In collaboration with the
University of Cambridge

WORLD ECONOMIC FORUM

Views from the Manufacturing Front Line: Workers' Insights on How to Introduce New Technology

INSIGHT REPORT

JANUARY 2024

Images: Midjourney, Getty Images

Look out for this icon for pages that can be interacted with

Contents

Foreword

Kyriakos Triantafyllidis
Head of Growth and Strategy, Centre for Advanced Manufacturing and Supply Chains, World Economic Forum

Thomas Bohné
Founder and Head, Cyber-Human Lab, University of Cambridge; Fellow, World Economic Forum

Historically, the introduction of new technologies to the manufacturing industry has represented a key lever to increase productivity and reduce costs for companies and society overall. While some tasks can be fully automated, manufacturers also need to actively augment their front-line workers with technology to support them in their day-to-day activities. This is because fully automated operations are rarely feasible or the most efficient processes, making humans an essential differentiating factor.

But without mastering the art of successfully introducing technologies to the shop floor, companies risk failing to keep up with the rapid pace of innovation and falling behind their global competitors. How, then, can managers best engage their front-line workers and ensure that technology introductions are designed in a long-term, sustainable, human-centric and effective way?

The value of this report – the result of a collaboration between the World Economic Forum, the University of Cambridge and constituent members of the Manufacturing Workers of the Future initiative – is that it answers this question by harvesting insights from a uniquely well-placed, though often overlooked, source – the workers on the shop floor.

Executive summary

Manufacturers face diverse and demanding challenges. These include the need to fulfil the demand for more customized products, to overcome skills gaps, and to respond to demographic trends such as ageing workers. In this context, companies are increasingly introducing advanced technologies, such as extended-reality headsets, exoskeletons and cobots to support their employees.[1]

As the process of augmentation accelerates, and the need for effective human-machine interaction becomes more critical, businesses face the urgent need to identify and adopt reliable strategies that enable them to introduce new technologies successfully.

Research to date has responded to this challenge mainly by developing adoption frameworks that primarily take into account the management perspective. Though obviously helpful, these strategies are, by themselves, incomplete – and need to be supplemented by the perspectives of workers on the shop floor, who are the end users of these technologies.

Hitherto, such workers often tend to be talked *about* in the research, rather than talked *with*. In contrast, this report reveals the views of workers, asking them how the process of technology introduction looks from their perspective on the shop floor. And, crucially for executives, it demonstrates how workers' insights can be used to contribute to the process and thereby add value to companies, resulting in higher employee retention, improved employee satisfaction and a measurable return on investment (ROI) due to more efficient and effective technology introductions.

The study conducted for this report is based on more than 85 interviews with front-line workers in large, international corporations drawn from several industrial sectors in the US, Europe and Asia. They included operators, mechanics, electricians, manufacturing engineers and supervisors working with a range of technologies, including robotics and wearable technology.

The interviews yielded a multitude of valuable insights, which are presented to help answer three broad questions – what to do before, during and after the process of introducing technology on to the shop floor – as follows:

1. In preparing to introduce new technology, managers need to help workers to understand the bigger picture – especially the benefits expected to accrue for all stakeholders – and the underlying decision-making process. Companies stand to benefit from enabling end users to contribute proactively – for example, by giving them the opportunity to try out technologies, contribute ideas and participate in risk assessments.

2. While introducing new technology, managers need to help workers by establishing and communicating realistic timelines, recognizing and catering for a diversity of learning needs and preferences, involving operators in contingency planning and providing sustained means of support. Harnessing workers in the role of super users or technology champions can also prove to be beneficial.

3. After introducing new technology, managers can benefit from playing a long game – monitoring and collecting feedback, revising and updating training resources, onboarding new employees and acknowledging and rewarding successes. Managers can also draw on the insights of workers to develop new uses for technologies that are already installed. The applications of a new technology are not limited to those for which it was originally designed. Strikingly, almost every interviewee in the research shared potential new uses for implemented technologies, thoughts about ways of innovating systems or additional ideas for improvement.

1 What this report offers

The goal of this report is to support companies in meeting the challenge of introducing technologies to the workplace successfully.

If done well, introducing new technology brings with it many benefits such as improved employee retention and satisfaction, as well as delivering on financial key performance indicators (KPIs) including costs and returns on investment (ROIs). Done badly, the company may miss out on these benefits and, even worse, risk the converse effects, such as losing employees, employee silence (when workers stop sharing feedback and ideas) or increased costs from having to redo work because of failed introductions or cessations in production due to technical issues with the new technology.

The approach outlined in this report is guided by the insight that the perspectives of the workers, as the end users of human-centric technologies, are often overlooked but are essential for the effective introduction new technology.

The report therefore explores how people respond to new technologies on the shop floor and how they interact with them. More specifically, it seeks to unlock value by presenting a group of stakeholders who have often been neglected in the management literature: the shop-floor workers.

The findings are based on research conducted in eight factories in the US, Europe and Asia. The factories belong to large international corporations drawn from a variety of industrial sectors: industrial goods, electronics, chemicals, pharmaceuticals, textiles, home- and beauty care and automotive. The technologies they have been introducing cover a broad range including robotics, tablets, augmented reality/virtual reality (AR/VR) applications and other wearables. The report's researchers interviewed more than 85 shop-floor workers who work in roles such as operators, mechanics, electricians, manufacturing engineers and supervisors.

The insights gleaned from the interviews unlock a wealth of ways to improve the effectiveness of the technology introduction process on the shop floor. In doing so they reveal suggestions for enhancing the process at all stages, from preparation through to review and beyond – to the benefit of not only the workers themselves but also their employers.

FIGURE 1 | **What to do before, during and after the introduction of new technology on the shop floor**

Before the introduction of new technology	During the introduction of new technology	After the introduction of new technology
Communicate the benefits and explain the why	Make timelines clear early on	Follow up
Explain the decision-making process	Cater for diversity	Incentivize and acknowledge success
Make the bigger picture clear to end users of the technology	Develop the role of “super user” or “technology champion”	Carry on and see it through
Help workers to explore and become confident with the technologies	Think contingency	Beware premature closure
Include workers in the exchange of ideas	Ensure that effective support is readily accessible	Ensure that the technology continues to be used
Ensure the pilot group is diverse		Continue to explore new use cases for technologies that are already in use
Involve workers in risk assessment		
Communicate expectations		
Balance the business’s local and global needs		

The report is part of ongoing research and contributes a diagnostic view of front-line workers’ perspectives; as such, it offers a first step towards introducing better practices rather than providing solutions to all of the challenges described.

2 Before introducing the technology – how to prepare your employees

Managers need to put in the groundwork with their workers before introducing new technology.

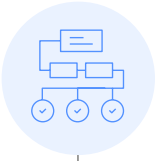
2.1 Communicate the benefits and explain the why

It is not uncommon, unfortunately, for front-line workers to perceive the efforts of employers when introducing new technology as "not enough" or "not well executed". In particular, they may feel that employers undervalue two-way communication: they may allocate sufficient time only for transmitting information to workers, thereby crowding out the opportunity for feedback, questions, suggestions and the voicing of concerns.

Reception of new technology may also be affected by concerns over the consequences for workers – including, notably, the fear of job losses. Something of the balancing involved was captured by one worker's view that *"You're taking parts of somebody's job, but these are also not tasks that you want someone to do all day … Besides that, the machine is faster and more reliable for repetitive jobs."*

Despite the difficulties, workers identified aspects of good practice among manufacturers. They were especially appreciative of employers who were able to communicate tangibly the benefits of adopting new technology – for example, by making workers' lives easier or facilitating the identification of errors or faults.

An important finding here is that if employers take the time to explain the "why" behind technological change (rather than just the "what" and the "how"), this often proves welcome and encourages a more positive reception.



2.2 Explain the decision-making process

For workers, the decision-making that lies behind the introduction of new technology – who makes the decisions and by what process – can be opaque. (*"Well, you know, we don't even know who decides. At some point in time, it was decided that we were going to get these tablets."*) And if employees are informed only late in the process, the introduction can readily be perceived as unduly rushed.

A common motivation for introducing change is the desire to enhance tracking and documentation to assess and improve efficiency – in particular, by monitoring progress with KPIs.

There is a need here to ensure that workers (who are often not represented during managerial discussions to review performance) understand both which KPIs have been selected and, crucially, why. This can help to counter the risks of low motivation and a sense of detachment on the part of workers.

BOX 1 **Introduction of a phone system on to the shop floor**

In one of the factories, phones were originally mounted on machines on each production line and could be called by dialling a specific phone number. If one phone was not answered, the call was automatically forwarded to the next phone. It was also possible for employees to pick up a phone on a line and press a specific button to receive the phone call from the other line. Employees perceived this to be very practical when walking to different parts of the line, which was required most of the time.

However, for reasons unknown to the interviewed workers, the system was changed: phones with Microsoft Teams capabilities but without the forwarding capability were installed. No consultations with shop-floor workers had taken place before the integration. Because they were not asked prior to the change, there was a feeling among workers of being disregarded. They felt frustration because the brought-in solution (which simply mirrored the company's office spaces) failed to meet their specific needs.

2.3 Make the bigger picture clear to end users of the technology

Problems arise with the introduction of technology when front-line workers lack the information required to see the bigger picture.

In particular, workers may be unclear as to how a project will involve or affect them. In one example, operators became anxious because they thought they would be required to take responsibility for the control of automated guided vehicles (AGVs) on the shop floor – whereas, in fact, this had never been intended by the management.

In many cases, unhappiness arising from not having a broad overview concerns questions of how two technology systems will interact. How, for example, will in situ systems interrelate with a novel system being introduced? Or how, when multiple innovations are being made in various departments, will issues of compatibility and connectability be resolved?

Such scenarios require communication and explanation. Some businesses have sought to solve the problem by developing specific forms of internal communication systems. One company, for example, covered such matters in a weekly newspaper provided to workers in print form and via screens on the shop floor.

2.4 Help workers to explore and become confident with the technologies

One problem is that workers often feel that they have insufficient opportunity to familiarize themselves with new technologies – to explore them, test them and investigate their potential. Though showcasing and demonstration opportunities might be provided by employers, they do not necessarily occur frequently enough.

The process of familiarizing workers with new technology can be inhibited by anxiety on the part of the employers over the risk and cost of breakages. During interviews, several employees shared examples of managers repeatedly reminding them of such costs, urging them not to "*break/drop*" new pieces of equipment. As one worker said, this anxiety can make workers "*worry about breaking it more than focusing on using it correctly*". In such contexts, progress in adoption can be impeded by negative impacts on employees' self-esteem and a general fear of making mistakes.

Workers identified many opportunities to improve the process through which they become familiar and confident with new technology. Initiatives that often prove welcome include:

1. Regular demonstrations, on a training line or on their own shop floor, by external technology providers

2. Using a variety of methods – such as physical interaction, hands-on exploration and support videos – rather than virtual showcasing alone

3. The opportunity to take new technology home, if possible. For example, one worker asked to take a VR headset home so that he "*could just see exactly what we can do and how we can integrate that*". Field or factory acceptance tests held either in external settings or with the assistance of an external provider in the employees' workplace seem particularly welcome, leading to a sense of engagement and even pride on the part of workers.

2.5 Include workers in the exchange of ideas

Frustration arises when, in the early stage of adoption, workers sense a lack of opportunities to generate and exchange ideas with peers and managers. This represents a missed opportunity both to incorporate productive thinking and to develop group spirit.

In contrast, workers often responded positively when employers provided workshops that included such activities as brainstorming, idea challenges and participatory design. Similarly, continuous improvement processes designed to provide incentives for employees with challenges to earn rewards often prove welcome.

2.6 Ensure the pilot group is diverse

Problems can arise over the ways in which employers conduct training or testing sessions.

A common problem here is the selection of an insufficient number of workers for such activities. This can be the direct consequence of the employer's selection policy – they might believe that only a few workers are required. Or it may arise from a sense that many workers would be unavailable for such purposes because they are required on the front line. It is easy here for employers to assess the cost/benefit ratio inaccurately: loss of production resulting from temporarily removing workers from the front line may be immediately discernible, while the benefits that accrue from better testing and timing might become evident only more gradually over time.

A second problem relates to insufficient diversity among the workers selected for testing or training sessions. There may be gaps among the pilot group in terms of such characteristics as gender, age, technical affinity and levels of experience.

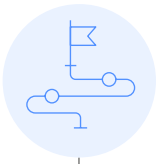
Two specific difficulties can arise here. First, a sample may be hand-picked so as to avoid criticisms arising. As one worker commented: "*You should always listen to [every] person and not listen to [just] the ones you feel comfortable with*." And, second, employees may be selected for pilots based on their (high) performance, so the experiences are not then representative. ("*It [the testing] is like a reward. Like if you do very well, you get to do the pilot*.")

Insufficient numbers or diversity can result in a lack of richness, variety and representativeness in the resultant learning and feedback. This suggests that an opportunity exists for employers to improve the adoption process simply by increasing the numbers and diversity of workers involved in testing and training. In particular, there is a need to ensure that end users are included – they are the people with in-depth knowledge and insight concerning machines in practice.

2.7 Involve workers in risk assessment

The adoption of technology can be impeded by a lack of foresight concerning risk assessment. For example, in one case the introduction of tablets on a line failed because the internet connection in one part of the plant was unstable and kept crashing. This led to immense frustration among employees. Multiple workers explained to us that a proper risk assessment could have prevented such a situation.

There is a need to include front-line workers when assessing the issues arising from the deployment of new technology. In particular, it is helpful to include such workers in more in-depth risk assessments that analyse the specific characteristics of the production lines and evaluate the effectiveness of the current analysis process.



2.8 Communicate expectations

Workers report that one source of stress is a failure on the part of management to make the level of expectations clear. Typical concerns are that there might be an intolerant attitude towards initial mistakes, or a lack of support provided for dealing with teething problems.

There is a need, therefore, to articulate the levels of performance anticipated concerning, for example, how quickly workers will be expected to grasp new methods and what levels of quality and productivity will be required over the various stages of the project.

2.9 Balance the business's local and global needs

A further challenge arises from the risk of misalignment between, on the one hand, local needs and, on the other, transnational or global perspectives. Sometimes projects can be pushed down to the local level without consulting on-site employees and without an appreciation of the circumstances related to a specific plant.

Workers indicated that they felt the need particularly to ensure that lessons learned by workers in one location are shared with those in another, and that there is regular and effective communication between teams.

BOX 2

Introduction of tablets on a sterile line

One business decided to introduce tablets on one of its lines. After the introduction plan had been designed, it became apparent that the chosen tablet models would not work on the specific line – the tablets were unsuitable for use in a sterile environment. The result was months of rework including worker consultations, discouragement among employees who felt they had not had a say in the design of their workplace, and the development of a negative attitude among employees concerning both the technology and global innovation projects in general.

3 While introducing the technology – how to ensure adoption

It is crucial to support workers fully at all stages of the process when adopting new technology.

3.1 Make timelines clear early on

Though some management teams announce changes regarding the lines and technology well before they start (for example, a few months before), others inform their employees only late in the process. One worker explained: "*There's people that do not understand (the technology) and you got the email on Friday that it (will be) put in on Monday*."

Moreover, sometimes timescales are either not communicated or even not formulated at all: "*They just say 'okay, we'll introduce it', but they don't have a fixed time. And sometimes then people are confused, or they don't know what's happening*."

To prevent these concerns arising, there is a need to provide workers with guidance on timelines. In particular, workers welcome assurance that they will have sufficient time to familiarize themselves with the new technology. Integral to the plan is the need for a pilot or testing phase during which workers can explore the technology and develop their learning.

3.2 Cater for diversity

The learning needs of workers are diverse, yet businesses often fail to provide a range of training methods, let alone personalized provision. Often, organizations rely on just one or two methods, with one-off in-person training or training on the job particularly common, while the trainers also often lack adequate supporting materials and may lack training experience. Overall, there is a risk that such provision will fail to cater adequately for the range of linguistic needs, levels of abilities and learning styles or preferences among a business's workers.

In response, some businesses have started to implement more diversified programmes. They might include, for example, micro-learning, video-based learning, peer demonstration, active learning and provision of reference materials.

Managers' plans for training and learning development depend in part on the assumptions they make about their workers' prior knowledge. Such assumptions do not always prove accurate.

For example, the observation that many workers make considerable use of technology, such as smartphones, outside work can lead managers to infer that their workers will prove knowledgeable, proficient and willing users of technology within work. Yet many workers make little or no use of smartphones at home and may be on very limited data plans, while some will be unfamiliar with other types of technology, such as touchscreens, tablets and AR/VR.

Erroneous assumptions of this kind arise where there is a sense of social or cultural distance between managers and workers. One method that has been developed to reduce this distance and make assumptions more realistic is the "live my life" approach. This involves a white-collar office worker spending a day on the shop floor, performing work tasks, and mixing and talking with workers.

3.3 Develop the role of "super user" or "technology champion"

The involvement of selected workers in the initial testing phase of a programme of technology introduction is, though useful, a short-term measure. To support longer-term engagement, two (closely similar) roles have been developed: the "technology champion" and the "super user".

These roles involve participating in testing and training sessions, developing expertise, being available to answer questions and encouraging peers. Typically, the roles are filled by team leaders or by younger workers who are passionate about the technology.

Evidently, however, there are difficulties with these roles. They can prove challenging, involving a large variety of tasks and a need to deal with peers with negative perceptions of the technology in question. The ratio of super users (or champions) to the number of lines requiring support may be taxing. And it may transpire that on some shifts none of these role-holders is present.

To develop a supply of willing candidates for these roles, some companies provide financial incentives. A problem here, however, is that the amounts offered are not always sufficiently enticing.

3.4 Think contingency

Introducing technology typically entails risks to production levels, whether through technical issues interrupting the production process or human-related challenges, such as a sense of frustration among workers.

To mitigate such problems, there is a requirement to communicate transparently to all stakeholders the design of the overall process behind a new technology introduction.

Critical here is the need to have in place back-up or roll-back options for when the technology is not working as expected, especially in the early stages. One worker suggested, "*If it's possible, maybe keep the old system a bit longer. One, two months maybe. Just to have it.*" Many interviewees cited occasions where having a back-up could have prevented frustration arising among front-line employees and even, on occasions, dire tales of the "bad introduction" spreading through an entire business.

3.5 Ensure that effective support is readily accessible

When new technology is introduced, workers will need to call on support. A number of challenges arise here. Some businesses fail to provide workers with an overview of the forms of support available. This can be discouraging and lead employees to conclude that they are unsupported.

A particular problem arises with shift working. It is common for night shifts to be less well staffed than day shifts: fewer managers may be available, and some support functions might have closed for the day. One worker who had changed shifts reported that "*It's the resources on day shift. There're so many more people around. I would never have thought it was that different* [from the night shift]."

Many businesses' support strategies rely strongly on digital communication methods and helplines. The problem here is that employees can feel that they do not receive support tailored to the problems they are encountering – or that they need to invest a lot of time in reaching out for help and explaining the issue before finding a solution. (In some companies the helpdesk is referred to as the "*helpless desk*"). Workers' comments evidenced a demand for greater availability of in-person support.

4 Beyond the implementation – how to sustain success

Workers offer valuable insights on how to ensure new technology is successfully embedded in the company's processes.

4.1 Follow up

Though some workers reported that their employers do follow up after introducing technology (typically either via email or in informal conversations), the majority identified a need for improvement – including greater reflection on the lessons to be learned.

Many workers argued that developing a standardized process might help to improve/solve this lack of conversation and communication. For example, according to one worker, "*It would be better if they have a standard, but they have not asked me about how I feel after seven months. Now there's an anonymized software name update, for example. They haven't ever asked what I'm feeling*." Even when there have been follow-up meetings, end users were not always included.

Workers suggested that follow-up could be improved via meetings, all-hands formats, or online forms: "*Put stars and comment on what you think about this application. In six months, you'll have like a hundred people. Answer(s) and review(s). And (the) company can think, oh, this program is good or not good, or we're just wasting our time*." In particular, online feedback could be set up as an automated process to collect and evaluate employees' feedback over a longer period.

4.2 Incentivize and acknowledge success

In general, workers indicated that businesses need to find ways to demonstrate that they value the contributions of their workers: "*I think most people just want to feel valued in their contribution. If I see something on the line that causes issues every day, I want somebody to listen, take it on board and act on my suggestions*."

Some businesses have sought to embed a culture of acknowledgement of, and gratitude for, good practice. One worker shared a story about how their employer is implementing this: "*We started to put this into practice quite a while ago, when we start a meeting, we always start off with 'What happened?', 'Who should we thank?' There's always somebody who went above and beyond at work, and we can thank those people*."

Some interviewees reported that their employers have established reward schemes – for example, based on gift cards or points that can be collected and exchanged for certain items. These do not, however, always succeed in promoting engagement: sometimes the rewards are too small. Interviewees recommended managers should provide a wider range of rewards and discuss the different options with employees to increase worker engagement. Other workers reported that their employers offer incentives or rewards in the form of additional training programmes or even funds for enrolling on university courses.

4.3 Carry on and see it through

Workers reported two issues concerning the need for training and development of staff over the long term. First, training materials need to be continually revised. Some workers suspect that managers tend to see training as a "to-do" to be ticked off as a single event, whereas several factors require it to be conceived as a continuous process: employees identify errors and omissions; interfaces are redesigned; the software is updated.

Second, training and development need to be provided for new hires – those who join the business after the introductory process. Typically, external providers (such as professional service companies or technology vendors) are hired to design and undertake training only for the current front-line staff. Plans for introducing technology need to detail the means and responsibilities for the subsequent onboarding of workers.

4.4 Beware premature closure

Workers identified that the ending of a project needs careful consideration. There is a risk of premature closure, with project teams (whether internal or external) being withdrawn too rapidly, while some issues remain unresolved. In such cases, it can feel as if management is treating the ending of a project as merely a checkmark that needs to be ticked off.

Sustained in-house project support tends to prove welcome. At the same time, however, there is often realism about the feasibility of prolonging project management indefinitely. As one employee who has supported the roll-out of technologies in the past, commented: "*It's good to have an internal resource, but when we go live, we can't have the project manager be the hostage of that project for the rest of their life*."

4.5 Ensure that the technology continues to be used

Workers report that sometimes technologies get introduced yet subsequently (typically 6–18 months later) go unused. As one participant said, "*They bought iPads for all the operators (…) so they could do some administrative work from home with the iPad. (…) They got it and now everyone has an iPad in their home, lying there not used. So that is exactly what happened here*."

A related problem occasionally arises where technologies have to be removed from the shop floor due to technical flaws. When this occurs, the questions that workers typically ask sometimes go unanswered. "*Yes, are they fixing something? What's the plan? I don't remember if they might have told us. But as of now, I don't think they have*."

A favoured solution is for supervisors to engage in one-to-one conversations with workers to encourage and coach them either to continue to use the technology or to learn more about the reasons that account for non-use. Many participants agreed that introduced systems do need to be used: "*If the company had decided that the system should be used, it's not a choice*." Coaching was clearly regarded as preferable to the application of pressure or enforcement.

4.6 Continue to explore new use cases for technologies that are already in use

Workers highlighted engaging opportunities to use installed technologies more fully and creatively. Such technologies need not be confined to the uses for which they were originally designed or acquired. Indeed, *in almost every interview*, participants shared potential new use cases for implemented technologies, thoughts about new systems that could be applied, or additional ideas for improvement.

Unfortunately, workers often feel disconnected from management and as a result such suggestions are sometimes allowed to lie fallow. Ideas offered by workers to improve employee-management relationships and develop a more receptive team include introducing food trucks to the plant and everyone eating together or holding a clean-up day at a local park where all staff from the office and the plant work together. Overall, the technology introduction process should be seen as a starting point for reflection on additional usage opportunities.

Conclusion: A call to action

This report has highlighted, through the lens of front-line workers, insights on end-user involvement in technology introduction.

Understanding the perspectives of end users is important. However, to achieve successful technology implementation and adoption – and thrive in the rapidly evolving manufacturing industry – organizations will have to consider employees' needs beyond augmentation technology and use these insights to develop sound workers' transformation frameworks. Only such an integrated perspective will lead to new best practices for human-centric, sustainable and effective technology introductions.

As manufacturing grapples with the challenges of a rapidly evolving landscape, companies need to extend their focus beyond experimentation. An integrated approach that combines knowledge-sharing among companies and collaboration with governments is imperative to navigate the complexities of present and future work environments successfully.

To address the opportunities and challenges arising from the manufacturing workers of the future, the World Economic Forum's Manufacturing Workers of the Future initiative aims to help companies and governments identify and adopt transformation programmes to support, attract and prepare manufacturing workers for the future.

Forthcoming work includes:

- Development of a workers' transformation framework to highlight successful human-centric transformation practices at a global and local level by collecting companies' insights and tailored approaches to capability-building, employee engagement and talent attraction at a global and local level (with an initial focus on China, India and the US)
- Identification of "lighthouses" – companies that excel in all dimensions of workers' transformation – to inspire organizations in the manufacturing and supply-chain environment and develop their employees at scale. This is in collaboration with the Global Lighthouse Network initiative
- Unlocking of new multistakeholder collaborations forged at the global and local level to attract manufacturing workers and prepare them for the ever-changing workplace

The future of work is shaped by the decisions of industry and government leaders today. This report is a catalyst for a new and ambitious agenda, urging companies, governments, educators and civil society to place the role of people at the centre of discussions concerning the future of manufacturing. With a shared commitment to human-centric approaches, the aspiration is to collectively create a future in which work enhances the well-being and potential of individuals in manufacturing industries.

Contributors

Maria Basso
Lead, Advanced Manufacturing and Value Chains, World Economic Forum

Thomas Bohné
Head, Cyber-Human Lab, University of Cambridge

Jessica Horn
Researcher, University of Cambridge

Francesca Zanolla
Initiatives and Community Specialist, World Economic Forum

Acknowledgements

The authors are grateful to all the thought leaders, experts and practitioners and their teams for their contributions to this insight report, as well as for their engagement with the World Economic Forum's Manufacturing Workers of the Future initiative. Thanks also to the US Center for Advanced Manufacturing for supporting the research in the US.

Production

Bianca Gay-Fulconis
Designer, 1-Pact Edition

Alison Moore
Editor, Astra Content

Citations

The paper was created as part of the Manufacturing Workers of the Future initiative, a collaboration between the World Economic Forum and the University of Cambridge.

Please cite this report as: Horn, J., Bohné, T., Basso, M. and Zanolla, F., *Views from the Front Line: Workers' Insights on How to Introduce New Technology*, World Economic Forum, January 2024: https://www3.weforum.org/docs/WEF_Views_from_the_Manufacturing_Front_Line_2023.pdf.

Endnotes

1. World Economic Forum, *Augmented Workforce: Empowering People, Transforming Manufacturing*, 19 January 2022: World Economic Forum https://www.weforum.org/publications/augmented-workforce-empowering-people-transforming-manufacturing/.

WORLD ECONOMIC FORUM

COMMITTED TO IMPROVING THE STATE OF THE WORLD

The World Economic Forum, committed to improving the state of the world, is the International Organization for Public-Private Cooperation.

The Forum engages the foremost political, business and other leaders of society to shape global, regional and industry agendas.

World Economic Forum
91–93 route de la Capite
CH-1223 Cologny/Geneva
Switzerland

Tel.: +41 (0) 22 869 1212
Fax: +41 (0) 22 786 2744
contact@weforum.org
www.weforum.org