

Proprietary Nonlinear Optimization and Breakthrough Control Technologies for Dynamic Systems



Stuart Landow
CEO & CMO

CEOCFO: *Mr. Landow, what is the fundamental idea behind AC Kinetics?*

Mr. Landow: AC Kinetics is comprised of a team of advanced engineers and scientists, mostly PhDs from MIT, who are experts in software that optimizes many metrics for machine controls. We develop software for license to others that controls electromechanical devices and complex, dynamic systems. Our proprietary algorithms optimize the performance of that system or machine. The objectives can include making machines move faster and more accurately, which increases productivity, reduces acoustics, and improves energy efficiency. We look at the primary task for the dynamic system and enhance that objective with our advanced controls. We don't necessarily characterize ourselves as a green technology, but we affect an energy reduction in the system or machine by reducing wasted energy, and the accompanying benefit is reduced CO2. We are presently focused on the control of AC induction motors for which we reduce energy consumption while improving the performance or the work output. We think another benefit from the performance enhancement could be improved system life since wasted energy dissipates as heat and penalizes both performance and system life. Our team has prior success with motor control software that is state of the art and is used on hundreds of millions of machines worldwide.

CEOCFO: *Are you working on a system with an OEM and then the product will go out to other people, or might you be called in by a particular company to work on their specific system?*

Mr. Landow: Our present focus is on motor control manufacturers and motor end users with our strategic partner, Koch Minerals, LLC. With the support of Koch's Jason Russell, we are inviting manufacturing colleagues to join in the further field testing and development of our technology. Our AC induction motor control technology resides in an electric motor control device called a variable speed drive. We intend to license our motor control software to drive makers. The drive makers would then supply end users and OEMs with devices that include our software, which is compatible with existing drive hardware. We are focused on new drives with some retrofit potential as well. Independently certified laboratory comparisons and field tests have proven that motors controlled with our software will use less overall energy and simultaneously improve performance compared to currently available drive software. Additionally, we are broadening our applications beyond motor control. We will consider all of the controllable variables in a system and optimize the entire system and process. We can optimize most linear and non-linear dynamic systems but we add the most value by working on highly complex systems. The more complex the system, the greater our contribution.

CEOCFO: *Can anything be made better, theoretically?*

Mr. Landow: If it can be computer controlled, is complex, and if it has multiple variables, it most likely can be made to perform better. Although there are many opportunities to apply our optimization techniques, we look for applications where we can deliver meaningful results that offer the end user a very favorable Return on Investment. We have initially targeted AC induction motors because they consume almost 50% of all electric energy produced in the world, so the application of more efficient controllers can make a meaningful impact on a large opportunity. The core technology that is currently used to control the motors is decades old. So, we started with a clean sheet of paper and have taken a totally different approach to motor control. Another benefit to end users of our control algorithms is that they are computer tuned to insure optimal settings for any load and speed. Hand tuning is often time consuming for the end user and can often require technical support from the drive maker. That adds cost for the end user by potentially operating a non-optimized drive and taking a lot of time up front to tune it. Even the best hand tuning in the field cannot deliver the level and consistency of tuning compared to our computer-generated algorithms.

CEOCFO: Will a motor always act the same way?

Mr. Landow: The simple answer is no. Motor speeds, loads and many other factors impact the efficiency of a motor. When a motor is rated for efficiency, that rating applies at the motors' full rated speed and load. Motors rarely operate at rated load and speed. Often motors are intentionally oversized for reliability and therefore operate well below the loads at which they are rated. Our smart algorithm senses the motor's energy needs at different loads and delivers the most optimal energy required to meet the work demanded. It adapts to steady state loads as well as dynamic loading, where speeds and loads change. When you flood the electric motor with too much energy the unused portion gets dissipated as heat, which shortens motor life. The extra, unneeded energy is counter-productive to both efficiency and performance.

CEOCFO: If you are designing for a particular manufacturing environment and there are changes in the manufacturing equipment, would you need to come back and retool or redesign, or will it just whatever is there your algorithms are going to cover it?

Mr. Landow: If we are controlling the electric motors in that system, no matter what load they put on that motor, it will be the most efficient it can be for that load. This applies to conveyor belts, pumps, and any motor/drive combination that benefits from a variable frequency drive. Our software makes that combination the most efficient it can be. The only time a change would be necessary is if the motor were changed. In this case the algorithm would retune to the new motor. Our algorithms are very robust and adapt to changes in speeds and loads put on the motor including changes due to modifications of the machinery.

"Our technology facilitates energy reduction while at the same time enhancing performance. Consumers of any product that uses AC induction motors, from large industrial plants to commercial buildings to a homeowner can benefit when our technology is applied to the products they use." - Stuart Landow

CEOCFO: That seems pretty hard to resist. Are people looking for better solutions or are they just talking about it?

Mr. Landow: There is extremely high demand for energy efficiency for several reasons. For one, savings in electricity goes right through the bottom line. Companies can be more competitive by reducing the cost of the products they produce. Utility companies are under pressure to support energy efficiency solutions because they are being forced to close down coal plants around the world because of the pollution. Most offer incentives for customers who buy a piece of equipment that reduces the energy consumed by their motors. A strong push is coming from regulators in the US and the European Union where they are mandating efficiency solutions. An example most people are familiar with is the mandate to eliminate incandescent bulbs in favor of LED or fluorescent bulbs. Our technology applies in both the industrial and commercial environment, in applications such as elevators, escalators, water pumps, and air conditioning systems that consume a great deal of energy. Owners and operators are very interested in reducing the cost of operating their facility – industrial or commercial. In addition, there are more than 16,000 Energy engineers whose job is to find better solutions for their employers. In the case of electric vehicles, the more efficient the electric motor runs, the longer the range from the same battery. Once they are aware of it, we think almost everybody will be interested in it. In some cases it will be driven by the bottom line, in other cases it is driven by their concern about the environment. Are consumers concerned about energy? Yes. They are looking at an air conditioner, refrigerator or dishwasher and they are looking for ways to offset increasing energy costs. The technology applies at the consumer level so we think that once people are aware of our technology there will be a large demand for it.

CEOCFO: Are the 16,000 energy engineers aware of AC Kinetics?

Mr. Landow: We published some press releases, particularly since we have been doing independent testing at a certified test laboratory in Raleigh, North Carolina called Advanced Energy, where they certify motors for efficiency. They also certify efficiency of motor controllers. We published the results of those independent tests as well as our own lab tests, and we received hundreds of calls from people in many industries including the tire and rubber business, the mining industry, paper manufacturing, printing, and chemical processing. Energy engineers call us and ask where they can get our technology. We are working with their drive suppliers now to make our technology available to them. We'd like it to be all 16,000, but awareness is just starting to happen.

CEOCFO: How do you decide where to focus your efforts with so much opportunity?

Mr. Landow: We are focusing right now on what we think is a prime opportunity. We are not interested in being a consulting company, going into a factory and looking at optimizing their process. We might eventually do that, but right now all of our effort is being put into AC induction motors because they consume 50% of the world's electrical energy. If we can improve that efficiency, even one percent is a huge number. We are focused on motors right now, and the end

users are going to be the factories and the commercial buildings, but we are not going to sell them directly because we do not make drives. We are working with companies that make variable speed drives to help them verify for themselves that our algorithm is an improvement, and that it can be seamlessly applied in their existing hardware. We are the next generation motor control algorithm.

CEOCFO: *Put it all together for our readers. Why pay attention to AC Kinetics today?*

Mr. Landow: The world is demanding a reduction in air pollution, and other environmental impacts associated with supplying energy. Our technology reduces energy consumption and, in turn, reduces pollution—including CO2 emissions—in a manner that is more cost-effective than other alternatives. Our technology facilitates energy reduction while at the same time enhancing performance. Consumers of any product that uses AC induction motors, from large industrial plants to commercial buildings to a homeowner can benefit when our technology is applied to the products they use.

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