The Emerging Role of Robots in the Construction Industry

Nicholas K. Holmes and Jason Walker

Advances in the field of robotics will lead to the increased use of autonomous robots in the construction industry to improve productivity while at the same time helping alleviate the shortage of skilled labor.

Until recently, the concept of robots working in the construction industry seemed far-fetched, but the idea is rapidly becoming a reality. Unlike factories and warehouses where robots have long been in use, construction sites are a much more difficult and challenging environment. Rather than operating at static locations in an enclosed, climate-controlled building, robots on construction projects will need to be able to navigate through complex, fluid, ever-changing environments.

The Construction Industry is Facing Unprecedented Challenges

There are not enough skilled construction workers to meet the demand. Expanding markets combined with a shrinking labor pool pose a real problem for the construction industry. As Ken Simonson, chief economist for the AGC, recently noted, even as firms in many parts of the country are trying to keep pace with growing demand for construction services, they “are having a hard time finding and hiring enough qualified workers as the pool of available workers remains very tight.” As a result, in March 2018, 248,000 jobs were left unfilled across the United States according to the Bureau of Labor Statistics.

Productivity also continues to be a challenge. According to a recent report by the McKinsey Global Institute, “Reinventing Construction: A Route to Higher Productivity,” the construction industry has an intractable productivity problem. The report found that, since 1945, productivity in manufacturing, retail and agriculture has grown 1,500%, but productivity in construction has barely increased at all.

Advances in robotics may help address both problems.

The Current Generation — Automating Repetitive Tasks

Robots have begun to gain a foothold in the construction industry. Here are three examples of how robots are being used on sites today.

**SAM** — (“Semi-Automated Mason”) — The SAM100 is the first commercially available bricklaying robot for onsite masonry construction. Although masons still need to set up the machine, load the bricks and monitor its output to make sure it is working correctly, the SAM100 performs the hard physical labor of lifting and placing the bricks, laying up to 3,000 bricks in an eight-hour shift. The machine accomplishes this by using a 3D map file of the wall it will be building, along with a laser guidance system.

http://www.construction-robotics.com/sam100/

**CISBOT** — (“Cast Iron Sealing Robot”) — Currently in use by Con Ed and National Grid, the CISBOT crawls through existing cast iron natural gas pipelines and replaces deteriorating joints. Joints are one of the most common points of leaks and failures,
so refurbishing them can extend the lifespan of the pipeline up to 50 years. Because excavation of the pipelines is not necessary, and the CISBOT can work while natural gas continues to flow through the pipes, it is a very cost-effective alternative to replacing an entire pipeline. http://ulcrobotics.com/services/cisbot-robotic-cast-iron-joint-sealing/

TyBot — Created solely to focus on rebar-tying for bridge contractors, an arduous and monotonous job, the TyBot is marketed as a “reliable, flexible and scalable solution for bridge deck construction.” Once set up at a job site, TyBots are able to autonomously navigate a bridge deck; no pre-mapping or calibration is required. In initial tests, a prototype tied more than 24,000 rebar intersections at a rate of 5.5 seconds each. https://www.tybotllc.com/

The Next Generation — It All Starts With Sensors
While impressive, the current generation of robots is only the first generation and has obvious limitations. For example, once the task they are designed to perform has been completed, these robots cannot be repurposed for other tasks and therefore must be demobilized and moved on to another project. In the future, robots will not be tied to a static location and will be capable of adapting to a variety of tasks.

It is easy to envision real life scenarios where the use of a robot would make sense. For example, soon robots may be able to perform the same tedious tasks construction workers get paid to do — tasks such as picking up garbage, or even picking up nails or other metallic materials using magnets. Additionally, robots could prove immensely valuable in terms of safety and preservation of equipment — a nail can harm someone who steps on it and can easily damage or break a piece of equipment that rolls over it.

Let’s say, for instance, that you’re hanging a drop ceiling in a concert hall or some other large venue. Traditionally, this process would involve workers having to drill thousands of holes to serve as anchor points for the drop ceiling. This process, while necessary for the project, is excruciatingly difficult and time consuming.

This is exactly the kind of task that begs to be disrupted by a robot. Tasks that are dull, dirty, repetitive and dangerous are perfect for robots. People don’t like this kind of work because it’s physically painful to perform (running a hammer drill above your head all day sounds more like punishment than work), and it is mentally monotonous. The combination of physical and mental challenges makes it likely that the work will be less than perfect, and because it’s so challenging, people can only do it for a few hours each day, which means it drags on even longer.

A robot, by comparison, doesn’t have any of those concerns. Outfitted with sophisticated sensors, a robot can be programmed to do the same exact task; it can take measurements and drill holes, and can repeat this process for hours upon hours. A robot can lay out a perfect grid of anchor holes, with the last one placed as precisely as the first one. Best of all, the robot can keep working on this task overnight and through weekends, which means when the workforce returns the next day, they can focus on the tasks that require more skill, are more comfortable and ultimately more valuable to the project.

The expansion of autonomous robots in the construction industry will rely heavily on the advancement of navigation algorithms and sensor technology. Currently, the most sophisticated sensors and powerful computers are required for a robot to navigate through a complex, cluttered and chaotic work environment — especially one where other trades are working concurrently.

Despite this, it’s very clear that robots will soon indeed have a role to fill on a construction site — most likely doing the tedious tasks that take place when everyone has gone home for the day.

There’s still a lot that needs to happen before the use of robots will reach their full potential. While the most sophisticated of today’s mobile robots can autonomously navigate through a complex construction site to deliver materials, it is often true that the cost of such a robot is too high relative to the cost of employing a laborer to do it. It will undoubtedly take some time for the costs to come down far enough to get the kinds of ROIs that construction companies are looking for.

However, there’s a bridge from here to there. There are some tasks and some jobsites which have conditions that are benign or predictable enough to be tackled by the robots of today. And if those robots are easy enough to use, so that the workers of today can be the ones that take control of the robots and put them to work when and where it makes sense, then the technology and the workforce can progress together.

The fear that these machines will one day replace humans on the job site is misguided and, quite frankly, unrealistic. The real issue is which robotics companies are going to make robots that are easy and intuitive enough for the workforce to use them? The robotics companies that build those robots will be elevating the skillset of the workforce, thereby making the workers, their companies and their industry stronger. Instead of sending construction workers to the unemployment line, easy-to-use robotic mobility platforms will make construction work more efficient, safer and more productive than ever before.

Endnotes

Nicholas K. Holmes, Esq., Devine, Millimet & Branch, PA Manchester, NH, and Jason Walker, Waypoint Robotics Merrimack, N.H.
Earlier this summer, I attended the Forum’s planning retreat held this year in Lake Winnipesaukee, NH. In addition to the boating, hiking (see my selfie below from one of those hikes), and other team-building activities, the dynamic meeting confirmed that the Forum has a defined strategy to provide meaningful value to its members, to construction lawyers, and to our construction industry partners. There are a lot of exceptional meetings and initiatives coming and I am excited to assist in those efforts as the new Editor of Under Construction. I plan to continuously re-examine this newsletter so that it provides the maximum benefit to our members. I am particularly focused on providing an approachable and helpful resource for our law student and young lawyer members whether through publishing “construction 101” articles and/or through providing publication opportunities.

It is also my honor to welcome our new editorial staff. Under Construction’s new Associate Editor is Neal Sweeney. Neal is a partner of Jones Walker’s construction practice group in Atlanta, GA. We are privileged to have Neal join us given his 30+ year construction law career as well as his extensive editing experience for industry books and publications. In addition to Neal, Under Construction’s new contributing editors are Jean Terry, an attorney with Manion Stigger LLP in Louisville, KY, and Mike Lane, an attorney with Riess LeMieux in New Orleans, LA. Please contact any member of the Under Construction editorial team with suggestions, ideas, or questions.

Tom Dunn, Pierce Atwood LLP, Boston, MA and Providence, RI
Q&A with Outstanding Forum Member—Jayne Czik

Tom Dunn

If you have not had the chance to meet Jayne Czik, General Counsel for Citnalta Construction Corp., you should. I was lucky to be her Associate Editor for the past three years. Her exceptional leadership and editorial skills will be missed but I am extremely grateful that I had the chance to work in a collaborative manner with Jayne. Before I let her off the hook, I asked that Jayne share some of her experience with us.

Why and how did you become a construction attorney? Throughout law school, I had hoped to go into international law. Although I was an Editor of an International Law Journal, I didn’t truly understand what practicing international law was until I worked as an associate at a firm that focused on international trade law for over a year. In 1989, disillusioned by practicing international trade law, I began working for a construction company owned by my father that performed as a general contractor or as a mechanical contractor on large-scale public sector projects. Ultimately, my father retired and we closed the family business, but I have been practicing construction law, primarily in the public sector, since 1989.

What best prepared you for serving as in-house counsel for Citnalta Construction Corp.? Prior to working at the Metropolitan Transportation Authority Capital Construction (MTACC), from 1995 to 2002, I was the editor of a newsletter “Construction Company Strategist,” published by Brownstone Publishers. This continues to be one of my most valuable work experiences. Construction Company Strategist provided articles focused on practical business management and legal strategies for construction company professionals, engineers, architects, owners, government employees, surety professionals, and attorneys. I spent most of my time identifying problems faced by construction companies and writing articles that provided solutions.

The first organization I joined when I began editing The Strategist was the ABA Forum on Construction Law. At every Forum Meeting, I came away with great article ideas and great sources to quote and use as references. The second organization was the Association of General Contractors where I spent time interviewing and listening to contractors talk about their problems.

From writing the newsletter and spending so much time learning what contractors’ problems — both big and small — were, I was prepared to become a General Counsel.

What role has the Forum had on your practice? The Forum has played a very significant role not just in my practice as General Counsel, but also in my professional life since 1992. Several of the Board members for The Strategist were ABA Forum members including Robert Rubin, Stan Sklar, and Andy Ness. I developed relationships with attorneys I met at the Forum, who became key contributors and “sources” to the newsletter as well as who became dear friends. I would be remiss if I didn’t mention my relationship with Bob Rubin, Jeff Cruz, Robbie McPherson and my brother Tom Czik who were not only Forum friends, and strong contributors to The Strategist, but also great resources when I worked at MTACC.

By the time I went to work at MTACC in 2004, the Forum was a significant part of my life. Once I was at MTACC, Forum membership provided me access to attorneys nationwide who were knowledgeable not only on construction law but even in specialty subcontractor and supplier issues. I was always able to call on a Forum member when an insurance or surety question arose. Even though the MTACC had a large legal team, it was often helpful to brainstorm on issues with a Forum friend in another jurisdiction to get a reality check.

How have the past six years been as the editor of Under Construction? Being Editor has been a wonderful opportunity. It enabled me to work with the authors and stay abreast of the hot topics in construction law nationwide. I also had the opportunity to work with two very talented Associate Editors. First, Ridgely Jackson, who is a very strong writer and a very interesting and inspirational individual, then with Tom Dunn who has been my Associate Editor for the past three years. Tom is one of the most organized and creative individuals I have ever met. I learned quite a lot from Tom about developing article content and organizing the newsletter content.

Any suggestions for the next editorial team of Under Construction? How would you like to see the publication evolve? Since it is so difficult for many attorneys to travel, I would like the Forum to continue to serve as a tool to help Forum members feel connected to the Forum. I think sharing personal experiences and profiles helps. I also like the features where attorneys get tips on improving diversity and helping young attorneys develop.

What do you enjoy doing outside the office? Now that my kids are 19 and 25, I consider any time I get to spend with them a treat. Also, since it’s hard for me to both sit still and quiet my mind, cycling and yoga provide the perfect antidote. I try to make both activities a regular part of my life.

Thank you for everything, Jayne!
It’s Already Here — Integrating Technology in Your Business’ Contracting Process

Khanh M. Josephson

As the frequency of technological disruption increases, the expectations for increased speed, improved efficiency, and consumer value rises. These higher expectations apply equally to corporate law departments providing legal counseling and services to their clients and customers. Corporate law departments in the construction industry can take advantage of technology in their contracting process just as architects and engineers first did with AutoCAD in the early 80s.

Benefits of Using Technology

Corporate law departments can benefit tremendously by adopting technology in their contracting process. A contract lifecycle management (“CLM”) tool can provide methodical management of a contract from initiation through award to retention and renewal. Implementing a CLM can provide benefits such as (i) an automated approval process, where designated approvers can approve a contract electronically within minutes on their portable device assistant (“PDA”); (ii) the ability to generate data and metrics, which can be used to evaluate the current state of contracts (including volume, cycle time, and risk analytics) and use that data to improve processes; (iii) a centralized document repository, which reduces risk of lost contracts or time searching for contracts; (iv) integrating artificial intelligence to perform a review and analysis of the contract; (v) eliminating repetitive tasks through an application programming interface (“API”) with other tools within the business (such as an accounting software); (vi) integrating an e-signature platform to allow for auto-upload of the executed contract into the CLM tool; and (vii) eliminating the need for storage of hard copy contracts. Implementation of a CLM tool can result in costs savings, improved efficiency, and risk mitigation to the business.

Electronic signatures are another great use of technology. On June 30, 2000, the Electronic Signatures in Global and National Commerce Act (“E-Sign Act”) was signed into law. The E-Sign Act codifies the validity of electronic records and signatures for transactions in commerce. As a result, requiring wet signatures on contracts between owners and general contractors or between general contractors and subcontractors is not necessary. In addition, e-signatures can reduce non-compliance risks by preventing changes to the contract, thereby maintaining the integrity of the contract being signed. Using e-signatures reduces the paperwork burden for everyone in the chain, from the customer to the salesperson and the law department. E-signatures save a significant amount of time by eliminating the need to chase down signatures, thereby allowing staff to focus on more value-added tasks such as selling and negotiating. With the use of e-signatures, an executed contract can be achieved in minutes, as there is no reliance on snail mail delivery. In a competitive business environment, where customers have many options to take their business, closing the deal in less time means competitive advantage. Finally, digitizing the contracting process is sustainable and eco-friendly since it eliminates pen and paper.

A third option is integrating artificial intelligence (“AI”) to perform mundane or redundant tasks. If a contract is adequately digitized, then AI can extract data that is important to the business and use that data to evaluate risks and make decisions, such as whether any terms may need to be modified or negotiated, whether to renew the contract, or whether to increase the price. Using AI in the contracting process saves time by transferring the contract review from your legal professional to a machine, which then allows your legal professional more time to focus on customer-centric activities such as relationship building. In addition, using AI in the contract review process provides consistency in the analysis of the contract, rather than subjective opinions by legal professionals who may be analyzing the contract based on different criteria.

Businesses Have Benefitted from the Adoption of Technology

In 2014, the Americas Law Department of KONE, a global vertical transportation provider, embarked on a 3-year total quality project to develop, test, and deploy a collaborative solution that combined the Company’s Shared Services Center and Contract Management contracting processes. The result was a customized CLM tool that: functions with 2 workflows — one for each team — in a single transparent record, serves as the contract repository where the business and other teams, such as litigation, can access the executed contract, and produces data and analytics to support continuous improvement and help solve business problems. In addition to implementing a CLM tool, KONE’s Law Department partnered with an e-signature platform provider to implement an electronic signature process to increase the speed, ease, and efficiency for its customers to sign contracts. KONE has received contracts executed by its customers within minutes.

In July 2014, Skanska, a national general contractor,
implemented an e-signature platform for execution of all contracts with their subcontractors. “Our very first contract was signed within 37 minutes,” said Linda Turtteltaub, Skanska Legal Counsel, who played a key role in the implementation of e-signatures at Skanska. In addition to speed, Skanska saved on express delivery costs, paper costs, and the administrative labor involved in processing hard copy contracts. Skanska and its subcontractors have had such a positive experience that Skanska plans to expand e-signatures to change orders and payment applications.

Stiles Corporation, a full-service real estate development and construction firm based in Ft. Lauderdale, Florida, took a deep dive to determine how they could save time in their contracting process. Kris Lengieza, Stiles’ Vice President of Operational Excellence, discovered that by linking their project management software with an e-signature platform, Stiles reduced its contract cycle time from 40-45 days to less than 14 days. Once the contract was created, assembled, and ready to execute, the project management software pushed the contract into the e-signature platform, which then delivered the contract to the recipients for signature. By combining these two technologies, Stiles’ executives could sign contracts remotely, the corporation saved on the costs of paper and storage of hard copy contracts, both signing parties had the security of knowing the contract could not be changed unilaterally, and most importantly, Stiles sped up its contract processing time.

**Adopting Technology Is Critical for Your Business**

Your business can benefit greatly by adopting technology in the contracting process. But first it will require a change in mindset. Unlike other industries, construction companies have been slow to adopt technology in the contracting process, especially within their procurement and law departments. The business needs to understand that wet signatures and hard copies are not required by law and demanding these outdated options increases the cost of doing business. Procurement and law departments must recognize that they need to provide competitive advantage and value-added services to their clients, just like the rest of the business. Any contracting process that slows down the ability to conduct business, creates inefficiencies, or prevents opportunities to lower fixed costs needs to be improved. Improvements and benefits can come through the adoption of technology.

**KHANH M. JOSEPHSON, Sr. Counsel, KONE Inc., Lisle, IL**

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**ON NOVEMBER 9, 2018,** the ABA Forum on Construction Law will present Infrastructure from the Ground Up: Civil Works Projects for Lawyers. This program will include presentations from leading industry professionals in four convenient locations, covering critical technical and legal issues vital to handling a civil works project. The range of topics will include multiple infrastructure sectors, including transportation, water, environmental, wastewater, geotechnical, power, and solid waste. Please join us for this unique program in Atlanta, GA, Columbus, OH, San Francisco, CA, and Washington, DC. Registration for the program will be available online at [https://www.americanbar.org/groups/construction_industry.html](https://www.americanbar.org/groups/construction_industry.html) beginning August 6, 2018.

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I think the Forum on Construction Law is doing great. Bar Year 2017-18 was a record year in attendance for us at our national programs. We provided first-rate continuing legal education at three national programs, a day of regional programs around the country, at the trial academy that had a waiting list to get in, with our webinars and podcasts, and in our fantastic periodicals “Under Construction” and “The Construction Lawyer.” The “Forum Flash” continues to be an excellent way to communicate with our members in one notification that eliminates countless e-mails to people. Many of our 14 divisions engage in substantive conference calls of topics of interest on a monthly or bi-monthly basis with their members. Some of our divisions have newsletters or blogs that provide information on topics of interest to the division members.

We are proud of our diversity efforts which include having an honored special diversity speaker at every national program. We provide scholarships and fellowships that create opportunities for diverse lawyers to attend our meetings free of charge and increase opportunities to get actively involved in the Forum. We even leave something behind at every national program as we donate amounts typically between $3,000.00 and $5,000.00 in volunteer contributions to a local food bank, just by passing the bucket at lunch time.

So are we doing great? This year we are going to take a thorough review of our diversity efforts. It is not uncommon for an organization like ours to think it is doing great without knowing whether it can do better. We are in the process of recruiting an outside consultant who will do a top-to-bottom analysis and review of our diversity activities and efforts. This will be a diversity and inclusion assessment of our organization and our culture and will provide recommendations to improve our actions. We expect to develop a meaningful long-term and short-term diversity and inclusion strategic plan as a result.

So are we doing great? In June of every year, the Governing Committee, Division Chairs and Editors of our publications get together for several days to discuss strategic planning and other matters. It is from these leadership retreats that many improvements within the Forum have been created. The Forum got into the book publication business as a result of discussions at a retreat. More recently, we created Division 13, the Government Construction Committee, out of discussions that occurred at a retreat. We engage in analysis, strategic planning and critiques of our performance at these retreats so that we can maximize our efforts to be the leading organization for construction lawyers in the world. This year, we have tasked all of our committee chairs, division chairs, publication editors and others with developing protocols for their organizations that will be reviewed and critiqued by others so that we can create working documents for those that come after us to utilize in maintaining and enhancing their activities in the Forum. We want to get away from the days of new leadership always having to recreate the wheel but rather have information that allows them to know how things get done, know what they are expected to do and create opportunities for them to do more.

So are we doing great? We need to look towards our future. We need to undertake a concerted effort to increase our membership of young and diverse lawyers. In this regard, I have appointed a task-force that will develop an action plan to do so. It will determine how to use social media, how to connect with young lawyers, and how to be extremely relevant to young lawyers in these ever-changing times in our profession. We know that young lawyers do not join trade associations like ours as readily as older generations did. We know that we have to convince young lawyers of the value in joining the Forum on Construction Law. We know that we need to use technology, social media and other tools to convince young lawyers to join and become active in the Forum on Construction Law. It is expected that the task-force will work diligently in creating an action plan that will be presented to the Governing Committee for approval soon.

So are we doing great? We are well into planning for this coming bar year for our three national programs and one day of regional programs. Our Fall meeting will be in Montreal, Canada on October 4-5, 2018 and will focus on the role of the owner from the perspective of all parties to the construction project. Our mid-winter meeting is in downtown Los Angeles, California on January 31-February 1, 2019 and will focus on public construction law issues. It is the first time we are bringing a public construction law program to the west coast. Our annual meeting will be on April 25-27, 2019 in Hollywood, Florida (yes after Los Angeles, we are going to Hollywood) and we will deal with natural disasters and the lawyer’s role in connection with representing clients preparing for natural disasters and addressing the effects of natural disasters afterwards. Our regional programs will be on November 9, 2018 in San Francisco, Atlanta, Washington, D.C. and Columbus, Ohio. Live speakers in each city will address infrastructure projects, a topic of great interest at this time. Roads, bridges, tunnels, treatment plants and other types of infrastructure projects will all be discussed and we are including an analysis of key legal issues affecting infrastructure projects.

So are we doing great? I think so. Can we do better? You betcha!

Thomas L. Rosenberg, Chair-Elect, Roetzel & Andress, Columbus, OH
Program Team - Co-Chairs: Nicholas D. Siegfried, Siegfried, Rivera, Hyman, Lerner, De La Torre, Mars & Sobel, P.A., Richard G. C. Wong, Osler, Hoskin & Harcourt, LLP, Governing Committee Liaison: Nicholas K. Holmes, Devine, Millimet & Branch, P.A.

Just like Montreal’s Mount Royal, this program takes a 360° view of a project and focuses on what it takes to build a successful project team and how to address the inevitable challenges that arise. Topics include the following:

- project delivery: who’s using what, and the implications for your project
- public private partnerships (PPP)
- effectively assessing risk and negotiating contract and subcontract clauses
- construction financing and insurance/bonding
- tips and best practices in proactively addressing delays and disputes as the owner
- effective dispute resolution tactics and technical considerations when facing the owner
- grappling with corruption in procurement and construction ethics and evolving practices

We are also honoured to host a special fireside conversation with former Chief Justice of Canada Beverley McLachlin, the longest serving Chief Justice of Canada and a former co-author of The Canadian Law of Architecture and Engineering.

But there is MORE!

- stay right in the heart of the City, steps from historic sites and charming Old Town
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