



The Future of Machine Control



An original report exploring where we are, where we're going, and how we'll get there

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Luc Le Maire
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Introduction

It's no secret that the construction sector is a traditional one. A slow-moving industry that's resistant to change, it has lagged behind its peers in manufacturing when it comes to technology adoption. And while construction has never had a large margin for error, it is quickly running out of whatever wriggle room it had.

The global population is growing rapidly - with it projected to tip the 10 billion mark by 2100 - and, as a result, infrastructure demands are higher than ever. Contractors are under enormous pressure to deliver projects on time and on budget, with both of these elements ever shrinking, and competition is rife. Throw into the mix the growing need to work more sustainably, a shortage of skilled personnel and the rising cost of fuel and materials, and the construction sector finds itself in an unenviable position.

We're reaching a breaking point, and it's clear that radical change is needed if we're to futureproof the sector. One tool that can go a long way to addressing these issues, as this report will demonstrate, is machine control. By accurately positioning machinery on jobsites and automating their movements to accomplish work based on approved design layouts, it helps teams do jobs faster, more accurately, with less fuel, and with fewer and less skilled people. But it's hugely underutilized. Why?

We set out to build a picture of machine control from the point of view of those in the position to implement it. For this report, we surveyed 1,000 managers, directors and business owners from construction companies in markets across Europe to find out how they're currently using machine control, their understanding of the benefits, what they believe to be the barriers to adoption, and their predictions for its future. We also gathered their perspectives on sustainability, the skills gap and the government's role in automating the sector.

What the research has revealed is an industry that is waking up to the power of automation in driving the sector forward, but which appears to be held back by a lot of red tape. What's evident is that if we want to make positive change - meet net zero, attract the next generation of talent, be more profitable - we cannot do so in isolation. If we're to realize the full potential of machine control and do what's right for the industry, a commitment is required across the board.

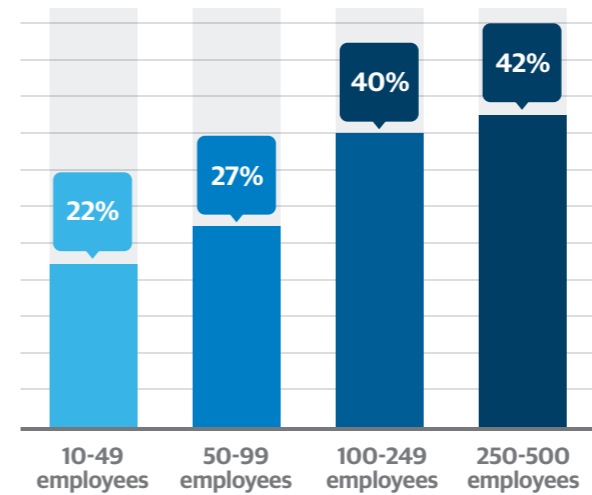
The Lie of the Land

Rates of adoption and what's slowing it down



Our research shows that contractors are by no means strangers to machine control, with all but 3% of respondents claiming to use automation in some capacity

This diversity is most apparent when we look at the average percentage of projects using machine control by company size:



What's the current rate of machine control adoption?

Modern methods of construction are increasingly held up as the solution to creating more productive, scalable, sustainable construction workflows. However, this growing understanding is yet to translate into adoption of technology on a broad scale.

Industry outlooks and sector analyses regularly highlight the technologies that will define the sector in the coming years, yet there is less reported on the challenges faced by those whose job it is to implement them on site. Barriers including the cost of purchasing hardware and software in the first place, the expense of training teams to use the technology, and fears over the impact of this technology on the labor market are all powerful forces affecting executives' decisions over whether to embrace change or push on with the status quo.

We conducted this research so we could better understand the support that the industry needs to get the most out of the technology that could transform it for the better.

Construction emerged from the pandemic better acquainted with the benefits of digital, but there is a long way to go. So, how far has the industry embraced machine control, and what's stopping it from going further?

Our research shows that contractors are by no means strangers to machine control, with all but 3% of respondents claiming to use automation in some capacity. However, half (46%) are using it on less than a quarter of their projects, suggesting that, for many, their experience with machine control is still in its infancy or confined to certain types of projects or applications.

At the other end of the scale, though, around 1 in 5 (17%) respondents are using machine control on 51-75% of projects, while a small but not insignificant portion (7%) are employing it on the vast majority (75-99%). There were also 12 respondents (1%) who reported using the technology without exception.

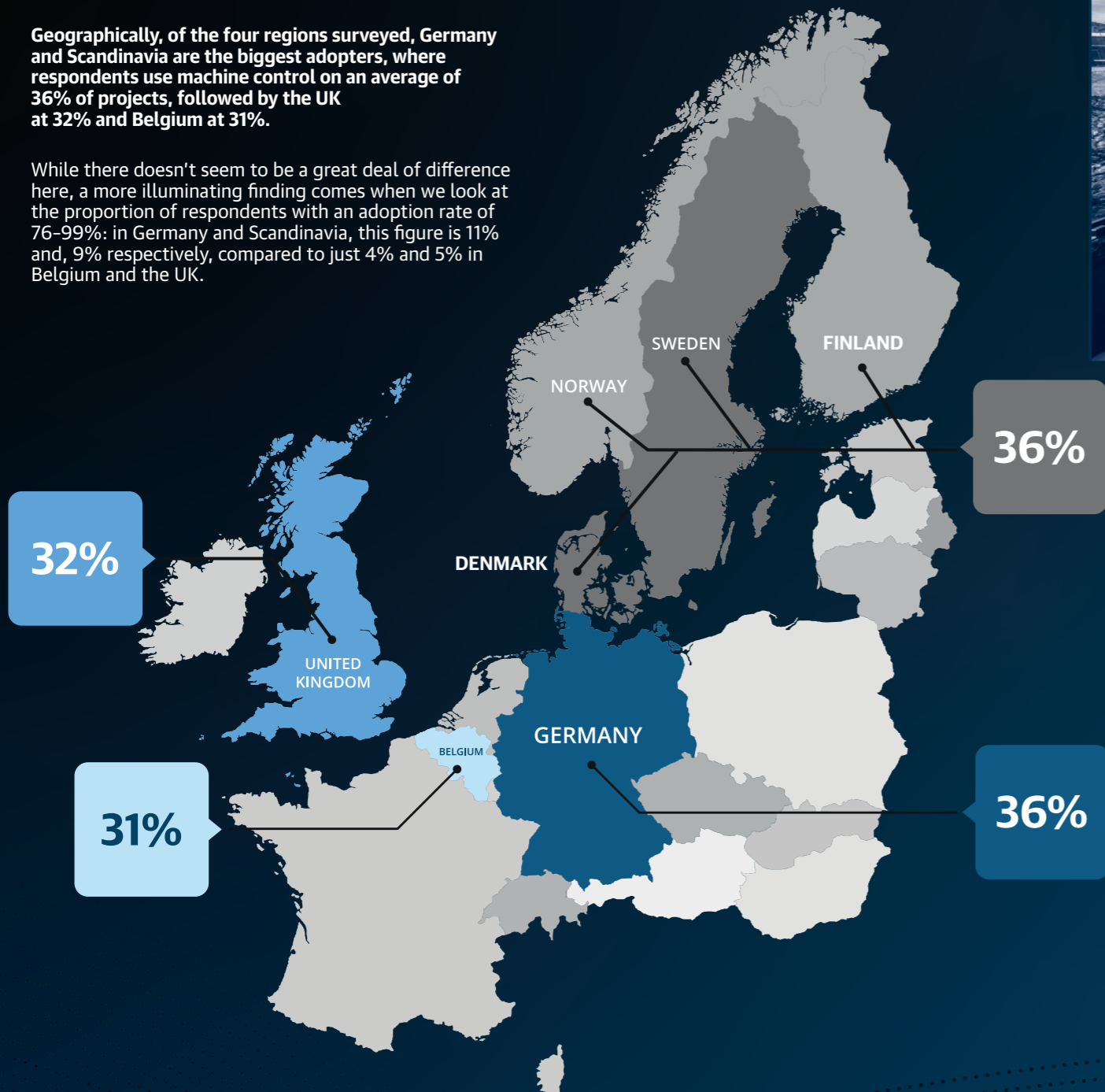
The ubiquity of adoption in one form or another is encouraging, as is the existence of companies consistently using machine control on the majority, if not all, of their projects. However, the findings also highlight the diversity of adoption rates within the industry and even from project to project.

The data shows a significant increase in the ability of larger companies to deploy machine control more consistently on their projects. This could be due to these contractors having more capital to invest or having been able to integrate it more broadly in their workflows. Another possibility is that these organizations are undertaking larger projects which require more comprehensive earthworks and have adopted machine control more readily out of necessity to cope with skills shortages or time pressures.



Geographically, of the four regions surveyed, Germany and Scandinavia are the biggest adopters, where respondents use machine control on an average of 36% of projects, followed by the UK at 32% and Belgium at 31%.

While there doesn't seem to be a great deal of difference here, a more illuminating finding comes when we look at the proportion of respondents with an adoption rate of 76-99%: in Germany and Scandinavia, this figure is 11% and, 9% respectively, compared to just 4% and 5% in Belgium and the UK.



There are factors preventing companies from embracing machine control and deploying it on a higher proportion of their projects.

Barriers to adoption

When we asked respondents to say what they think the biggest barriers are, the most common reasons for limited adoption were 'lack of government initiatives or support for technology adoption' and 'lack of buy-in from senior decision makers', with over a quarter (27% and 26%) citing these options.

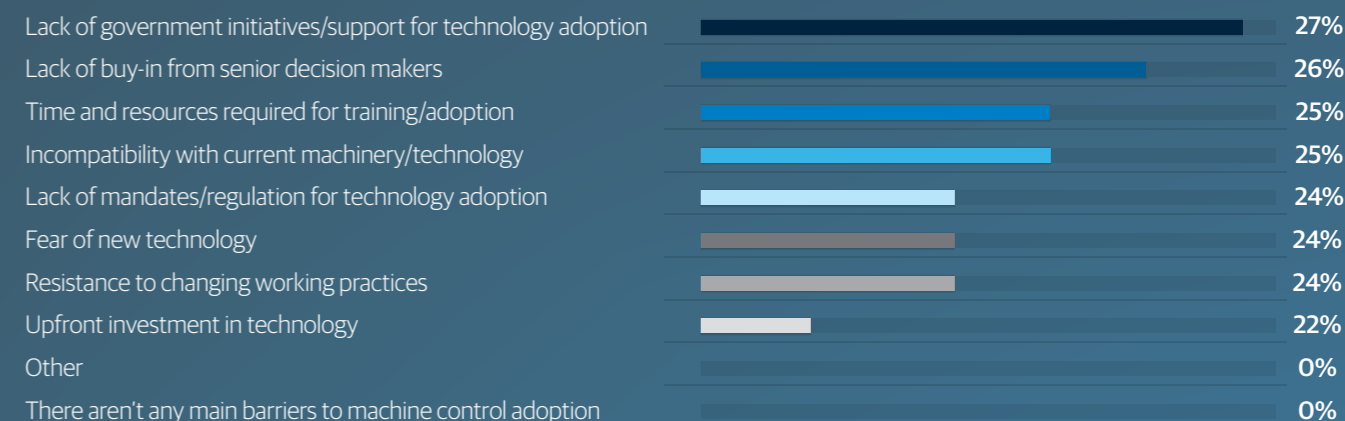
In a risk-averse sector, lack of buy-in from senior decision makers is unsurprising and could explain the relative scarcity of consistent adoption - investment in technological development often falls victim to more immediate pressures on an industry more focused on maintaining narrow profit margins in a tight market.



In fact, despite being the least selected reason, more than a fifth (22%) of respondents still chose 'upfront investment in technology' as a key barrier. "We'd like to enhance the rate [of machine control adoption] but we have limited budget," describes one respondent.

This could also explain why more than a quarter of respondents feel that lack of government support is a major barrier to adoption. Governments incentivising machine control use enables them to shoulder some of the risk entailed in the time and resources needed for training and adoption which, incidentally, was the most commonly selected barrier in the UK, chosen by 1 in 4 respondents.

As well as the incentive represented by governments rewarding or subsidising adoption, there was almost equal support shown for the converse approach, with 'lack of mandates or regulations for tech adoption' chosen by almost a quarter (24%) of respondents. Clearly, those surveyed are eager to move forward with machine control but believe that more should be done by legislators to bring about systemic change.



Embracing automation

Research conducted by management consulting firm Mckinsey & Company in 2020 identified nine shifts that the industry expected to see in the coming years, of which one was digitalization.¹ The more specific picture of machine control adoption offered by our research is one of a shift in progress but far from the 'next normal' described by Mckinsey.

The industry uses machine control, but for the most part it uses it sporadically, on a third (34%) of projects on average, which is indicative of a sector still beginning to embrace automation. So, we need to look to the 9% of companies that are using machine control on more than 75% of their projects and learn from these success stories.

John Downey, Topcon Positioning Systems, said: "Investigation into the barriers to adoption reveals a working environment where machine control struggles to compete against a range of other, arguably more immediate, concerns for the time and investment needed to implement the technology on more projects. It's in this context that the need for more government support and regulatory pressure is imperative, which will add urgency and incentive to embrace digital construction methods."



We want to change this attitude - machine control is not another burden on limited resources, but a resource which itself can help to alleviate some of the pressures felt by the industry. Achieving this change in mindset will be a big step towards overcoming many of the barriers to adoption raised in our research.

John Downey
Senior Director,
Distributor Sales EMEA
TOPCON POSITIONING SYSTEMS



A Greener Way Forward

Making the sector more sustainable

Sustainability in the construction sector has developed from an aspiration to an expectation. The legislation governing this area is becoming increasingly stringent and, commercially, it's a key factor in the decision-making process when appointing a partner.

Representing almost half (47%) of global CO2 emissions, the built environment will need to lead efforts to decarbonize if economies are going to make meaningful progress towards limiting global heating to the 1.5°C target specified by the Paris Agreement.²

As countries move closer to their science-based targets, they require key industries such as construction to change faster and more drastically. In Europe, this is represented by the €600 billion European Green Deal which has set a target of 55% reduction in greenhouse gas emissions by 2030.³

But where do functions such as earthworks and paving, for example, fit in to this? Traditionally very fuel- and carbon-intensive processes, the focus now is on ensuring that work is as efficient and streamlined as possible, with minimal wastage.



Efficiency is the name of the game in construction today. Clients are looking for complete accuracy, not just because it keeps costs down, but because it makes the carbon footprint of a project as small as possible.

With every piece of unnecessary rework, you're multiplying the volume of materials used, and with that the emissions that come from producing them, transporting them to site and deploying the machinery needed to undo and redo the work. Machine control is crucial to achieving the required level of accuracy first time around.

Jean-Luc Durand
Survey Lead
VINCI CONSTRUCTION TERRASSEMENT
GRANDS PROJECT



With all of this in mind, it's no surprise that 30% of respondents in our research highlighted meeting sustainability targets as one of the main challenges they face on projects. However, the majority (67%) of people we surveyed agree* the construction industry will be net zero by 2050. These results paint a picture of a sector confident of a sustainable future and demonstrate that the industry is motivated and optimistic about the challenge that lies ahead, but recognizes that it is indeed a challenge. Belgian respondents were the most optimistic about reaching net zero, with 72% agreeing we will meet the target, while those from Germany were less hopeful, with 1 in 5 (19%) believing we won't.

The majority (67%) of people we surveyed agree* the construction industry will be net zero by 2050

So how do we rise to this challenge?

When it came to asking our respondents what they think is the key to achieving sustainability goals in construction, it was machine control that came out on top, with a quarter choosing this as the most important factor, alongside improving supply chains.

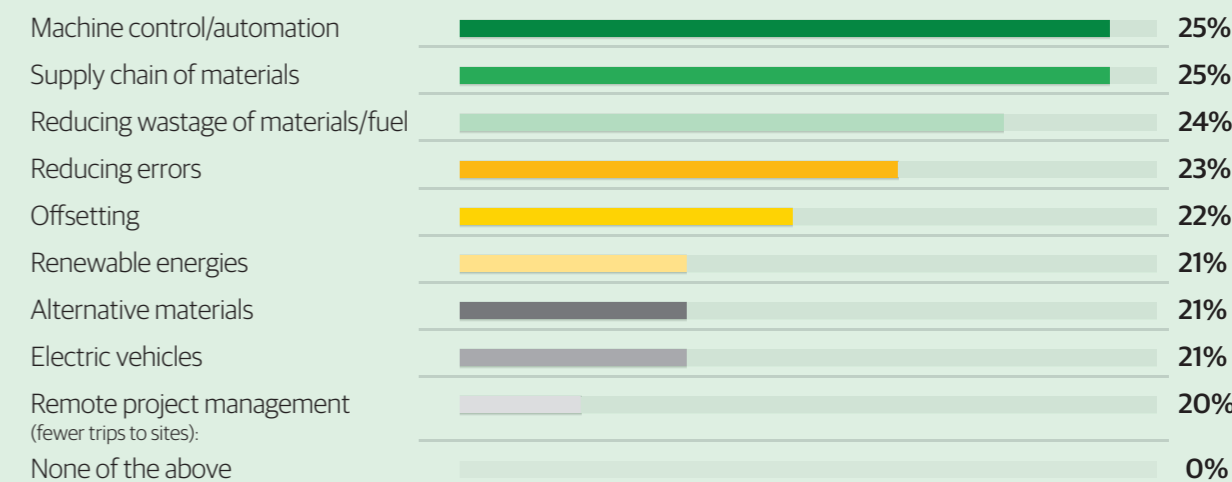
This is echoed by the trio of key benefits of machine control most commonly highlighted in our research: 'Accuracy' (chosen by 25%), 'Improving efficiencies' (25%), and 'Improving sustainability' (24%). The data highlights a link made by those in the industry between automation, effective use of resources, and meeting sustainability targets - by improving accuracy and efficiency, automation helps companies to deliver more sustainable projects.

Interestingly, it was the regions that are least hopeful about hitting net zero by 2050, the UK and Germany, that most commonly chose machine control as the most important factor in hitting sustainability targets in the future - 26% and 28%, respectively. In the same territories, an average of 66% of participants agree that the industry will hit net zero by 2050, suggesting they see machine control as a driving force behind a carbon-neutral construction industry. This is indicative of the frustration felt by construction professionals who know how we can best reduce carbon emissions in the built environment but have operational and commercial challenges to contend with.

John Downey said: "It is widely accepted that the construction industry is one of the biggest contributors to global warming, and the drive to change this within the industry is acute. But the industry needs active and practical support in order to make the shift it needs to in the limited time we have. The legislation is there in terms of driving targets, but the support needed to affect change, whether that be financial support, consultancy or education, does not quite match. This needs to change, and soon, because we will reach a point where we are unable to reduce the carbon footprint as much as is necessary to save the planet."

When we asked our respondents what they think is the key to achieving sustainability goals in construction, it was machine control that came out on top.

Which of the following, if any, will be the most important in helping to meet sustainability targets on earthworks projects?



Rising to the challenge

The built environment is working harder than ever to reduce its impact on the environment. Sustainability as standard is what's expected from new projects across the world, and developers and contractors must respond, prioritizing building green and hitting targets in every area of their output.



While hitting these targets is a major challenge for many in the industry, there is an encouraging level of optimism that the construction industry can arrive at carbon neutrality in the next few decades. It's also clear that machine control is considered critical to the improved accuracy and efficiency needed for companies to hit their sustainability targets.

The industry believes in a sustainable future for construction, in which machine control will be a central pillar.



John Downey
Senior Director,
Distributor Sales EMEA
TOPCON POSITIONING SYSTEMS



Key benefits of machine control



ACCURACY
(CHOSEN BY 25% OF CORRESPONDENTS)



EFFICIENCY
(CHOSEN BY 25% OF CORRESPONDENTS)



SUSTAINABILITY
(CHOSEN BY 24% OF CORRESPONDENTS)

Skills Growth for a More Intelligent Future

A healthy construction sector is critical to a world facing many complex economic challenges. Construction and infrastructure are the bedrock on which economies are built and countries across Europe are putting the sector front and centre of their economic recovery plans.^{4,5} In fact, the European Union Next Generation EU recovery plan includes specific funding for public infrastructure and energy projects, which is positive for all businesses operating within the built environment. However, the industry is still having to contend with its own recovery from the pause enforced by the pandemic and subsequent materials delays, which has in turn exacerbated existing labor and skills shortages.⁶

The skills gap is widening for a number of reasons. Many experienced operators are now reaching retirement, projects are posing increasingly complex job requirements, wages offered in certain territories are not attractive, and a portion of the workforce have re-evaluated their career path following the pandemic. This poses a major challenge for contractors looking to keep up with demand, with EU production in construction already surpassing pre-pandemic levels by Q1 of 2022.⁷ Our research reflected these concerns, revealing that nearly a third (30%) of managers and above consider skills shortages one of the biggest challenges they faced on earthworks projects alone. Only rising costs and shortage of materials were selected by more respondents (by 31% and 32%, respectively).



Nearly a third (30%) of managers and above consider skills shortages one of the biggest challenges they faced on earthworks projects alone

Country by country

The UK market in particular is feeling the bite of staff and skills shortages, especially following Brexit. Skills shortages were selected most frequently as a major challenge alongside shortage of materials, by 32% of those polled – and this isn't helped by this country offering some of the lowest salaries for these roles.

The recent Construction Skills Network Industry Outlook released in June 2022 estimated that the industry would need more than a quarter of a million additional workers to meet demand by 2026, and the skillset needed is only expanding. The end of free movement to and from the

European Union has undoubtedly had an impact, with many skilled workers moving back to the continent.⁸

However, in Scandinavia, skills shortages were less of a concern, being fifth place down the rankings in terms of challenges faced by respondents. A lot of this can be accounted for by the higher salaries machinery operators enjoy in these countries but, as the region which embraces machine control most readily, using it on 36% of its earthworks projects, it's also possible that the benefits of automation have already eased the impact of skills shortages.

Transforming talent

Machine control and automation can completely transform the skills requirements for companies recruiting operators, and also the role played by the skilled employees they already have. In a tight labor market, experienced operators are in short supply but high demand.

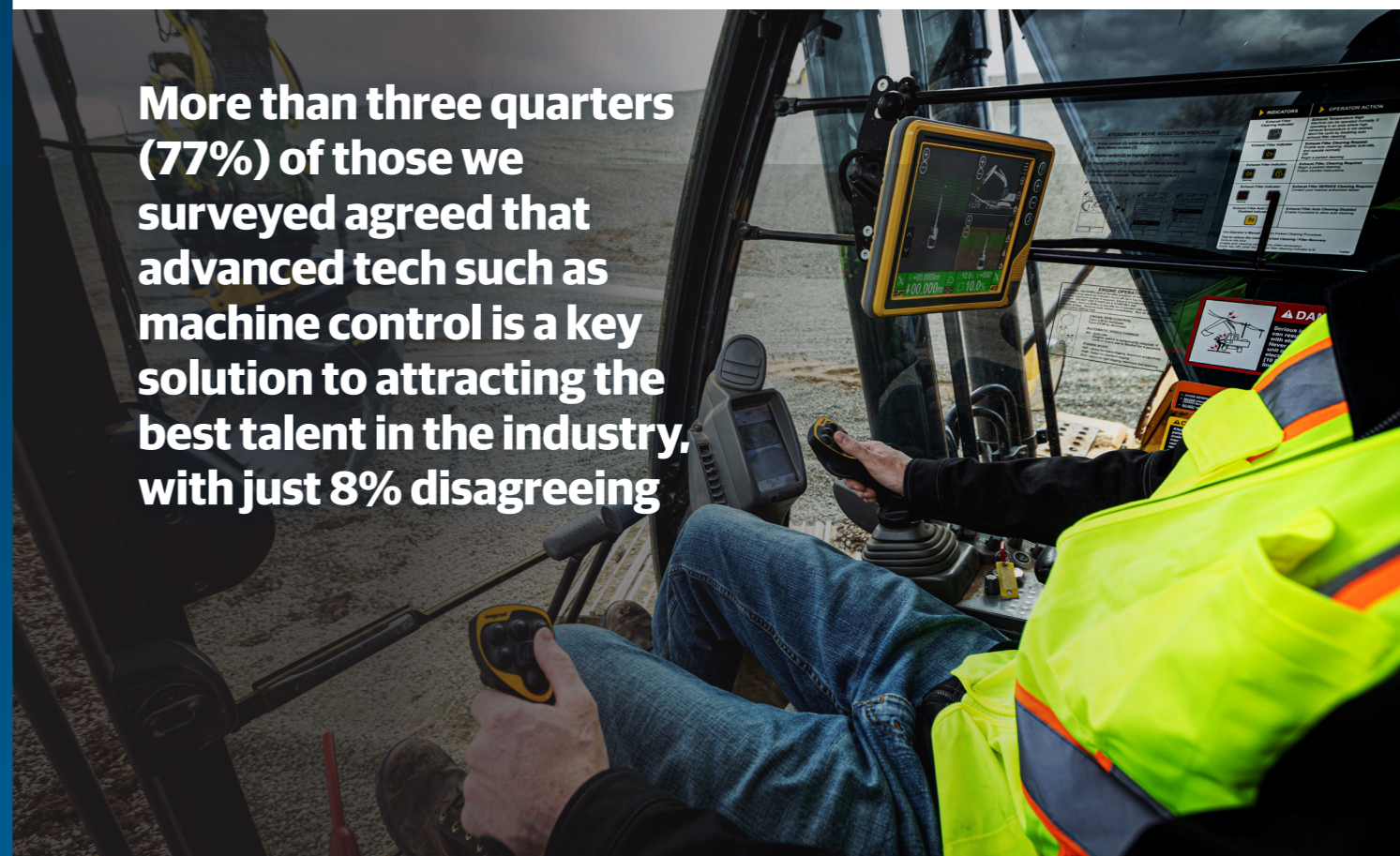
This isn't all good news for existing operators, though, as it can mean long hours in the cab. Construction businesses are aware of this, with almost a quarter (24%) of respondents to our survey choosing 'Reducing operator fatigue' as a key benefit of machine control, and in Germany, the figure was as high as 28%. This speaks not only to the toll current conditions have taken on projects, but also on individual operators. It also illustrates the urgency of the issue for those in the industry, especially given that this benefit was highlighted more often than traditional drivers, including saving money, fuel, and improving project management.

Machine control solutions allow less traditionally experienced operators to carry out more complex excavating or dozing jobs, with the technology offering that bridge between precision and operator experience. This allows machine control

to not only mitigate operator fatigue, but free up more highly skilled individuals to take up supervisor roles while newer recruits carry out the work aided by the technology.

In a market competing for the most talented operators, the ability to offer a role that is less physically and mentally demanding, involving more responsibility, and on a more efficient project, is a game-changer. More than three quarters (77%) of those we surveyed agreed that advanced tech such as machine control is a key solution to attracting the best talent in the industry, with just 8% disagreeing, and it was among the youngest respondents (aged 25-34) that the consensus was strongest. A staggering 89% of the next generation of leaders in the industry see technology contributing powerfully to the battle for talent in the future.

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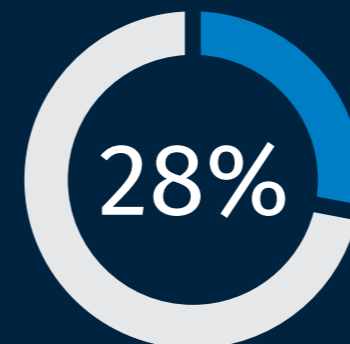




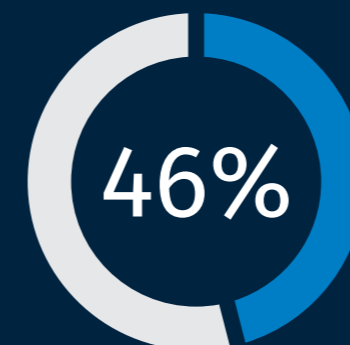
Driven by data

Modern surveying technology means we can know and manage our project data and work sites with total accuracy. These millions of data points bring with them the opportunity to work more efficiently, more intelligently and more sustainably, but unlocking these benefits requires a new skillset, that of data managers, technicians, and modelers who can interpret the information.

Our research showed that the industry is already grappling with this transfer to a data-driven way of working. More than a quarter (28%) of those we surveyed told us that 'managing complex project data' was one of the biggest challenges they faced during earthworks projects, but crucially this rises by nearly 20% to almost half (46%) for respondents in the 25-34 age bracket. Innovative machine control, positioning and workflow systems can bring the power of data into the hands of not just the specialists, but also existing decision makers. Clearly, managing data and extracting insights that can improve projects is a priority, but solutions that display data intuitively, and in a manner that can be easily taken into the cab to guide work, will be crucial to attracting the operators and managers coming into the industry.



Of those we surveyed told us that 'Managing complex project data' was one of the biggest challenges they faced during earthworks projects



When looking only at the 25-34 age bracket, this figure changes to 46%

Closing the gap

At the heart of the construction crunch are people: skilled operators are in short supply, and this lack of people causes delays and limits the ability to win more jobs. In McKinsey's 2020 'Next Normal in Construction' survey, 87% of those in C-suite roles said that skilled labor was becoming increasingly scarce and expensive, and almost half said this will impact the whole industry in the next year.⁹

The implication for earthworks projects is a lack of experienced operators, with developers picking up the cost in the form of delays to projects, training, and temporary staffing arrangements. Embracing automation transforms what companies can offer new talent, whether that's more responsibility managing a team of operators, or as a newer operator completing more advanced dozing and excavating work with machine control tech ensuring accuracy.

In its 2022 US engineering and construction industry outlook, Deloitte highlights 'talent challenges' as one of its five key themes to watch closely.¹⁰ Another is 'connected construction' - the impact of the ever-widening range of technical solutions which bring together people, jobs and processes to work towards common goal is clearly equally important on the other side of the Atlantic. And the same can be said for the need to seize the opportunities presented by data.

As shown in our research, there's a generation of younger industry professionals for whom dealing with complex project data is a major part of their role, and who overwhelmingly see advanced technology as a deciding factor in their career path.



Digitalization is the way forward. Not only does it supercharge productivity, but it's also the key to attracting the younger generation to construction. Everyone is feeling the impact of the skills gap, and it has consequences for the adoption of technology too, because people need training on how to use kit properly and bring those advantages from the showroom to the job site. Intuitive machine control technology provides a solution here - allowing contractors to train people more quickly, getting operators on site and up to grade faster than ever before.

Jean-Luc Durand
Survey Lead
VINCI CONSTRUCTION TERRASSEMENT
GRANDS PROJECT



Driving Change from the Top



Working with the government

In each market surveyed, the construction industry and government have a close relationship. Governments award contracts for large-scale infrastructure and public building projects, while the industry fulfils these contracts, creating jobs and growing the economy in the process. In the European market, construction contributes 9% of EU GDP and is responsible for 18 million jobs.¹⁰ The European Union counts 'more active uptake of new technologies' among the challenges it is engaged in helping the industry overcome, demonstrating an awareness that the sector needs to improve to fulfil its role in the European economy.¹¹

Often, governments are construction companies' single biggest customer, giving weight to their view of the

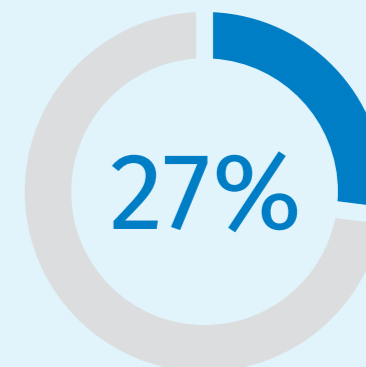
industry and their priorities for its development. In the UK, for example, facilitating adoption of modern methods of construction (MMC) is an aim for the government in its role awarding public works contracts, with increasing productivity named as a principal motivator.¹² However, this description is broad in nature and government guidance on sourcing and contracting public works projects does not specify beyond this vague endorsement of modern technology. Similarly, the 2021 European Commission analytical report 'Digitalisation in the construction sector' details the widely shared desire for increasing digitalization among EU member states, and the provision of incentives to achieve this, but focuses on robotics, drones, and 3D printing in the context of automation.¹³

Boosting confidence

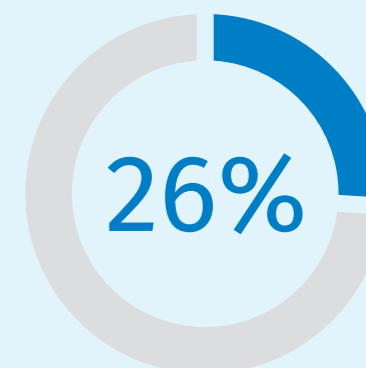
This ambiguity is reflected in the results of our research, which shows that the lack of specific guidance and support is having an impact on the uptake of advanced technologies, particularly those which require upfront investment. **Indeed, participants in our research selected 'Lack of government initiatives/support' and 'Lack of buy-in from senior decision makers' as the main barriers to machine control adoption (27% and 26%, respectively).** These influential stakeholders could be acting as fundamental blockers to adoption.

A look at the distribution based on seniority sheds light on the link between these factors. **'Lack of buy-in from senior decision makers' was cited the most by managers and less so by directors and business owners. 'Lack of government support/incentives' was selected frequently by all respondents but among business owners it was the single most commonly selected factor, chosen by 27%.** Given that the vast majority of construction, architecture and civil engineering firms are small and medium-sized enterprises (SMEs), it's possible that business owners, the most exposed to the risk of investing in new technology, are looking to policymakers to share the burden of that risk.¹⁴

When you break down these results by organization size, the desire for government intervention is more important for smaller organizations than for larger ones. For companies with between 50 and 99 employees, 32% of respondents chose lack of government intervention as a main barrier to adoption, while the figure was markedly lower for organizations with 100 or more employees - an average of 22%. Given the huge share of the market that these smaller businesses occupy, the fact that more than a third perceive this factor as a major barrier to adoption is testament to the impact that policymakers can have if they provide concrete, achievable incentives for tech adoption.



Selected **'Lack of government initiatives/support'** as a main barrier to machine control adoption



Selected **'Lack of buy-in from senior decision makers'** as a main barrier to machine control adoption



The issue is one of confidence that the risk of investing time and money into machine control is one that will pay off. A lack of confidence from governments dissuades business owners and directors from taking that risk, which is then perceived as lack of buy-in from senior decision makers further down the ladder.

John Downey
Senior Director,
Distributor Sales EMEA
TOPCON POSITIONING SYSTEMS



The domino effect

The aversion to risk in the construction industry is a natural one. Costs are high and the stakes are higher. This has long been a reason for slow adoption of technology in the sector. However, a slow shift in attitudes, which began in the 2010s, was accelerated by the pandemic, which pushed even previously technophobic firms to digitalize quickly in order to protect the health of their teams and keep them working. Will this shift towards automation continue apace through this decade?

Our research found clear consensus that governments can play a more active role in encouraging and mandating technology adoption - 70% of those we surveyed agree that legislators could be doing more, and this rises to an average of 82% for businesses with between 10 and 99 employees, demonstrating the urgency of support for businesses that perhaps lack the capital or flexibility to embrace technology without support from policymakers.¹⁵

This result in particular highlights the need for incentives more clearly defined than promised gains down the line. In its 2020 report, as well as highlighting digitalization as a key shift in the industry, McKinsey & Company recommended policymakers help to boost productivity.



70% AGREE THAT LEGISLATORS COULD BE DOING MORE



By offering tangible incentives that offer short-term return on investment, governments and industry leaders can boost confidence in machine control and automation, and increase the chances of it succeeding. By subsidising hardware and software, or highlighting machine control adoption more specifically in tendering guidelines, governments and industry figures can lead the drive towards a more productive, connected construction industry.

It's the opportunity to be the first domino in the chain; policymakers can make machine control and automation technology a less risky investment and consequently increase buy-in from senior decision makers - removing these two significant barriers to adoption.

Landry Ayeba
 Chef de Mission Topo/Etude
 COLAS LTD



Building momentum

For proof of the potential impact of widespread adoption of automation, governments and senior decision makers need only look at how machine control can be leveraged in tender applications. **Those we surveyed overwhelmingly agreed that 'Inclusion of machine control has been a deciding factor in recent tender applications', with almost three quarters (72%) of respondents agreeing.** And in a crowded market made up of lots of smaller businesses, anything that can set your service apart is invaluable; for companies with between 10 and 99 employees, the proportion of respondents who agree that machine control is a deciding factor in winning contracts increases to 87%.



7 OUT OF 10 surveyed overwhelmingly agreed that inclusion of machine control has been a deciding factor in recent tender applications

Collaboration is key

Both the government and the construction sector stand to gain from widespread technology adoption, yet lack of government support was the most commonly highlighted barrier to adoption in our research and 3 in 4 respondents said legislators could do more. There is most definitely an appetite for wider adoption of machine control in the industry, but for many it's still too much of an expensive risk; active, clear and specific government intervention is the helping hand it needs.

If the industry is to embrace machine control and benefit from it on a large scale, it's time to share the risk involved upfront. By presenting real incentives that bring short-term return on investment, policy makers can be a catalyst for a change that will supercharge the industry of which they are the biggest customer.

John Downey said: "If governments want to help contractors evolve with technology such as machine control, they need to see that the road to adoption isn't as smooth as seeing the benefits and implementing the solution. Policymakers should make incentives and interventions achievable and provide accessible pathways to meaningful and consistent use. This involves working with manufacturers to understand the technology available and incentivize digital best practice, rather than offering one-off or surface-level trials."

The influence that machine control has on tender applications demonstrates that there is a shared confidence in companies that use the technology. There is appetite for it on both sides of the tendering process, but change requires help from the top down.



Onwards and Upwards

Skills, labor and materials shortages have combined with growing sustainability standards and soaring demand for infrastructure to leave the construction industry in a precarious condition.

Machine control represents a powerful lifeline, but it's a solution with heaps of untapped potential.



Despite believing it can make a difference, executives in this traditional sector plagued by tight margins can't afford, financially and reputationally, to invest in technology from which they don't see an immediate return. Our research revealed that this caution from senior decision makers and a lack of support from policymakers were the main barriers holding back consistent adoption.

To change these attitudes, we need to reframe how the leaders and regulators of our industry think about these innovations. Rather than representing a vision of the future, machine control can help tackle the challenges the industry faces right now. By carving out new roles for seasoned operators and revolutionizing the work that can be done by less experienced colleagues, automation can put an end to delays caused by labor shortages and go a long way to closing the skills gap and attracting the next generation of talent. Not to mention how much of the heavy lifting it can do to help us meet net zero targets.

To make this a reality, the construction industry needs the confidence and the support to try something new. Only by working with stakeholders at all levels can the sector ensure that machine control fulfils its potential and helps us create the profitable, sustainable future we all want to see.

Rather than representing a vision of the future, machine control can help tackle the challenges the industry faces right now

About Topcon Positioning Group

Topcon Positioning Group, always one step ahead in technology and customer benefits, is an industry leading designer, manufacturer and distributor of precision measurement and workflow solutions for the global construction, geospatial and agriculture markets. Topcon Positioning Group is headquartered in Livermore, California, U.S. Its European head office is in Capelle a/d IJssel, the Netherlands. Topcon Corporation, founded in 1932, is traded on the Tokyo Stock Exchange (7732).

Methodology

The research was conducted by Censuwide, with 1,000 managers, directors and business owners working in construction companies (UK (250), Belgium (250), Germany (250), Scandinavia (250 – an equal split between Denmark, Norway, Sweden, Finland)). The fieldwork took place between 05.09.2022 and 16.09.2022. Censuwide abides by and employs members of the Market Research Society which is based on the ESOMAR principles.

*Wherever 'agree' is mentioned it combines those that selected 'strongly agree' or 'somewhat agree'; similarly 'disagree' combined those that selected 'strongly disagree' or 'somewhat disagree'.

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- (8) <https://www.citb.co.uk/about-citb/construction-industry-research-reports/construction-skills-network-csn/>
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- (10) <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/energy-resources/us-2022-outlook-engineering-and-construction.pdf>
- (11) https://single-market-economy.ec.europa.eu/sectors/construction_en
- (12) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1102387/20220901-MMC-Guidance-Note.pdf
- (13) https://single-market-economy.ec.europa.eu/document/download/dabeca1-0008-4034-a3d6-5f01d76c0f24_en
- (14) https://single-market-economy.ec.europa.eu/sectors/construction_en
- (15) Those who selected 'a lot more' or 'slightly more' when asked: 'How much more or less, if any at all, do you think governments could be doing to mandate and incentivize digital adoption?'



