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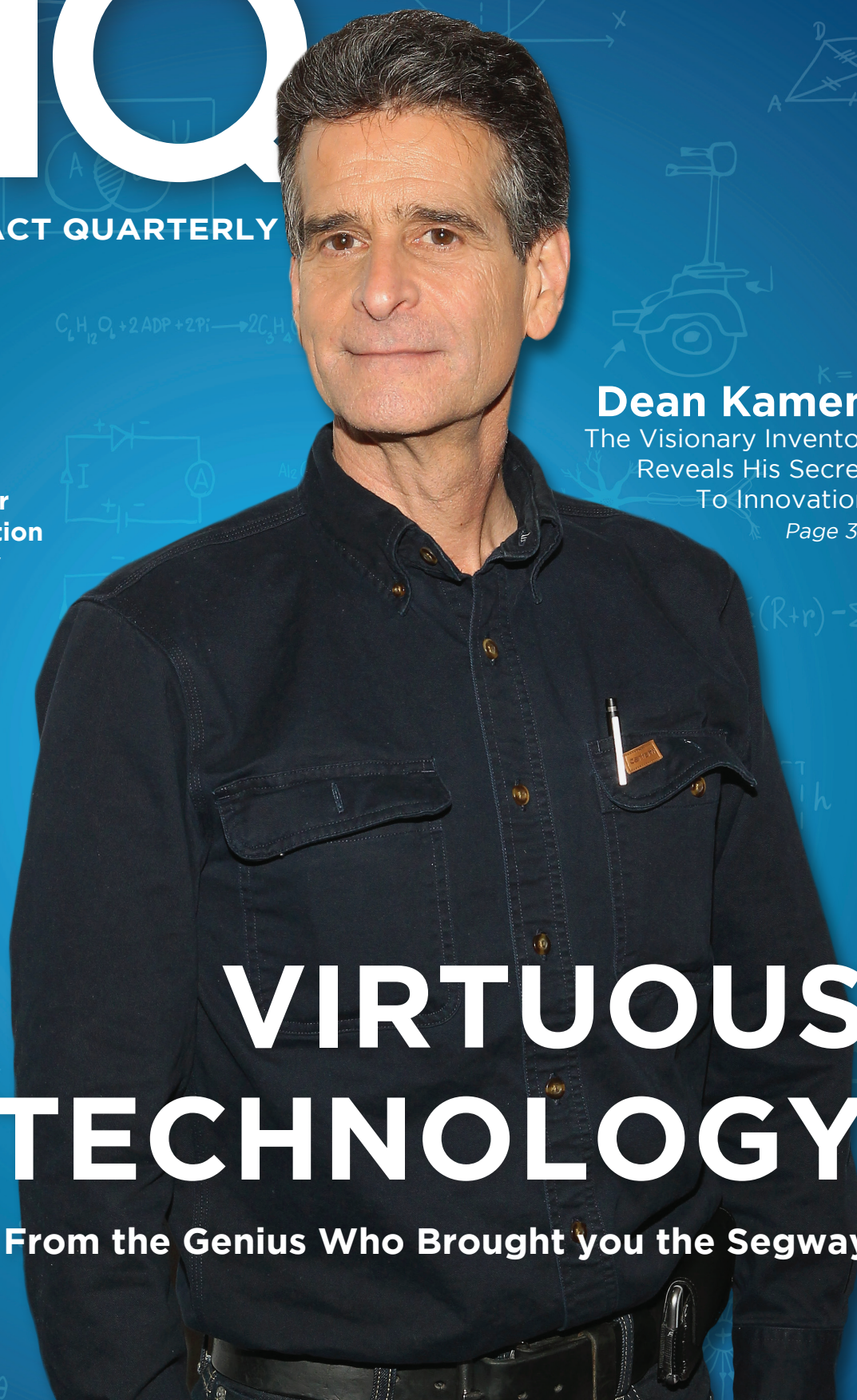
# VIRTUOUS TECHNOLOGY

From the Genius Who Brought you the Segway

## **Dean Kamen**

The Visionary Inventor  
Reveals His Secret  
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# A SYRINGE, A SEGWAY, AND A SLINGSHOT:

## DEAN KAMEN SAVES THE WORLD, ONE INNOVATION AT A TIME

BY EMILY HACHE

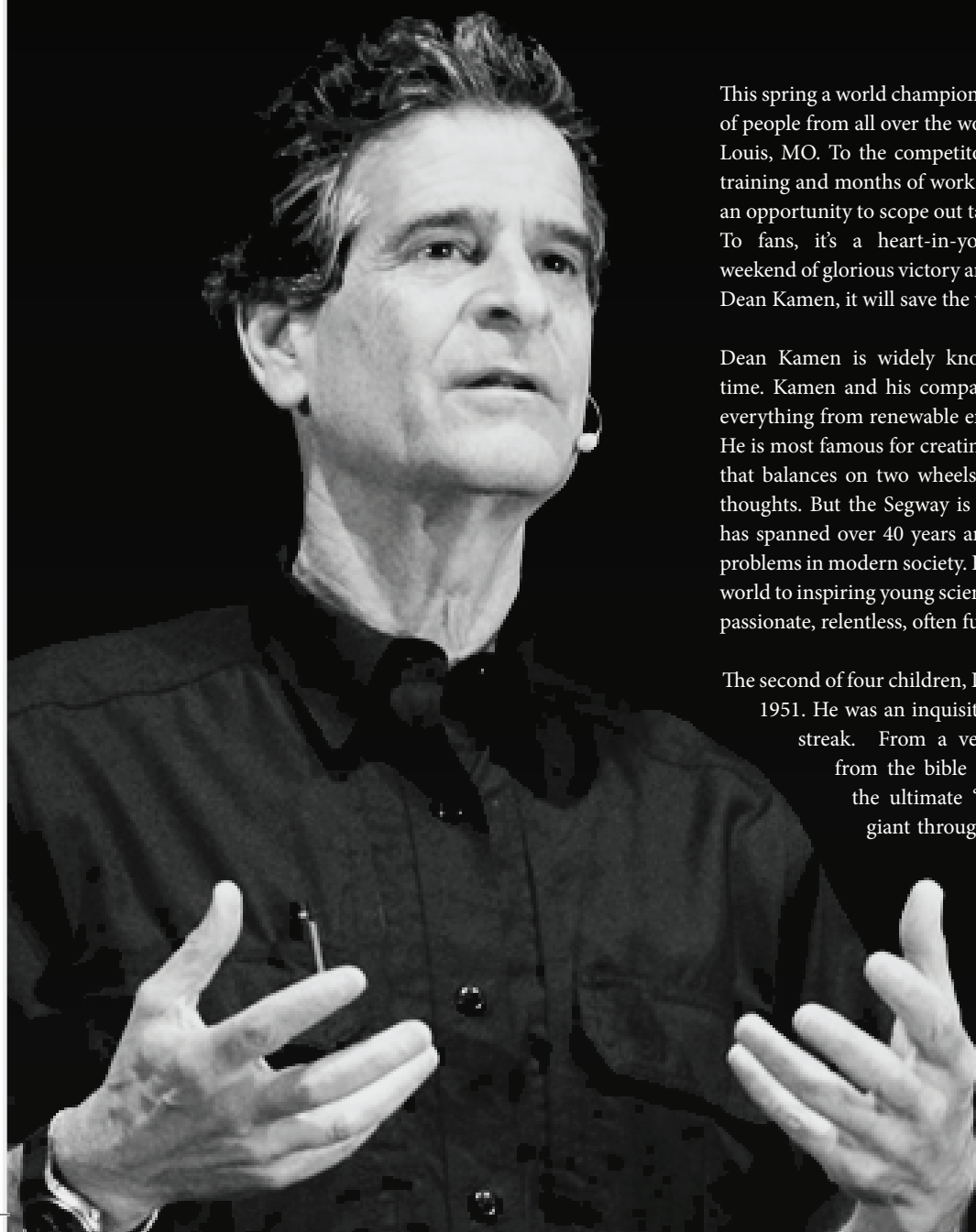
ENTERTAINMENT DEVELOPMENT SPECIALIST, ACTOR, AND WRITER

This spring a world championship event brought tens of thousands of people from all over the world to the Edward Jones Dome in St. Louis, MO. To the competitors, it is the culmination of years of training and months of work. To corporations and universities it's an opportunity to scope out talent and offer lucrative scholarships. To fans, it's a heart-in-your-throat, scream-'til-you're-hoarse weekend of glorious victory and crushing defeat. But to its founder, Dean Kamen, it will save the world.

Dean Kamen is widely known as the Thomas Edison of our time. Kamen and his company DEKA hold over 400 patents in everything from renewable energy to robotics to soda dispensers. He is most famous for creating the Segway, a personal transporter that balances on two wheels and seems to move with its rider's thoughts. But the Segway is just one innovation in a career that has spanned over 40 years and has tackled some of the toughest problems in modern society. From bringing clean water to a thirsty world to inspiring young scientists and engineers, Dean Kamen is a passionate, relentless, often funny, force of nature.

The second of four children, Dean was born on Long Island, NY in 1951. He was an inquisitive and curious kid with a stubborn streak. From a very young age, he took inspiration from the bible story of David and Goliath. David, the ultimate "little guy," takes down a terrifying giant through the use of technology, in the form of a slingshot. That idea—that technology could solve the "giant" problems of the world—would drive Kamen his entire career.

And his career started early. Dean began inventing at age five, when he built a device to help him make his bed in the morning. By high school, he





had developed numerous ideas and had built his first workshop in his parents' basement. By the time he graduated from high school, he was designing lighting systems for rock bands and museums. He even worked on the technology for New York City's famous New Year's Eve ball drop in Times Square. Before he started college at the Worcester Polytechnic Institute, his basement business was earning \$60,000 a year—more than the salaries of both his parents combined.

Not everything was smooth sailing for the young inventor. He struggled in school, plagued by ADD and a relentless curiosity, which annoyed both his teachers and his family. His father once called him a "human irritant". Part of the reason he struggled, he says, is that he wanted to focus his energies on one thing, one idea or concept, but his teachers would jump from subject to subject. They threw information at him, and he couldn't keep up. To this day, he admits he is a slow reader. "I would argue that education, actual learning—it is hard work. You read it. You don't understand it; you read it again. You break a pencil and read it again."

His difficulties with traditional education didn't end in high school. In college, he refused to go to class. Instead, he was determined to use the intellectual resources of Worcester Polytechnic to help him build his technology business. He remembers his rationale, "I can pay you this tuition and avail myself of this extraordinary faculty, but I'm not going to waste my time in class because the opportunity costs would be too high." He eventually dropped out.

It was his brother, Barton, then a medical student, who gave Dean his first big problem to solve. Bart worked with infants who needed regular medications via injection. To receive these injections, these small children came into the hospital, sometimes every day. For the babies and their families, these trips were a burden. So Barton told Dean to figure out a way for patients to receive injections without having to make a trip to the doctor. Kamen recalls his brother's challenge, "You want to do something useful? Figure out a way to fix this for me."

## AUTOSYRINGE AND THE BIRTH OF DEKA

Dean's answer to that challenge was the first portable infusion pump, a device that administers medication automatically at set times. The device was an instant success with applications beyond pediatrics into cancer and diabetes treatments. In 1976, at the age of 25, Kamen officially founded AutoSyringe to manufacture and market the pump.

He was still operating out of his parents' basement, but as demand for the pump grew, he needed to expand. So, in his usual innovative style, he sent his parents off on a cruise, hired an architect, and raised the house off its foundation so he could

expand the basement into a small factory. He employed the whole family in AutoSyringe, hiring his younger brother, Mitch, for assembly and his mother, Evelyn, to keep the books.

Dean downplayed his age to prospective clients. No one believed that a 25-year-old without an engineering degree (or any degree for that matter) could design and build something like the AutoSyringe. But five years later, the device had proven itself so well that it drew the attention of the drug giant, Baxter International. Baxter bought AutoSyringe for 30 million dollars.

Kamen, now thirty years old, finally had the resources to let his massive imagination run wild. Proceeds from the AutoSyringe sale were enough for him to start up a new firm that would focus exclusively on research and development of new technology. DEKA Research and Development Corporation (an acronym derived from Dean Kamen) was born and began to attract high profile clients like DARPA (The Defense Advanced Research Projects Agency) and Coca Cola.

## THE LORD OF NORTH DUMPLING ISLAND

Kamen's new status as a millionaire also allowed him to live out his boyhood dreams. He designed and built his dream home, a 32,000 square foot retreat in New Hampshire. He built the entire house around a three-story steamboat engine once owned by Henry Ford. Kamen earned his pilot's license and bought a helicopter. And he designed a motorized helipad that allowed him to land his chopper right outside his front door and then roll it into a hangar inside the house.

It was this helicopter that led Kamen on one of his most unusual adventures. Dean was learning to fly, and his instructor's wife told him about an island for sale off the coast of Connecticut. Dean was intrigued and hopped in his helicopter to check it out.

North Dumpling Island is a two-acre speck of land in the Atlantic Ocean. It is home to a lighthouse, a keeper's cottage, and, oddly, a miniature version of Stonehenge. This tiny island has a storied past dating back to 1639, when it was first given to John Winthrop, the son of the Governor of the Massachusetts Bay Colony. The Winthrop family owned the land for almost 200 years, until the US Government bought it in 1847 for the purpose of building the lighthouse. It moved back into private hands in the 1950s, though the coast guard continues to maintain and operate the lighthouse to this day. North Dumpling has been a Navy outpost, a transfer point for bootleggers during Prohibition, and was once owned by the man who invented the automated doughnut-making machine.

It was just the kind of place for Dean Kamen. He was so charmed by the island that he bought it. He set about making improvements, restoring the keeper's cottage and updating the

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*Kamen and "Luke," the robotic arm developed by his company, DEKA. (Photo from DEKA)*

*Dean Kamen hard at work tinkering with an oscilloscope in his lab.*

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island's infrastructure. One of the first things he sought to do was build a wind turbine. And that's when the trouble started.

Although North Dumpling is off the coast of Connecticut, it lies within the jurisdiction of Southold, a small town on Long Island. When Kamen went to Southold with what should have been a routine request to build a turbine on *his own private island*, Southold denied him the permits. He couldn't build a 100 foot-tall turbine in a residential zone, even if *he* was the only resident.

Dean's brother Mitch said, "[Dean] was always focused on what he wanted to do, and nobody could ever talk him into doing something he didn't want to do." Dean wanted his wind turbine, and he meant to get it. So he informed the town of Southold that North Dumpling Island was seceding from the United States.

Kamen went all out. He wrote a constitution. He appointed friends and family as his "ministers." Ben and Jerry (yes, *that* Ben and Jerry) became the Ministers of Ice Cream. His father Jack, a cartoonist, was the Minister of Creation; his mother, the Minister of Nepotism. Kamen wrote to then President George H. W. Bush, whom he knew personally, and asked him to sign a non-aggression pact with North Dumpling. Bush joined in on the joke. It was satire and a lot of fun, but it was also an act of rebellion against those who stood in the way of innovation. Kamen was making a statement.

The press picked up on the story, and eventually, Southold relented. Kamen built his wind turbine. But people continue to call him Lord Dumpling to this day, and Kamen maintains that

North Dumpling Island is its own sovereign state.

A few years after this incident, Kamen had a run-in with the government again. The US Coast Guard informed him that they would no longer maintain the undersea cables that brought electricity to the island. They would be switching the lighthouse to solar power and cutting him off.

True to form, where others may have seen an expensive and inconvenient problem, Kamen saw an opportunity. Why not go off the grid and turn the Kingdom of North Dumpling into a proof-of-concept center for DEKA's most important projects?

## INVENTIONS IN ACTION

DEKA's mission is to solve problems—not small problems but huge, daunting problems. Life and death problems like pollution, climate change, disease and disability.

Kamen has said, "I only start on projects if enough credible people tell me, 'You're nuts,' because then you know, this must be a big problem."

In the early days of DEKA, Kamen observed a man in a wheelchair struggling to get over a curb. Kamen imagined what his life would be like if he were confined to a wheelchair. What would he need the chair to do? He would want to move anywhere, up and down stairs, over rough, uneven surfaces like grass and gravel, and he would want to be seated high enough to look people in the eye.



*Dean Kamen rides in on his most famous invention – the Segway. He designed the Segway as a solution to efficient and green urban travel.*



*Dean Kamen shares the groundbreaking concept of the Slingshot – a device that can produce clean drinking water from any source.*

Kamen invented a specialized chair that can rise up on two wheels (bringing the user to standing level), climb stairs, and is rugged enough to go anywhere. He called it the IBOT.

Dean saw kidney patients forced to come to the hospital for dialysis several times a week, so he invented a home dialysis machine. DARPA commissioned him to develop a robotic arm for soldiers who had lost limbs in the Iraq War. Kamen called this invention the Luke Arm, for Luke Skywalker, and made it so precise that it can pick up a grape without crushing it and a raisin without dropping it.

He created a new kind of Stirling Engine, a highly efficient, zero-emission engine that runs on almost any kind of fuel, even cow dung.

Kamen's most famous invention is, of course, the Segway. The Segway was built to solve another global problem: automobiles and the traffic and pollution that come with them. Why, Dean wondered, do we use large, inefficient vehicles when over 50% of the human race lives in cities? He set his sights on a vehicle that would take people "the last three miles." It was clean, energy efficient, and could navigate almost any terrain. Its drive system, borrowed in part from the IBOT, was unlike anything else on the market. And even though it didn't revolutionize urban life, as Kamen hoped, the gyroscopic technology behind it is still considered a major breakthrough.

While the Segway may be the most famous Kamen invention, the Slingshot is his most important. Named for that famous piece

of technology that brought down Goliath, the Slingshot aims to bring safe, fresh, drinking water to every human being *on Earth*. It is a technological marvel, a water distillation system that requires little energy to run, no filters or parts to change. It can purify enough water for 100 people per day and can run for five years without maintenance. The best part? It purifies water from anywhere—polluted rivers, oceans, even raw sewage. North Dumpling Island's water comes from a Slingshot, with a DEKA Stirling Engine to power it.

From the AutoSyringe to the Slingshot, Dean Kamen has proven that "when you take a bunch of people with intelligence, drive, and just a hint of madness, there is nothing that they cannot do."

## FOR INSPIRATION AND RECOGNITION OF SCIENCE AND TECHNOLOGY

As proud as Kamen is of his inventions and the impact they have on people's lives, the project that gives him the most joy isn't an invention at all. But it does aim to solve a global problem.

In 1988, just as DEKA was taking off and North Dumpling was declaring its independence, Kamen noticed a disturbing trend among the kids he talked to. On any given day, he saw kids in jerseys and baseball caps emblazoned with team logos. When Dean talked to these kids, he found that they could name all kinds of athletes and movie stars but not one living inventor or

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scientist. He wondered if America's declining math and science scores might be linked to a lack of "science heroes".

"You get what you celebrate," and kids in the United States were celebrating sports, not science. And if kids weren't interested in math and science, America would lose its ability to lead and innovate in the world. Dean knew that something had to be done. But how do you shift an entire culture?

Dean decided to use the model of sports to create excitement and enthusiasm around science and technology. His program would not be educational—education wouldn't even be included in the name. It would be a competition, an event. He would hand young inventors a problem, and they would build a device, a robot, to solve it. And then they would show off their inventions in an arena where the best robots win.

So began FIRST—For Inspiration and Recognition of Science and Technology. FIRST officially launched in 1992 with twenty-eight teams gathered in a high school gym in New Hampshire. The first challenge, "Maize Craze," required robots to navigate a field covered in corn kernels. If it sounds like a humble beginning, it was, but Kamen was determined to get kids excited about science.

Of course, people thought he was crazy. They told him it wasn't possible to change an entire culture with a kids' science program. They told him kids weren't interested in science, and a robotics competition wasn't going to change that.

Fast forward twenty four years. FIRST has grown from its original 28 teams in 1992 to over 44,000. Over 400,000 kids participate on a FIRST team each year. FIRST quickly outgrew that high school gym in New Hampshire, and now the FIRST Championships fill the Edward Jones Dome in St. Louis with 40,000 aspiring inventors and their mentors, coaches, and families. Over 80 countries send their best and brightest. More than \$25 million in scholarships are awarded to FIRST participants *each year*.

And the effects of this amazing organization are lasting. FIRST kids are twice as likely to major in science or engineering than non-FIRST kids. Over 90% of FIRST participants show improved problem-solving, time management, and conflict resolution skills. And over 85% of FIRST kids express more interest in doing well in school and in going on to college.

Kamen calls the two core values of FIRST Gracious Professionalism and "Coopertition". Fierce competition and mutual gain are not separate notions. FIRST teaches that young people can compete

but still respect each other. It isn't about winners and losers. In fact, every team must work with other teams, form alliances. Teams are judged on how well they demonstrate the values of Coopertition and Gracious Professionalism as well as how their actual inventions work. FIRST shows kids that cooperating and competing go together, that breakthroughs often happen when many people work on a problem at the same time.

But, perhaps most importantly, FIRST brings science and technology alive for kids. It allows them to experiment, get their hands dirty and engage in trial and error. And it gives them immediate results. Either their robot works, or it's back to the drawing board.

In the FIRST kids, Kamen has found his greatest inspiration. Whenever he attends a FIRST event, he wonders if there's a kid in the stands who's going to cure cancer or solve global warming. For a man who has spent his entire life trying to solve the world's *big* problems, FIRST is a passing of the torch to the next generation of innovators.

## WHAT IS POSSIBLE

There is a story Dean tells about his father, Jack. Every evening, the other dads in the neighborhood would come home from work, and Dean would see them out on the street, playing ball with their kids. But Dean's father never played. After dinner, Jack would go back to his small studio and continue to work, drawing for comic books like *Tales from the Crypt*. One evening, Dean came up to the studio and told his father he felt sorry for him because he never got to go out and play like the rest of the dads. His father told Dean that he should never feel sorry for him. Jack loved what he did, and he was lucky to be able to do it. It taught Dean that if he worked at something he loved, it would never feel like a job.

Dean Kamen continues to change the world for the better. His goals are no less than to put a FIRST team in every public school in America and a Slingshot in every poor village in the world. From medical advances to creating his own sovereign nation, Dean Kamen loves solving problems with his own brand of rebellion, humor, and innovative thinking.

"What do inventors do? Inventors look at problems, the same problems everybody else looks at, but see them differently. The true agent of change in this world has always been the will and creativity of smart people." **GIQ**