Construction and autonomous vehicles — Considerations for increased adoption

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Autonomous construction equipment is already being deployed to job sites. Unlike a parking lot or busy highway, construction sites are highly controlled and fixed geographic locations that have clearly delineated boundaries. Within these boundaries, trained personnel operate in an organized and safety-conscious manner. This creates an opportunity for deployment of autonomous vehicles with varying degrees of autonomy.[1] Tightly structured and well-ordered construction sites allow partially autonomous vehicles and equipment to be deployed in order to increase efficiency and improve safety.

Start-ups like Built Robotics and SafeAI, and larger industry players like Caterpillar and Komatsu, have developed autonomous equipment to work on construction sites. The COVID-19 pandemic and associated social distancing mandates have served to accelerate the pace of development of autonomous equipment. Caterpillar boasts the largest fleet of autonomous haul trucks. In six years, these vehicles hauled two billion metric tons.

Built Robotics' automated bulldozers and excavators have logged 10,000 hours of autonomous operations without a recorded safety incident and currently work on oil and gas, water distribution, and infrastructure projects across the United States. The rapid development of autonomous machinery, coupled with their successful use on construction sites today, means widespread use of autonomous equipment on construction sites is inevitable.

In this article, we highlight areas for stakeholders to consider in the development and adoption of autonomous vehicles in construction sites.

Contractual risk consideration

Autonomous construction technology represents transformative innovation. Its increased use will result in industry and legal disruption. Owners, equipment suppliers, contractors and subcontractors must be prepared to implement and leverage the use of autonomous machines on construction sites. The disruptive impact of autonomous construction equipment will likely result in a fundamental shift in how construction firms approach owning/contracting for equipment. As a result, autonomous machinery is also

expected to disrupt the traditional approach to construction contract negotiation, risk-sharing and liability.

In this changing paradigm, insurers will require consideration of their traditional insurance coverage models and approaches as autonomous equipment and machine use increases. In this context, considerations around how to quantify risk, address questions of liability allocations, and pricing insurance premiums are likely to prevail.

The changing perspective of owning construction equipment

Autonomous software guiding and controlling autonomous equipment is far more valuable than any individual piece of equipment it may control. As a result, akin to the movie rental industry, economic forces and the need to protect intellectual property may require industry players to accept something less than full ownership of a piece of equipment. Much like a piece of computer software, an end user may own a physical copy but uses the actual software as a licensee, not a property owner.

As the use and acceptance of autonomous construction equipment increases across construction sites in the near future, industry players will have to be flexible and creative about what ownership means. This may mean moving away from traditional purchase and sale agreements for equipment and moving toward a licensor/licensee model, where end users can negotiate for stronger technical and maintenance support while licensors are able to protect their intellectual property and fully monetize the value of the software they developed.

However, even this type of model comes with risk. From exclusivity arrangements to a power imbalance between licensor and licensee, construction firms, AI developers and their legal counsel must clearly delineate responsibilities, repercussions for contractual breaches and liabilities for both end user mismanagement and autonomous system failures.

Privity and product liability risks

Even without a radical shift in ownership models, the increased use of autonomous construction equipment will require meaningful changes to how parties view, assess and allocate legal risk. The entry of autonomous software developers into the construction industry will add an additional layer of product liability risk that has to be identified and insulated against.

A defect within the connected and autonomous vehicle used on a construction site could cause delays on an interconnected construction site. Delays caused by software failures or malfunctions can have serious consequences for the contractor deploying the autonomous equipment. As a result, parties negotiating for the use of autonomous systems should consider the intersection between contractual privity and limitation of liability clauses in order to limit exposure to risk, while identifying who will bear responsibility for issues and disputes related to the performance of autonomous equipment. Finally, expanding indemnity clauses or stipulating that contractors and/or

autonomous software developers carry robust insurance coverage are other potential risk mitigation strategies to hedge against autonomous performance risks.

Insurance partnerships and data risks

At baseline, industry players will have to work closely with insurers to develop policies and products that fully encompass the traditional and novel risks inherent in deploying autonomous equipment to a construction site. Specifically, industry players must ensure that insurance polices cover novel perils like an autonomous system malfunction, and even cybersecurity breaches compromising an autonomous system.

As autonomous systems become smarter and more capable, insurers will need data to effectively quantify, price out and develop commercial insurance products and coverage options. Specifically, insurers will need significant amounts of real world data. Autonomous software developers, construction firms and insurers have an opportunity to generate synergy by exchanging data that insurers need to develop products, while obtaining the kind of insurance coverage required to foster further innovation in this sector.

In addition to assisting insurers, this data can be used by developers to further improve autonomous systems. As a result, the data generated by autonomous systems is valuable and must be protected. Software developers and construction firms will need to collaborate on contractual provisions that obligate both parties to develop appropriate safeguards that reflect the significant value of data generated by autonomous construction equipment. Finally, as autonomous equipment and smart sensors and devices transform construction sites into data-driven workplaces, industry players will have to consider privacy concerns, cybersecurity and data ownership when negotiating construction contracts.

Takeaways

The above risks will evolve as use of autonomous construction equipment becomes universal across construction sites. The increased use of autonomous construction equipment will likely pave the way for the automation of construction workflow altogether, involving the synchronous co-ordination of multiple machines and different types of devices, creating a data-driven site capable of improving productivity while minimizing execution risks and site hazards.

Smart concrete testing companies have developed sensors capable of testing, analyzing and assisting in the production of concrete. Solutions like these represent the foundation for future data-driven construction sites. Coupled with autonomous construction equipment, technology like smart concrete testing sensors could exponentially increase the overall safety and quality of a construction project. That being said, automated construction workflow will create new challenges and generate new risks. More importantly, this emerging facet of automation will require developing and negotiating standards for digital data, cybersecurity frameworks and data protection protocols.

A proactive approach to the rise of autonomous solutions in the construction industry will best position those looking to take advantage of the productivity and efficiency

improvements offered by these solutions. As discussed, the rise in deployment of autonomous solutions will likely disrupt the traditional approach to construction contract negotiation, risk-sharing and liability. Further, there is a growing need for digital data management and to develop standards for safe and effective autonomous operations in this sphere.

Involving legal advisors at an early stage can help improve outcomes and minimize potential issues inherent in utilizing autonomous equipment and machinery.

Taking action early is often a key factor to making a successful transition in a time of industry transformation.

BLG's Autonomous Vehicles group

With broad industry experience and particular expertise in the development of autonomous solutions in the construction industry, BLG's Autonomous Vehicles group is here to help clients navigate the opportunities and challenges this revolutionary era of autonomy is expected to bring.

[1] The six levels of autonomy as defined by industry leaders and Transport Canada group autonomous vehicles can be summarized as: Level 0 (no automation); Level 1 (driver assistance); Level 2 (partial automation); Level 3 (conditional automation); Level 4 (high automation); and Level 5 (full automation). The Society of Automotive Engineers developed this six-level taxonomy.

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