Construction Robots - The Way of the Future is Already Here, *by Andrew L. Smith, Esq. and Cynthia Rouse*

Fifty-five years ago, the cartoon "The Jetsons" presented a space-age family complete with George, Jane, Judy, Elroy, a dog named Astro, and last, but not least, a robot-maid named Rosie. The family lived in Orbit City in the year 2062. Well, according to my Apple Watch it is not yet 2062, but the robots are definitely already here. In fact, McKinsey & Company, a global consulting company, estimates by 2025 more than half of the U.S. economy will be automated.

Construction is a $10 trillion worldwide industry. It is also plagued by waste, worker shortages, and weak productivity growth. Since 1945 productivity in the manufacturing, retail, and agriculture sectors has grown by 1,500%, while construction growth has remained stagnant. These factors create an excellent opportunity for technology, including drones, autonomous vehicles, and – the focus of this article – robots, to help change the construction world. Indeed, the use of robots in construction has an anticipated market value estimated at $127 billion, according to a PricewaterhouseCoopers 2016 report.

A Few Examples

A Brick-Laying Helper

Construction Robotics, a New York-based engineering company, created "SAM," which is short for Semi-Automated Mason. Comprised of a conveyor-belt, mortar pump, and robotic arm, SAM is pretty nifty. One worker helps feed the bricks into the machine, which are then grabbed by the robotic arm, covered in mortar, and placed on the wall. A second worker will then follow and smooth over any excess joint mortar.

The SAM100 is a brick-laying robot, having already laid literally tons of bricks across the country on various industrial building and school projects. Under optimal conditions, SAM can lay up to 3,000 bricks per a day, while a human can lay between 600 and 1,000. As just one example, while SAM was working on the Shenandoah University jobsite in Virginia, it set a world record for the most bricks laid in an eight-hour period, totaling 3,270!

According to Construction Robotics, SAM has improved a mason's productivity three to five times over and saved labor costs by at least 50%. SAM can work collaboratively with human workers, improve the ability to plan and quote jobs, and decrease injuries and safety concerns. For a cool $500,000, a SAM100 can be all yours.

A Robot Tractor

Built Robotics is another example, having raised over $15 million in start-up funds. Started by an ex-Google engineer, this company is building self-driving tractors at its San Francisco headquarters.

The tractor uses LIDAR and GPS to get around, similar to self-driving cars. The robot can excavate holes for building foundations. For instance, it would take a crew of humans up to three days to finish a 30-by-40-foot excavation at a depth of two feet. Built Robotics claims its machine can finish this project in one day.

The company expects the products will be available for residential construction projects in 2018.

3D-Printed Homes

A Chinese company, Winsun, is using 3D-printing technology to actually build, or "print," homes and other structures. Using a special ink made of concrete, sand, and fiberglass, together with a proprietary hardening additive, the printer adds layer by layer to print walls and other components at its factory to construct homes and buildings. The machine is 20 feet tall, 33 feet wide, and 132 feet long. A CAD drawing is then fed to the enormous 3D printer to fabricate each structure piece-by-piece using the "ink."

Winsun started building homes in 2015 and is now building apartment complexes such as Suzhou Industrial Park in China's Jiangsu Province. Winsun is also responsible for the first 3D-printed office building opened in Dubai in 2016.

Current Legislation

In 2017, 33 states have introduced legislation governing autonomous vehicles. Eighteen states: Alabama, Arkansas, California, Colorado, Florida, Georgia, Louisiana, Michigan, New York, Nevada, North Dakota, Pennsylvania, South Carolina, Tennessee, Texas, Utah, Virginia and Vermont, and Washington D.C., have passed legislation related to autonomous vehicles. Governors in Arizona, Massachusetts, Washington

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and Wisconsin have also issued executive orders related to autonomous vehicles.

Arizona's governor signed an executive order in August 2015 directing various agencies to "undertake any necessary steps to support the testing and operation of self-driving vehicles on public roads within Arizona." He also ordered the enabling of pilot programs at universities and developed rules to be followed by the programs. The order established a Self-Driving Vehicle Oversight Committee, as well.

Michigan's statute limits liability of vehicle manufacturers for damages in a product liability suit resulting from modifications made by a third-party to an automated vehicle or automated vehicle technology under certain circumstances. The law says that if an autonomous vehicle's operating system is at fault for a collision, then the manufacturer is responsible.

Tennessee's regulations prohibit local governments from banning the use of motor vehicles equipped with autonomous technology.

These are just a few ways self-driving vehicles are being regulated. We certainly expect the broader concepts of automation and robotics to be regulated in a comparable manner. However, there is no current legislation in place specifically regulating the use of robots in the construction industry.

Will Robots "Doom" the Insurance Industry?

A number of questions currently exist on whether Tesla and the rest of the self-driving car industry will "doom" the personal lines automobile insurance industry. These same questions will begin to surface as more and more of the construction industry becomes automated, and workplace accidents and claims decrease. However, the robots will still need human assistance. By way of example, SAM100 still needs at least two human counterparts to build a brick wall.

Likewise, computers and robots will still make mistakes. As we have seen with autonomous vehicles, the "smart" machines will still get into accidents, even if the accidents are the fault of a human. Just recently, a driverless shuttle in downtown Las Vegas was involved in a crash just hours after it was launched.

Many people are also familiar with the Florida Tesla fatality incident in 2016. Joshua Brown, an Ohio entrepreneur, was driving along a Florida highway in a Tesla Model S that had been switched to autopilot mode. Unable to distinguish the white 18-wheeler making a turn against the brightly lit sky, the self-driving system failed to apply the brakes, resulting in Brown's death. At the time, he was watching a Harry Potter movie on the TV screen.

In a press release, Tesla said the incident was a tragic loss, but noted that it was the first fatality in 130 million miles of Autopilot driving. The company compared that to regular driving, which incurs one fatality per 94 million miles in the US. Tesla also stressed that the self-driving feature is still in the beta testing phase, and is only designed to be semi-autonomous. Drivers are instructed to keep their hands on the steering wheel in case of a software hiccup.

Liability and Accident Cost

The number or claims and incidents will certainly decrease as the use of robots continues to grow and technology improves. However, the potential cost of each claim could drastically increase due to the costs of the robots and machines to be used on jobsites. The SAM100 as just one small example costs around $500,000 per machine.

New issues in assessing fault will be created. Difficulties will arise in pointing the finger and determining who to blame. Fault-shifting may come into play. For example, the Association of California Insurance Companies is advocating just this with autonomous vehicles. The group is asking "for changes clarifying that the autonomous vehicle's manufacturer retain all liability for damage, losses or injuries caused by the operation of these vehicles." The onus could soon be on the robot product and software manufacturers to disprove liability in these complicated scenarios.

Possible Defendants

Think of all the potential defendants robotics litigation could entail. Insurers will need to consider evaluating the following:

- Owners could be sued for negligent operation, or training/hiring of a pilot, operator, or driver. In addition, renters, lessors, and anyone else borrowing the robot at issue may be implicated. These machines are expensive and manufacturers are offering a variety or lease and rental options.

- Pilots, operators, or drivers could also be sued for his or her own negligence.

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- Product, software, and component manufacturers and installers will also need guard against suits for software malfunctions, design and manufacturing defects, inadequate warnings, breach of warranty, or failure to comply with to-be-determined safety standards.

- Operation training facilities may be subject to liability.

- Use of robots could be deemed an ultra-hazardous activity and subject to strict liability.

Use in Claim Investigations

According to Cynthia Rouse, Claim Director for Old Republic Contractors Insurance Group, while construction robots are literally changing the landscape of construction, so too, are they changing the landscape of claim investigation and documentation. Until recently, the primary tools utilized to investigate a claim were cameras, measuring equipment, and recording devices. Although those tools were effective, they left gaps in the investigative process. It can certainly be difficult to reflect the actual depth, width, or height of an area with a two-dimensional picture and a ruler. Sometimes, it is even more difficult to convey those images and measurements to other parties.

Thanks to robotics and automation, there are many additional options in the investigative tool box. There are drones that can assist in visually inspecting the exterior of buildings, large construction sites, and roadway builds. Drones offer an entirely different perspective of a loss location and this can be useful when assessing everything from damages to liability.

In addition to drones, very detailed 3D imagery can be obtained through point cloud data. In seconds, millions of accurate measurements can be captured through the use of 3D laser scanners and converted into a virtual duplicate 3D image of all visible structural components, landscape components, and mechanical components. As a result, this data information can produce very detailed 3D imagery or 3D animation of accident sites or occurrences. If the data is obtained immediately, post-accident, there is a preservation of the of loss site through a 3D image. This can be utilized at a later date to recreate the loss in a way that no two-dimensional photograph can reflect. Instead of passing around dozens of photographs to depict an accident scene, a 3D image, model, or animation will provide the viewer with a more accurate and detailed view of a loss site, accident scene, or damages.

At best, witness memories fade. At worst, those memories morph into entirely different fact interpretations. What better defense than tools that can take the viewer virtually to the loss site and allow the viewer to personally experience the landscape, structures, and factors at play on the date of the loss?

Conclusion

The future is here! Robotics and automation in all forms of construction are starting to take form. The potential legal and insurance issues are endless and will be refined in time. How will courts and juries assess fault in robotics accidents? How will existing insurance policies handles robotics claims? Be sure to stay abreast of the changes in construction technology.

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