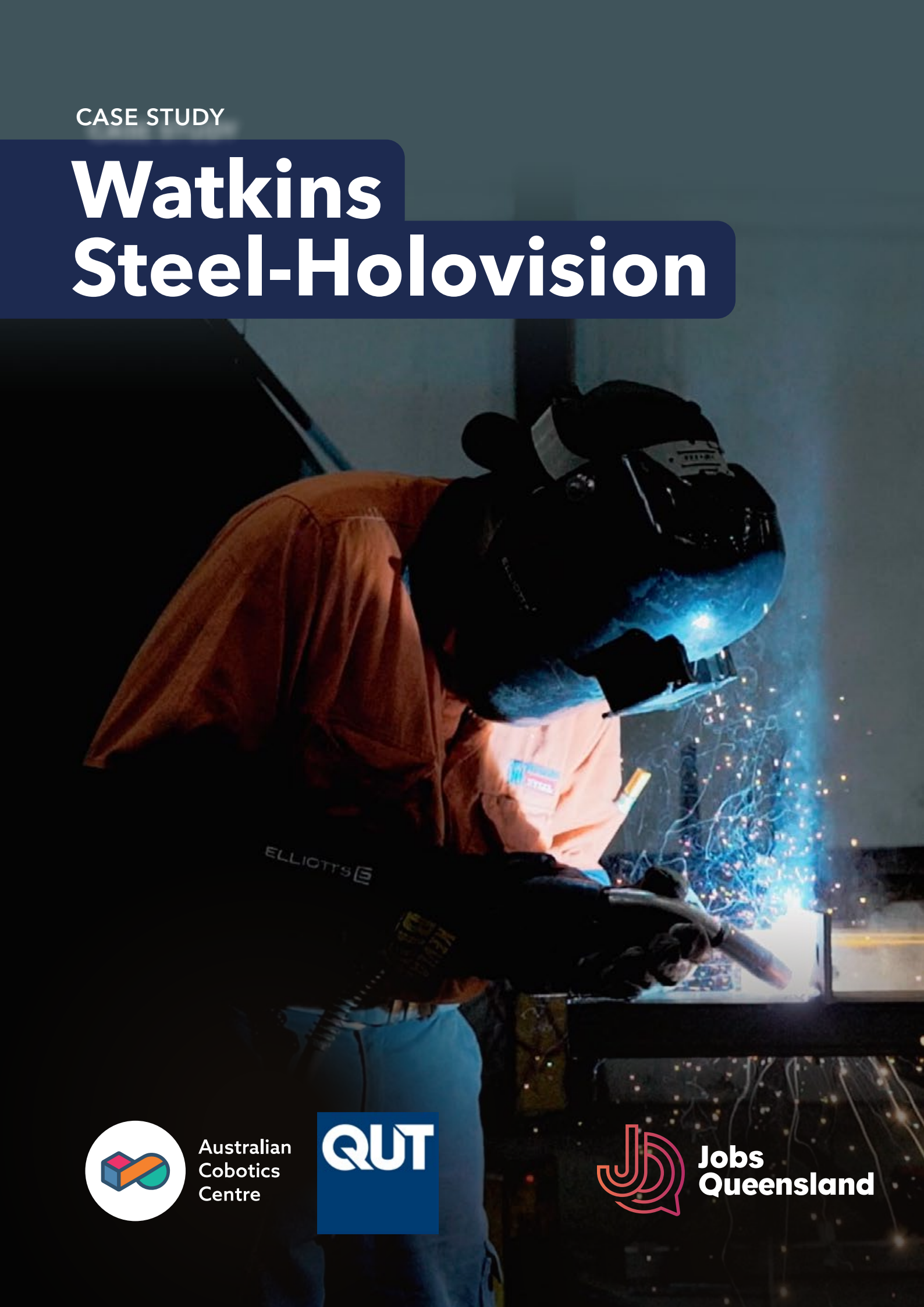
CASE STUDY

Watkins Steel-Holovision



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Watkins Steel-Holovision

Watkins Steel is a Brisbane-based company specialising in structural steel and metalwork fabrication. Operating since 1968, it services clients in multiple industry sectors growing from a base in construction and mining. As part of its journey to Advanced Manufacturing, Watkins commissioned its first line of robotics in 2014. Since then, the company has experienced growth averaging 20% year on year. In terms of employment, for every line of robotics that the company has commissioned, it has employed approximately an additional 10 people per line. Watkins Steel has recently expanded their footprint even further.

In 2018, it had 2500 square metres. Two years ago, it added a 4000 square metre factory. In 2022, it is adding a further 3500 square metres. Growth means more employment, and Watkins Steel is building a workforce that shares the company's reasons, purpose and passion, namely, to compete with the 600,000 tonnes of steel fabrication that is currently imported to Australia every year. Since 2018, spurred by this growth based on automation, robotics and digitalisation, the company not only grew employment, for example, in their in-house drafting department, but has created a complementary company, Holovision, which provides spatial scanning services and 3D digital solutions.

Holovision has been growing faster than Watkins Steel.

The impetus for Holovision was recognition that the robotics lines were only productive if the information they were fed was accurate. This led to developing the capability to laser scan sites for measurement and surveying, and the development of a digitally integrated four-step robotic steel fabrication process that guarantees near-100% accuracy. Holovision can now provide its scanning and data services to a wide range of clients from sectors such as utilities, transport and manufacturing production. Since 2018, it has developed a presence in Melbourne, Darwin and Cairns and has international data scanning customers. Working from Darwin to Melbourne, the company has applied scanning to everything from television sets to sand volumetric measurement in rivers.

Considered together, Watkins Steel and Holovision exemplify a remarkable transformation from a very traditional steel fabrication company and demonstrate innovative approaches to the challenges of building the Advanced Manufacturing workforce of the future.

PAA 1 | Positioning the manufacturing workforce as a key player in the journey towards Advanced Manufacturing

Across the sector, traditional mindsets are a barrier to Industry 4.0

The biggest point … it's changing the mindset of people, yes, they can do it with a tape measure … measure things, build things and then try to fit them. Whereas with this technology, we do not have to. But it's getting them out of that mindset, that they've done this for 5, 10 years, and it works. This can make it quicker, but they have never seen it. So … that is going to be the hardest thing … just convincing those guys to adapt and change

- Drafting Manager, Holovision

A culture of experimentation and innovation

Workers are encouraged to have 'crazy' ideas and test them with experimentation. That is, there is a very strong innovation culture with world-leading research and development (R&D) happening on the factory floor, led by teams of digital experts and trade workers. For example, Watkins is seeking to develop technology that enables every robotic arm to work independently rather than relying on a pre-programmed XYZ axis. Workers are thus experimenting with more movement of those robots through the factory. If a robot falls outside of the parameters, the team rewrite the algorithm on the fly, incrementing capability in real time. R&D is integrated into factory work. Another example of this R&D tinkering is harvesting electricity from the existing conveyors.

So, if you've got a two-tonne beam or one-tonne beam rolling out of these conveyors, the conveyors are going to roll no matter what. The workers came up with the question: 'Can we link up, say, three rollers to an alternator and a battery pack to turn that kinetic energy into electricity and store energy in a battery?' All of a sudden you are creating this energy from nothing, from something that was just wasted. Now, that might capture 0.01% of total energy to start. That 0.01% might get to 0.5%, which might get to 2%. All of a sudden you are an energy company … In short, you give the staff the parameters and the licence to come up with their own ideas and it's exciting. Watkins could have an animation department before too long, to show the sequential construction process in virtual reality or augmented reality and link it to various construction programs – a powerful visualisation tool.

- Managing Director, Watkins Steel

Being willing to learn from the workforce

It is important for the company to be open to new ideas, and to bring in talent with new ideas and combine them with the seasoned experience of older workers.

The young engineering students from universities, they have got all the theoretical ability with not much practical ability. So, you mix them with the experienced boiler makers and magic happens.

- Managing Director, Watkins Steel

For other workers … at this point, the automation is not … completely removing the job but I think a lot of warehouse type work and manufacturing workers should be considering where their careers will go in 5, 10 years. Because I can see automation picking up quite rapidly in that time frame and their jobs may not exist in the same abundance … because of automation.

- Quality Assurance Tester, Holovision

A culture of 'change is the norm'

I think once people accept the fact that robots aren't going to take their jobs, workers can embrace change. Watkins embraces the cultural momentum of change. Every 10 years, since its inception back in 1968, Watkins has moved factories. Every time they move, they double in size. That's got nothing to do with technology. It's ingrained in the company that there will always be change. They always invest in new equipment. They might try different service offerings or they might stop service offerings. There's always been change with technology. It's just a line of change. I think people now accept change and they want to be the drivers of it rather than get towed along. The mantra is: "Anybody can copy what we do today. They can't copy what we will do tomorrow."

- Quality Assurance Tester, Holovision

The adjustment that occurs when new technology is implemented is accepted as positive change.

It is going to take time for these automated processes to work … because it is new technology, it is difficult to get right 100% of the time. It is going to change, it is going to be imperfect at first, but it will get better and, as it gets better … the company will save more and more money, as it becomes more efficient. So, it is worth it in the long run.

- Quality Assurance Tester, Holovision

PAA 7 | Building a highly skilled, adaptable and capable existing workforce

Proactive approach to skills issues

Watkins' philosophy is if there is to be a skills shortage, the time to act is now. Part of this philosophy is to send various groups overseas to conferences, courses and seminars. The company believes it is important to learn from what other companies, other countries and even other industries are doing to see if it can be adapted to Watkins and Holovision. The aim, however, is not just technology for its own sake; it is to work out how to commercialise, commoditise and monetise the latest technology and services.

Relationships with education institutions

On the journey to Advanced Manufacturing, training and relationships with educational institutions have been essential, and a point of difference in the market (e.g. the relationship with QUT and other education institutions).

Watkins has also benefited from great training programs through high schools and apprenticeship schemes, and through these relationships has obtained cadets, trainees and workers.

Training at Watkins also values very informal on the-job-processes

Learning on the job can touch all facets of the business. Watkins works with some local high schools to provide work experience opportunities. The company has a relationship with a registered training organisation which facilitates apprenticeships in Watkins, and it tries to retain apprentices and invest in people, longevity and career paths. For its drafting department, Watkins pays an external trainer to come in to train up their cadets in practical, cutting-edge skills. The company believes the more you invest in training, the greater the return on investment.

> *A number of types of training we do here, formal, informal, internal, external, and it is an open space here in the office … that is how we do the bulk of our learning. … We work with people from a number of different backgrounds, a number of different drafting companies. There [are] four or five different ways to do something here. So, one person does something somewhere. They just sing out: 'Hey, [has] anybody ever done this type of connection before?' You will get four different answers. Then we will have a bit of a group chat about it. Some managers might look at that as, 'Hey, that's not very time-effective', but essentially, you find the best way out of those four ways to do that connection. And that is the way the team will do it from there on out. I think that is the best type of training. It is the most effective way to learn because we are all going to be working on a live project … We're not in the classroom, working on some theoretical connection that we possibly never going to have in a real-life job. So, this way, it's on the job. It's a lot of training and … group training as well.*
>
> ***- Drafting Manager, Holovision***

While investment in training makes staff very employable in other businesses, this investment makes their company even more desirable as an employer.

Investing in training and recruitment is the key to R&D and innovation

Investment in training and recruiting young skilled digital workers has been important because they introduce new things to the company that had not been considered possible.

> *New recruits worked out a way to link a Tekla file or a Tekla drawing to a QR code. This means you can open it on your phone, then use augmented reality to position things on site. They worked out a way to scan an object using their phone and link it to a 3D printer. And now they are looking at ways to print a QR code on steel as a permanent record.*
>
> ***- Managing Director, Watkins Steel***

The company view is that even if some of these experimental innovations fail, the technology, information or software that they learn along the way are useful for the base understanding of production and robotics.

Expect and empower people to be responsible for their own continuous learning

The learning culture at Watkins prizes the adage that it's always better to ask for forgiveness than permission. Supporting experimentation and learning with resources is the rule rather than the exception, and if that trust is abused it's a very small price to pay to work out that the employee is not a cultural fit.

> *The best resource I can give any of my line managers isn't a new computer and it isn't a car. The best resource I can give is a credit card – this is really a metaphor for trust. If staff see anything that would either make us money or save us – the value of a piece of kit or training or whatever they want – they usually get it.*
>
> ***- Managing Director, Watkins Steel***

Continuous learning also means gaining job-relevant experience in addition to qualifications.

> *You have got architectural drafting, electrical drafting … mechanical drafting, structural … drafting, engineering drafting … . You have got one course that covers all those things … How much detail can you get into each of those areas, in one course? … . Even though you have done that qualification, you have not actually worked in the industry just yet … you have got to assume that they do not know what you're doing because that course that I've just told you about doesn't teach you anything that we are doing here.*
>
> ***- Drafting Manager, Holovision***

Soft skills are important

Problem-solving and communication are two skills considered essential for manufacturing workers today and into the future.

> *Work independence … having workers that can solve the problem themselves, because there is going to be a lot of problems just in attempting to automate things, especially on a complex scale, and if every worker needs to continuously go back to … a manager … to solve every problem it's going to be a bit of an issue … it's going to slow things down … definitely communication, because when you solve those problems by yourself you have got to explain how you solved it. Because someone, after you will run into the exact same problem … so the more you communicate your problem-solving solutions, the more solutions; the whole team has to grab from their, like, toolkit solutions. So, communication and individual problem solving I would say the two big ones.*
>
> ***- Construction Modeller, Holovision***

Leadership by empowering others

> *The biggest change that I've experienced is I realised that I was the biggest obstacle. You just get out of the way. Once you accept that, you know there's smarter people than you. And once you accept that other people can do better with your own company than what you can, it's liberating.*
>
> ***- Managing Director, Watkins Steel***

This philosophy permeates the company at all levels and is a key element in developing agile and continuous innovation.

Learning to manage rapid growth

Perhaps the biggest challenge that the company has faced in their expansion and growth of 20% to 50% per year is managing cashflow. Innovation is a cost, and growth and expansion require capital. To deal with this, managers need to learn how to have great relationships with banks and attract good customers who provide a long-term pipeline and financial stability.

Innovation is the competitive advantage in Advanced Manufacturing

Watkins believes that its R&D and innovation leadership mean there is little competition in its market in south-east Queensland.

Therefore, with less than 2% of that market and strong R&D leadership, the toughest competitive challenge Watkins faces is competition from overseas. One of the driving factors for Watkins' passion for innovation is that it wants to be competitive in overseas markets.

Managers themselves need to learn and grow if they expect others to do so

The leaders in Watkins are challenged to travel internationally to share knowledge and learn new things. For example, the Chief Executive Officer has presented to the Heavy Engineering Research Association in New Zealand, Belmont industries in Omaha, Nebraska, and was invited to go to the Andrew Maintenance Group in South Africa.

> *[The company is] always sending us off to seminars and presentations all over the world and people that you meet at these places are … very professional. … there is always … wherever you go around the world, someone is doing something a different way. But, I am proud to say, out of all the professionals I have seen at these seminars, I still haven't seen someone doing all the things that we're doing.*
>
> ***- Project Director, Watkins Steel***

PAA 8 | Increasing the diversity of the manufacturing workforce

A challenging task requires innovative approaches

Watkins is keen to encourage more gender diversity in the very traditionally masculine engineering or blue-collar industries, notwithstanding the well-known challenges that exist to achieving meaningful improvement in them. Considering the difficulty of attracting female job applicants, the company has sought to build relationships with all-girl secondary schools and also to recruit from overseas.

> *'I suppose in a way it's more about education and going to back to high schools and letting them know what the education would be and what they're capable of.*
>
> ***- Managing Director, Watkins Steel***

Recent successes in improving gender diversity are the recruitment of two female engineering drafters and a survey/reality capture technician. The company is actively considering recruiting female engineers from countries where gender diversity is better than in Australia for engineering and blue-collar industries.

> *It used to be like 10% female to male in the university and the degree, but I think now it's more closer to 30% or 40% female, 60% or 70% male … as far as I'm aware, that sort of needle has been moving, for engineering, to 50/50 split and I think over the next few years that'll trickle down into the workforce … as people do the degree … the workforce will slowly develop into a 50/50 split.*
>
> ***- Quality Assurance Tester, Holovision***

Robotic automation presents an opportunity for less physically demanding work

Experience with robotic automation of the steel production lines has suggested the future of manufacturing could be less physically demanding and require more intellectual skills. This may be more attractive to the next generation of female manufacturing workers. For example, some research indicates that females are better at some design components in augmented reality (AR) and virtual reality (VR), so that may serve to attract more women in those fields. The improvement in safety due to robotics may also present an opportunity to increase diversity.

Approaches for the older workforce

Watkins prides itself on long-term employment opportunities. In its management and foreman teams are employees who have been with the company for 20 to 30 years.

> *In terms of trades and management, the key principle is 'getting the old heads mixing with the new heads.*
> ***- Managing Director, Watkins Steel***

For example, the new Director of R&D has never worked as a boilermaker, so:

> *He doesn't know the pain points. He doesn't know what it's like to drill 10,000 holes in a day! However, new technology can solve those pain points if you mix the traditional trades with workers who have the new technology skills. One plus one equals three.*
> ***- Managing Director, Watkins Steel***