

Geared Power - Developing their BioGuard UVC™ Device to help Eliminate Hospital-Acquired Infections (HAIs) by Neutralizing Pathogens in the Exhaled Breath of Infected Patients



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Interview conducted by:
Lynn Fosse, Senior Editor
CEOCFO Magazine

CEOCFO: *Mr. Kellstrom, what is the focus at Geared Power today?*

Mr. Kellstrom: We have two divisions in the company, but our main focus is where we help hospitals eliminate hospital-acquired infections (HAIs) by neutralizing pathogens in the exhaled breath of infected individuals. We have a product BioGuard UVC™, which uses UVC radiation or light to kill viruses at the source, to protect everyone in the room. We are seeing a lot of excitement about this now.

CEOCFO: *Why do we need the product?*

Mr. Kellstrom: Infection control, as we know what we all went through during the pandemic with COVID a few years back, can be challenging. We saw that the medical treatments were difficult and sometimes not 100% effective. Sometimes they were done for comfort rather than a curative treatment, and preventative solutions which was what we were all chasing is extremely difficult. The vaccines were not 100% effective in preventing transmission. During that time I went to the board of directors of Geared Power and I asked them to pivot from our original mission of developing technology in a different area, to focus on trying to solve the shortage of PPE (Personal Protective Equipment). That is how this mask was born. We got authorization. We did a root cause analysis.

The bottom line is when you get infected, you become the virus factory. We attempted, and I think we were successful at, coming up with a solution that addresses the root causes of the problem, stopping the spread of the virus at the source. We tried to avoid N-95 masks, cloth



masks, and surgical masks because they were in short supply at the time. We utilized an aerosol mask and built our product around that.

We have a system of one-way check valves. We convert that ordinary mask into what is called a non-rebreathing mask. In other words, each port is dedicated to either inhaling or exhaling. We take 100% of that exhaled breath and we pass it through two UV chambers that are sized to the tidal volume of an average person, which is the amount of air that you process with each breath. We went through quite an iterative design process, resulting in a device that can operate effectively across the entire spectrum of breathing rates, from five breaths a minute to 30 breaths per minute. We can guarantee the minimum dosage required to get a 100% kill rate on something like COVID-19. It is pathogen-agnostic as well. We kill bacteria and viruses, and that translates to measles, or tuberculosis, as well as the common cold and flu.

CEO CFO: *Would you tell us about the size of the mask?*

Mr. Kellstrom: An aerosol mask is something that is typically used when let's say you have a nebulizer. It is also similar in size to a CPAP mask. That is about the size of the BioGuard UVC. An aerosol mask weighs about an ounce by itself. Our product weighs four ounces. It is a little bit heavier than the mask by itself, but its volume is mostly open air passages. You can see there are two UV chambers on each side but they are largely hollow housings. There is only a quartz lamp and spiral ducting inside, which is very light as well. You wear it like a normal mask. It is a little bit bulkier, but for the most part it is out of your vision. You don't see it on your face.

One of the great advantages of this is no mechanical filter, or they are not breathing through a cloth mask or an N-95 filter; it is 100% neutralization through UV action. There is no resistance to breathing whatsoever.

"We have come up with a medical countermeasure, as it is not a diagnostic, it is not a treatment and it is not a vaccine. It is a medical device that is capable of solving this challenge of reducing hospital-acquired infections." Gary Kellstrom Jr.

It has two benefits. One, the wearer who might be in respiratory distress already, doesn't have to suffer through wearing a mask that makes it harder to breathe. The second one is there is no heat build-up; the lamps are cool so they do not raise the temperature. That is another level of comfort for the wearer.

CEO CFO: *Would someone wear this mask continuously, or at certain times of the day?*

Mr. Kellstrom: It is reasonable to recognize that most of the public does not want to hear anything about masks, but the fact is we still have respiratory infections. We all get sick, and where we have dense populations, that is where it tends to spread faster.

One of the greatest challenges that hospitals have is a great concentration of sick people. They come in and are looking for help because they recognize that the illness has gotten beyond where they are comfortable staying at home and waiting it out, and now you have the perfect opportunity for that pathogen to jump to another susceptible host. That is where our target market is. Once we get through the FDA process; we will sell these to hospitals to be used 100% of all respiratory illness patients coming into the emergency department.

The concept here is only those with respiratory illness will need to wear this mask. We have already established that it is easy to breathe through so they are not going to be in any discomfort because of the BioGuard UVC mask. The patients that come in for other conditions, like sprained ankles or other reasons, when they come to visit the emergency department, they are going to be protected as well as the staff, so we are going to reduce the HAIs in the emergency departments of the healthcare facilities that have implemented policies to use BioGuard UVC.

CEO CFO: *Are hospitals looking for something like this or do they even realize it will be available?*

Mr. Kellstrom: There is quite a lot of interest. Hospitals are challenged in a couple of different ways. This is an important aspect in that the CDC has made reporting on hospital infections mandatory as of the first of this year, for all hospitals. It is something that the government is interested in solving, hospitals are interested in solving, and insurance companies, Medicare, and Medicaid are interested in solving this. It is a challenging problem.

We have come up with a medical countermeasure, as it is not a diagnostic, it is not a treatment and it is not a vaccine. It is a medical device that is capable of solving this challenge of reducing hospital-acquired infections. On average, it is one out of every 30 people who come out of the hospital with a hospital-acquired infection. It is a pretty large number, one that you might not expect.

CEOCFO: *Would you tell us about the Letter of Allowance from the US Patent and Trademark Office?*

Mr. Kellstrom: That is exciting news. We filed that patent right after we developed the product back in the time of COVID. We received the European patent grant first. Almost a year later we received the US allowance which is great. It is a proud moment because the mask is such a simple design. It is hard to believe that it hasn't been thought of in the past. Necessity is the mother of invention and COVID motivated me to help out. We put real effort into its design.

It started out like a found-objects project; just trying to put something together that might work. In the end, there is a lot of engineering and science that went into creating the right volume and attributes of the helical duct work within the sterilization chamber, to make the whole thing work practically and effectively.

CEOCFO: *What are the next steps for you?*

Mr. Kellstrom: We are working with our regulatory consultants and some experts that we have in-house, to complete the FDA clearance. We have a few different options and I think we are going to pursue an investigational device exemption which will allow us to do a clinical study and look for a partner hospital to help us out with that study, and get some clinical data behind our claims of efficacy and safety.

CEOCFO: *Are you seeking funding, investments, or partnerships?*

Mr. Kellstrom: Yes. We are seeking funding and working through several different organizations that have been very helpful; New Jersey Manufacturing Extension Program (NJMEP), as well as BioNJ and NJEDA. We are looking to get through our milestones, which are the clinical trials, and FDA clearance.

CEOCFO: *Would you tell us about being nominated for The Coolest Thing Made in New Jersey?*

Mr. Kellstrom: That is a fun topic. We are working with NJMEP. I got the email request to be nominated. I looked at it and to be honest, I was not sure if I should even attempt to be in that category. I figured what the heck. There were roughly 50 products that were in the original round. We have gone through several rounds of voting and we are in the semi-final rounds now. There are eight remaining and we are right up there with the best of them.

It is an exciting opportunity to get some recognition ahead of our pre-market authorization with the FDA. We can't market and sell this yet but this is PR and it is a great opportunity to get a little bit of awareness about the technology in the upcoming availability that is pending.

***Editor's Note: As of 12:01am, 4/9/25, BioGuard UVC has advanced to the final round of 4 in the Coolest Thing Made in NJ contest (manufacturingcounts.org/vote/).*

CEOCFO: *Do you have ideas about manufacturing yet or is it too early to think about that?*

Mr. Kellstrom: We have been in discussions with a couple of potential contract manufacturers. There is always the option to do it in-house, but we are a startup and to scale at that level immediately is probably not the best option. We have some very capable companies that have shown some interest. The nice thing is it is blow molding and injection molded parts, and a little bit of assembly. This is a great opportunity to partner with someone with established current good manufacturing process is in place already.

CEOCFO: *What was the biggest challenge in getting the product ready?*

Mr. Kellstrom: One of the challenges we are working through right now, is we have taken a unique approach to eliminating the pathogens. We are pathogen agnostic. There is a lot of standardized testing that is available for testing masks. Most of them require sophisticated instrumentation that counts the number of particles that the mask filters out of the air. Our approach does not filter anything, it kills all the pathogens. It deactivates and neutralizes them, so those standard tests can't be applied.

We have to develop our testing protocols and get the protocols approved by the FDA, and then we will have to go out and conduct our testing. It is a byproduct of being novel and unique but it did present us with another layer of challenge in getting through regulatory.

CEOCFO: *What is Geared Power?*

Mr. Kellstrom: Initially Geared Power was founded by me, to develop some IP around a continuously variable transmission in basically automotive and even large truck categories. It was gear-driven rather than belt-driven or friction-driven. We had progress but COVID interrupted us and we pivoted and began working on what is now known as the BioGuard UVC.

CEOCFO: *What makes BioGuard UVC so important?*

Mr. Kellstrom: As we get more intimate with the market, we find that although it is a perfect product-market fit with hospitals and healthcare providers, the real challenge that they are experiencing right now is with antimicrobial-resistant pathogens and multi-drug-resistant pathogens, and controlling the spread of those difficult-to-control pathogens. The germicidal UVC that we use in the BioGuard UVC mask is pathogen agnostic, it kills everything; there is no resistance to UVC light. It is known to be very effective.

Our sterilization chambers encapsulate the UVC so it doesn't expose any human skin or anyone through visual contact. It is lethal even to multi-drug-resistant pathogens. BioGuard UVC provides a stop-gap for a difficult problem, that not only the government but researchers are all trying to develop new drugs for. They haven't discovered anything and what we have now is an effective solution that can bridge that gap.

