetry of precious rare-earth permanent magnets, slip-induction dependent windings, reluctance saliencies, or DC field windings*) of the original electric motor or generator system.

Electric motor and generator systems are the backbone of the electricity infrastructure. For instance, *electric motors* consume at least 45% of the entire global supply of electricity, which has a compounded annual growth of 4%, *electric generators* produce virtually the entire global supply of electricity, which includes electricity generated from renewable energy, and together, *electric motors and generator systems (or electric machine systems)* will produce and consume virtually the entire 70% of additional expected growth in the global supply of electricity for serving electric propulsion as the customary means of mobility by circa 2035. Electric machine systems are *fundamental* for renewable energy (*e.g., wind, hydro, tidal, hydrogen, etc.*), electric mobility (*e.g., ships, electric vehicles, electric airplanes, high altitude electric drones, trains, etc.*), and industrial efficiency and automation (*e.g., fans, pumps, robots, machinery, etc.*). Without argument, continuous improvement of the electric machine system provides enormous opportunities: a) for the efficiency, cost, power density, and future of our energy infrastructure, b) for decarbonization, and c) for combating global warming; but with the shared belief that any electric machine circuit and control architecture that could be invented has been invented, electric machine system research and development (**R+D**) is specifically focused on tactically applying readily available and conveniently applicable performance material, winding, packaging, manufacturing, and thermal management techniques that enhance *the established century old electric machine circuit and control architecture with the non-optimal electromagnetic asymmetry of the universally essential “active stator assembly” for power and torque production but with the similar loss, cost and size of a “passive rotor assembly” of permanent magnets, slip-induction dependent windings, reluctance saliencies, or direct current (DC) field windings.*

Asymmetric electric machine systems with the *non-optimal electromagnetic asymmetry* of a stator with an active winding set but a passive rotor with either RE-PMs, reluctance saliencies, slip-induction windings, or DC field windings need intensive research with computer aided design optimization to only approach the performance of SYNCHRO-

SYM with the *optimal electromagnetic symmetry* of a stator and rotor with similar active winding sets, respectively.

Therefore, SYNCHRO-SYM is truly a turnkey electric motor system that can leverage legacy, off-the-shelf, or futuristic electronic control components and packaging techniques without the reiterative need for intensive research or development as universally expected for a non-optimal electromagnetic asymmetric electric machine design. When MOTORPRINTER fabrication is completed (circa late 2024) for our inhouse, just-in-time, additive manufacture of any size SYNCHRO-SYM, which is without the typical, highly capially equipped, industrial real-estate but with simple incremental production scaling, the complement of SYNCHRO-SYM Technologies, including BMSCC and BM-HFMDB for system-of-systems applications, are clearly straight-forward-ready!
