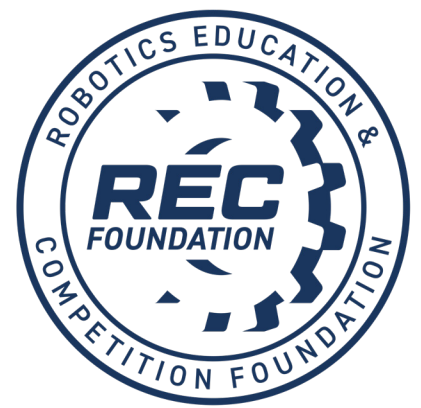


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students,
one robot
at a time.**

roboticseducation.org

HOW REC FOUNDATION IS INSPIRING THE NEXT GENERATION OF STEM STUDENTS

The Robotics Education & Competition (REC) Foundation's mission is to increase student interest and involvement in science, technology, engineering, and mathematics by engaging students in hands-on, affordable, and sustainable robotics engineering programs. Recently, Dan Mantz, the CEO and Chairman of REC, sat down with Dallas Business Journal Market President & Publisher Ollie Chandhok to discuss how the Foundation allows students to design and innovate as part of a team, experience failure, persevere and embrace STEM.

OLLIE: Why don't you tell me about your background, how you got to Texas and how you got started in this business?

DAN: I grew up in rural Pennsylvania, which is why I have a passion for providing STEM opportunities for rural students. I wanted to work in advanced manufacturing, so I went to Kettering University, a 5 year co-op program in Flint, Michigan, that has close ties to the auto industry. I eventually spent over 20 years at FANUC Robotics as a Controls Engineer and later leading the development of new industrial robots.

One of my good friends in Michigan relocated to Dallas. He told me, "North Texas is a great place to live, a great place to raise your family. You don't have to shovel snow anymore. I think you need to come down here." So six years ago, I was hired as the President of Rack Solutions, a Texas based developer and manufacturer of data center products and relocated to Texas. When I relocated, I had

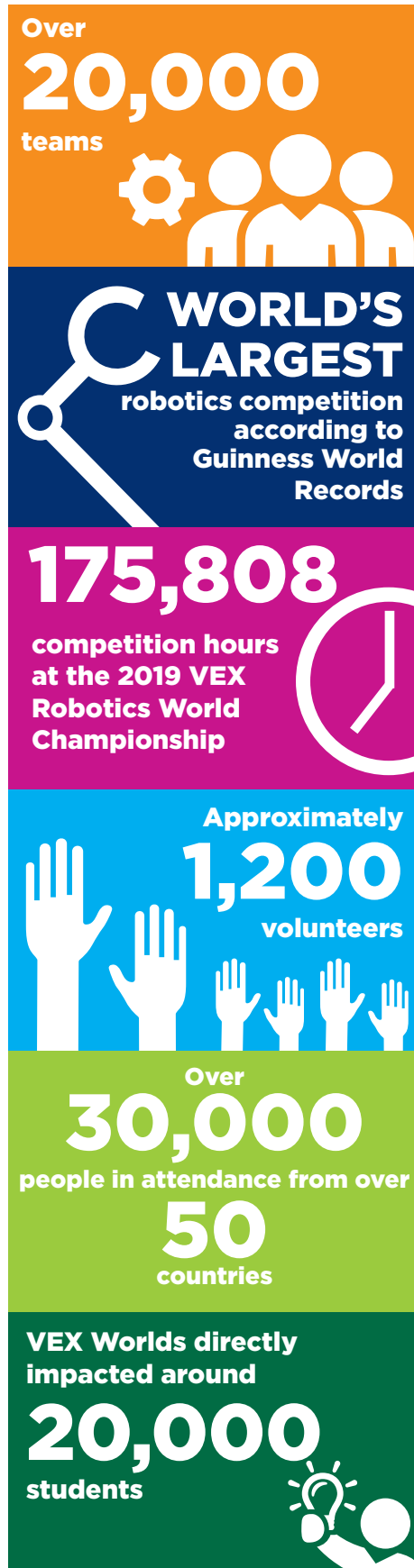
the opportunity to start coaching robotics teams. I had a lot of ideas about robotics education. One of my friends was the President of VEX Robotics. He patiently listened to my suggestions and noted there was an opening on the Robotics Education and Competition Foundation (RECF) board and nominated me to join.

Once I joined the board, I spent the next six months learning more about RECF programs to understand their strengths and where there were growth opportunities. After I reported my findings, the Board asked if I would join the REC Foundation as CEO to implement some of the recommendations such as launching workforce development programs. I saw this as an exciting opportunity to use my industrial robot experience to bring emerging technologies to competitive robotics. That all happened two and a half years ago, and it's been an incredible experience. It's like I've come full circle. I've gone from developing robots in the manufacturing world to engaging students in STEM education



Dan Mantz, CEO of REC Foundation (left) and Ollie Chandhok, Dallas Business Journal Market President & Publisher, recently sat down to discuss how STEM impacts the workforce of the future and why businesses need to embrace it to stay competitive.

VEX ROBOTICS WORLD CHAMPIONSHIP



programs so that they have the skills to develop and implement the next generation of robotics and advance manufacturing systems

OLLIE: Tell me a little more about the REC Foundation, where it started and how did it become what it is today?

DAN: The REC Foundation is based out of Greenville. The beginnings of the organization date to 2008 when the initial focus was to develop and expand VEX Robotics education programs. At that same time, we also started organizing robotics competitions. There were a lot of companies that wanted provide philanthropic support for the competitions. So, in 2011, three employees of VEX Robotics education division launched the REC Foundation. The REC Foundation is now engaging and inspiring over a million plus students in over 70 countries in multiple robotics and work force development programs.

OLLIE: I'm curious to know the impacts that you guys have on individuals ... the community in general. Start at the education level. Who are you working with and what's the impact?

DAN: One of the interesting things is when I joined the REC Foundation, one of the more seasoned employees came up to me and said, "Dan, don't ever forget the 'E' ... E is for education and is very important". At that time that REC Foundation was known more for robotics competitions. But it turns out, our biggest impact is actually education. We developed educator resources that teachers can use to teach STEM in their classrooms. Sometimes it's a full course; sometimes it just supplements existing math or science courses. We are providing STEM education and awareness to classrooms across the United States and around the world. The REC Foundation, from its humble roots of three employees in 2008, has grown to be a multinational organization. We have 48 full-time employees in the United States, 18 of which are based here in Texas. We have employees based in China, in Europe, and even in Australia supporting our programs.

OLLIE: I'm curious to hear a little more about the competitions, but before that I would just like to address what you said. On some level, you are educating the educators?

DAN: That's exactly right. Our educators out there are doing fantastic work often with very limited resources. And what we do is we provide very cost effective means for them to provide STEM education and workforce development programs. But a top priority at the REC Foundation is to "prepare" teachers. So we travel across the country providing regional grants to start robotics programs. Unlike other education programs, we don't just provide robot kits. We work with teachers to train them about the process of designing, building and programming a robot. During the three-day training, teachers actually build and program the robot for a small day competition amongst themselves. The students that they are teaching can learn the technical concepts very easily. What we're doing is giving the teachers the confidence to be able to provide robotics programs in their school.

OLLIE: How do you establish relationships with the school districts, with teachers? Do they seek you out?

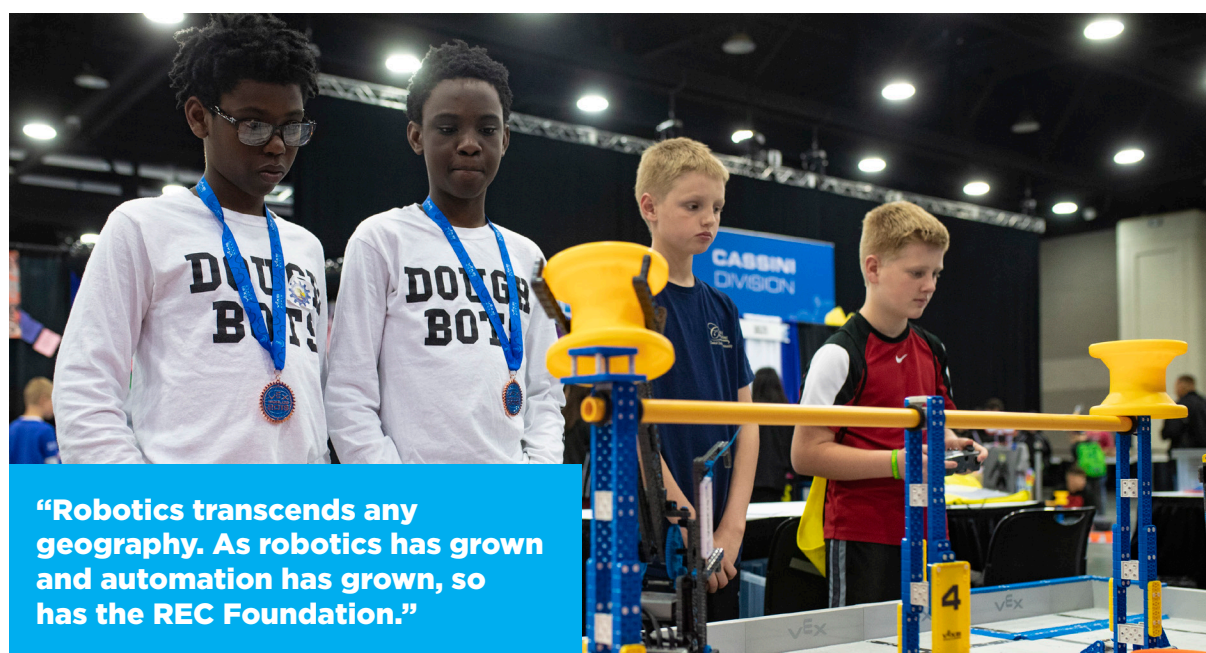
DAN: Most of the time school districts seek us out. We have a grant process which school districts apply to receive support. Often, schools start out just wanting to start a single team. And we do award hundreds of grants a year to start robotics teams. However, we realized two years ago that starting teams isn't enough. For these programs to be sustainable, we want to create a robotics education ecosystem. We partner with a school district, and instead of just giving a grant to start one or two teams, we'll start 40 to 60 teams. In the case of the Miami-Dade Public Schools, we created hundreds of teams. This approach allows us to have trained teachers serve as a resource for fellow teachers. Additionally, and more importantly, it allows the teams to compete against each other within the school,

and within the school district, without expensive travel costs.

The REC Foundation believes that the design process is the most important thing about robotics competitions. Every team in our program, and this year we will be close to 30,000 teams, gets an engineering design notebook. We expect them to document the challenge, strategize, and build a robot to play the game. I travel all over the world and I always ask the students, "Was your robot perfect the first time?" They all laugh because they've all had lots of failures with their robot. As part of our design process, students are encouraged after a competition to reflect: "This is what went well, and this is what can be improved on." The students will do the technical work, building and programming themselves with teachers helping to facilitate. By having an ecosystem of multiple schools together, the students compete more because they don't have to incur expensive travel costs. Students learn a lot by building the robot and collaborating with their school mates. When they start competing against other schools and other students and see what they built, that's where the creative process and the development process really takes off. This is why we feel that by developing ecosystems our students and educators get the maximum benefit to learn and improve technical literacy. For example, Dallas ISD has over 200 VEX Robotics teams. Dallas ISD will have VEX Robotics competitions with just Dallas ISD schools. So, there's no hotel or other expensive travel costs.

OLLIE: Who's providing the materials to build the robots?

DAN: The materials for our REC Foundation VEX Robotics Competition are VEX Robotics parts and kits. What's unique about our program is that every year when we announce the engineering challenge, we also release an entry level robot design that allows you to compete. Now will you end up winning the Texas State Championship with that design? Probably not. But you can go into a competition knowing that you can compete. The students take this basic design, they go on YouTube, they go on the internet



"Robotics transcends any geography. As robotics has grown and automation has grown, so has the REC Foundation."



and see how other teams approach the challenge and they build more advanced robots. We don't allow custom parts because we want a level playing field from all schools. Whether you're in Dallas ISD, you're in the suburbs, or you're in rural Texas, everybody starts with the same set of parts. Now, that doesn't mean that there aren't different quality levels of robots, but everybody has a level playing field.

OLLIE: So obviously, you have great relationships with school districts. I'm curious to hear about your partnerships, corporations and businesses that you work with.

DAN: We couldn't achieve what we're doing as a Foundation without our corporate partners. A huge shout out to the Northrop Grumman Foundation, which is our presenting sponsor. They invested in us ten years ago and really believed in our programs from the very beginning. They provide funding for operations as well as specific programs. Over the years, we've evolved partnerships with great corporations and organizations including NASA, for example. Each partner brings something unique to the REC Foundation. For instance, Texas Instruments has invested in our Girl Powered initiative. They recognized that there weren't enough women in the STEM workforce. They know that our Girl Powered initiative is a great way to introduce girls to robotics and STEM education. Google sponsors a traveling roadshow, where the REC Foundation takes our Girl Powered workshop to 20 different Google locations throughout the United States. These aren't one-day, one-hour seminars but a two-day workshop. The girls come in and they build and learn to program robots.

Organizations like Tesla, which is one of our newer sponsors, are collaborating with the REC Foundation on our workforce development initiatives. Tesla has invested funds to start robotics teams in every school in the state of Nevada. We are also working with Tesla to build STEM labs for students to learn workforce skills that can immediately be utilized for manufacturing jobs. For example, the students start with a basic robot kit to learn how to build a robot

and do basic programming. By the time they complete our program, they're programming large industrial equipment that is used in factories across the country. Tesla recognizes that this is a great pipeline for what they need for their current and future workforce.

OLLIE: So, it sounds like you guys are representing partners who are very invested in the world in front of you, certainly your presenting sponsor. Have you seen some of your students land at some of these companies?

DAN: Absolutely. There's nothing more exciting than when you go to a competition and there is an excited young engineer or robot technician who comes up to you and says, "Dan! I was in this program six years ago. I had little interest in robotics and no interest in mechanical engineering, but I had so much fun, I ended up going to college. And guess what? NASA has offered me a job." Or, "I'm working for Tesla!" or "I'm working for Northrop Grumman designing aerospace products." We have students all over the world that are working as mechanical engineers, robotics engineers, software engineers, and their first interest in STEM education began with the REC Foundation.

OLLIE: Is Dallas a major center for this?

DAN: Yes it is. However, robotics transcends any specific geographic location. Two decades ago robots were used primarily in manufacturing and did dirty or dangerous jobs such as welding. But now when you visit the doctor, it's very possible that there is a robot in the doctor's office. The robotics industry has grown in ways that I could never have imagined. Robots are not just "industrial" and in tech hubs such as Dallas; even the most rural areas have robotics. And that's where the REC Foundation has had to evolve to expand our reach. Our goal is to show students the basic concept of robotics. Not everyone in our programs will earn a four-year engineering degree or an industry certification in computer programming, but when our students graduate high school, they are still very desirable to all types of employers, including

all the major companies here in Dallas. This is because in addition to technical skills, they have great communication and problem-solving skills. Once these students start these good paying jobs and show their high-value, these companies will often pay for them to go get a two-year degree, then a four-year degree, and ultimately, even advanced degrees.

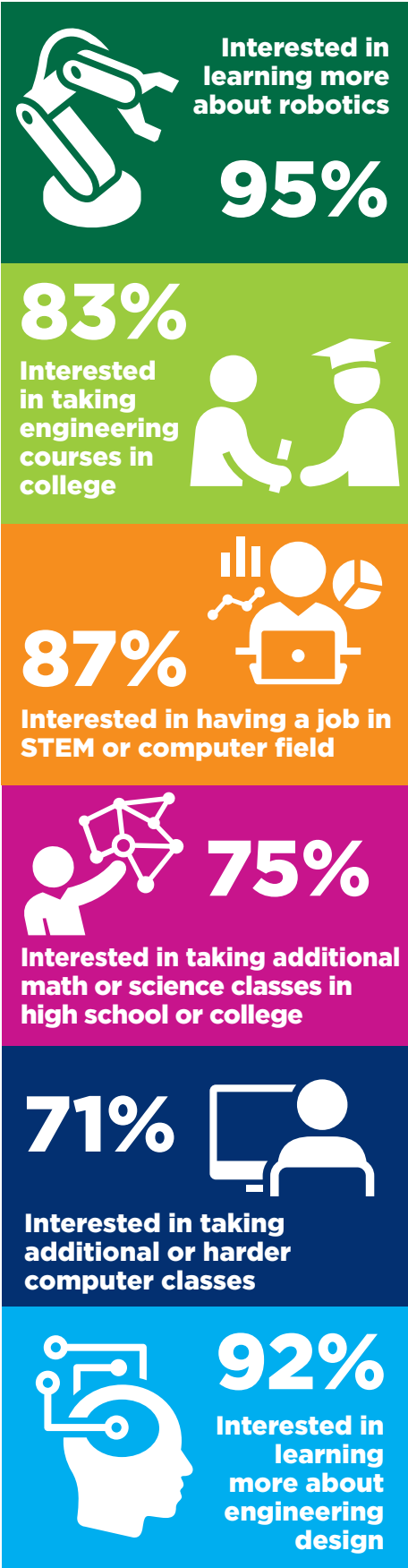
OLLIE: Where else would we find robotics? They're all around us, aren't they? Where else can we find robots?

DAN: Robots, as you said, are everywhere. If we go to any manufacturing facility, you're going to encounter robots that pick things up and move them around. The military is utilizing robots to deliver equipment to soldiers that are in the field. Instead of exposing troops to dangerous situations, robotic vehicles deliver supplies or equipment to minimize risk. We have robots now that vacuum your rugs or mow your lawn. We're just on the precipice of what robots are going to be. We're honestly just touching the surface. Our children will live in a different world where robots are integrated in part of their daily life. However, it's more than just robotics. It's artificial intelligence, data analytics, sensors and more. And as the technology evolves, the REC Foundation evolves with it. It used to be about building a robot but our programs also have a computer programming element. Every one of our competitions has an autonomous mode where the students program a robot and they don't even touch it. So for a minute or two, depending on the competition, the robot runs without driver control. This is an example of the types of real life advance technology skills our program provides.

OLLIE: This is a question that you probably heard many times, what would you say to concerns that robots are taking their jobs or changing the way that they work?

DAN: It's funny because that's the number one question I'm asked. Since the dawn of the industrial age, we've always worried about machines taking jobs. I won't pretend that robots haven't

ATTRIBUTES OF VEX ROBOTICS PARTICIPANTS



"The REC Foundation, from its humble roots of three employees in 2008, has grown to be a multinational organization."

displaced industrial workers, just like the ATMs replaced bank tellers. But overall, society has benefitted. We have more time to travel. Everybody carries around a supercomputer in their pocket that makes phone calls and takes pictures. Most of us use social media and stay in touch with family and friends. This lifestyle was a dream, 15 years or so ago. So, while robots will displace some very repetitive jobs, they'll create new opportunities for even more exciting jobs. That's why it's so important that there are organizations like the REC Foundation because we need to prepare those students for these highly-technical jobs. In published studies, STEM jobs are growing by 20 percent a year. Non-STEM jobs are only growing by 7 percent a year. We must provide all students with opportunities to pursue STEM-related jobs as the non-automated jobs disappear.

OLLIE: Tell me more about other REC Foundation programs.

DAN: The REC Foundation was initially known for our robotics competitions and we have evolved to provide educational support and hands-on learning opportunities, but we are still not reaching all students. Drones reach students that were not interested in mobile robotics. It is another pathway to provide more students access to STEM education. We are excited to launch our Robotics Aerial Drone (RAD) competition this year and are anticipating hundreds of teams to participate.

OLLIE: You are traveling globally. Talk to me more about what you're doing on these trips.

DAN: As I mentioned earlier, although we are based in North Texas, the REC Foundation has a global presence. Other countries, have the same challenges of not having a tech-savvy and educated workforce. I recently traveled to



“The REC Foundation will soon be bringing the next generation of innovators to Dallas where we'll host the world's largest robotics competition.”

PROGRAMS FOR STUDENTS



ELEMENTARY & MIDDLE SCHOOL PROGRAM AGES 8-14

- Computer Programming Included
- Free Curriculum
- Teamwork Matches
- Robot Skills Challenges
- Snap-Together Assembly
- STEM Research Project
- Local, State, Regional, National and World Competitions



MIDDLE & HIGH SCHOOL PROGRAM AGES 11-18

- Computer Programming Included
- Free Curriculum
- Driver Controlled and Autonomous Robot Challenges
- Online Challenges
- Scholarships
- Local, State, Regional, National and World Competition



COLLEGE & UNIVERSITY PROGRAM AGES 18+

- Gain Desired Industry Skills, i.e. Programming, CAD, and Technical Writing
- Longer Autonomous Period
- VEX U Teams Build 2 Competition Robot
- Fabrication of Unique Parts by Machining or 3D Printing

China to attend the Chinese National Championship, a massive robotics competition where Alibaba asked me to speak about the importance of our programs, STEM education, and workforce development. From there, I visited Singapore, where

Google sponsored a three-day REC Foundation-led robotics workshop for under-served students. The REC Foundation will soon be bringing the next generation of innovators to Dallas where we'll host the world's largest robotics competition.

Starting in 2021, 2,000 teams from at least 70 countries will come here to compete for the world title. We'll be bringing in over 40,000 people to the city of Dallas. The event is free and open to the public and we invite all DBJ readers to attend!

DAN MANTZ

Chief Executive Officer and Chairman of the Board

REC FOUNDATION

Dan Mantz is Chief Executive Officer and Chairman of the Board for the Robotics Education and Competition (REC) Foundation, and has more than 25 years of engineering experience, solving complex problems in the software, electrical, and mechanical fields. The REC Foundation is one of the world's leading science, technology, engineering and mathematics (STEM) nonprofit organizations whose mission is to spark student interest and involvement in STEM by engaging them in hands-on, affordable, accessible and sustainable curriculum-based robotics and workforce development programs.

Dan is a highly respected leader and innovator in the robotics industry. He is on the front lines working with educators, partners and more than 1M students worldwide through the VEX Robotics programs that builds interest

and excitement for STEM-related career opportunities. This includes classroom integration and thousands of yearly robotics competitions - including the world's largest robotics competition. These competitions and programs have a big impact in getting more young learners involved in STEM and preparing them for rewarding careers. Through partnerships with Autodesk, Dell, Google, NASA and Texas Instruments and other well-known partners, students are gaining critical skills and hands-on learning to ignite curiosity and passion for innovation. Prior to joining the REC Foundation in 2017, Dan was President of Rack Solutions, a leading developer and manufacturer of data center and IT products. He previously spent 20 years in the industrial robotics industry at FANUC Robotics, first as an engineer and later as Director of Product Development.

ABOUT REC FOUNDATION

MISSION

The Robotics Education & Competition (REC) Foundation's mission is to increase student interest and involvement in science, technology, engineering, and mathematics (STEM) by engaging students in hands-on, affordable, and sustainable robotics engineering programs.

VISION

We see a future where all students design and innovate as part of a team, experience failure, persevere, and embrace STEM. These lifelong learners emerge confident in their ability to make the world a better place.

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