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# COBOTS IN ACTION

Introducing new technology - Workforce implications


**Date: November 26, 2025**

## ACKNOWLEDGEMENT OF TRADITIONAL OWNERS

QUT acknowledges the Turrbal and Yugara, as the First Nations owners of the lands where QUT now stands. We pay respect to their Elders, lores, customs and creation spirits. We recognise that these lands have always been places of teaching, research and learning.

QUT acknowledges the important role Aboriginal and Torres Strait Islander people play within the QUT community.

# ABOUT PROGRAM 5

Our research program aims to answer research questions associated with:

- future skills;
- design and safety of jobs of the future;
- managing workplace readiness for the successful implementation of collaborative robotics; and
- the benefits of greater workforce diversity and longevity.

**For more information about our research projects**

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**A/Prof Penny Williams**
Research Program Co-lead

**Prof Greg Hearn**
Research Program Co-lead

**Dr Melinda Laundon**
Postdoctoral Research Fellow

and many other talented researchers, including our PhD students

# The Rise of Collaborative Robots

A collaborative robot (cobot) is designed to work **directly** with human operators in **a shared workspace.**

- **Easily programmable**
- **Flexible**
- **Equipped with sensors to prevent injury**

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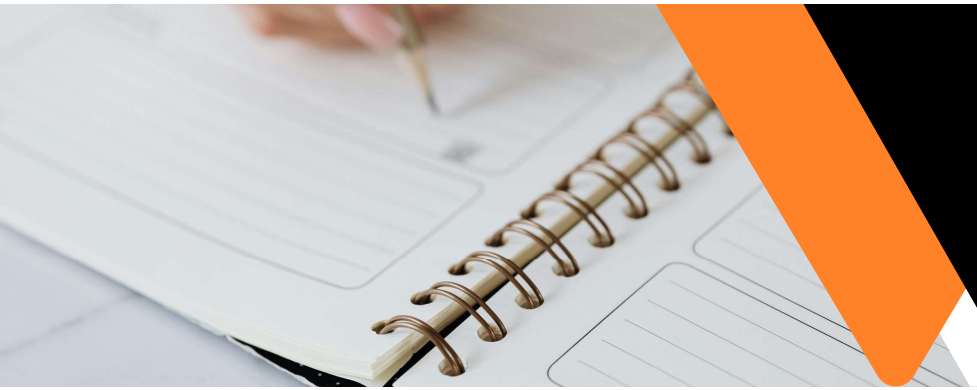
Poll

# What are your biggest workforce concerns about implementing cobots or other advanced manufacturing tech?



# AGENDA

| | | |
|---|---|---|
| **Key factors in adoption of cobots** | 01 | Prof Greg Hearn & Nisar Channa |
| **Cobot usage and work design** | 02 | Phuong Anh Tran |
| **Future of manufacturing workforce** | 03 | Jacqueline Greentree & Akash Hettiarachchi |
| **Next steps** | 04 | Dr Melinda Laundon |

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# Key Objectives

By the end of the session, participants will

**01** Recognise key factors in the adoption of cobots and other advanced manufacturing technology

**02** Understand how work design can be used to shape safe, productive, and engaging workplaces

**03** Reflect on future skills gaps and opportunities to support workforce development

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# KEY FACTORS

## IN ADOPTION OF COBOTS

Presented by Prof Greg Hearn and Nisar Channa

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# Future Factory

This manufacturing floor of the future includes cobots and people working together across a variety of tasks

Credit: Professor Jonathan Roberts, Dr Anjali Tumkar Jaiprakash, and Dr Benjamin Donnelly


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# THE DRIVING FORCES

## for adoption of cobots

- Labor shortages and rising labour costs
- Need for increased productivity and quality
- Demand for mass customization and flexible manufacturing
- Focus on improving worker safety and ergonomics

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# THE KEY FACTORS IN ADOPTION

Adopting a cobot is more than just a purchase; it's a **strategic** integration. Success depends on three interconnected pillars:

- **STRATEGIC & ECONOMIC FACTORS**
  The "Why"
- **TECHNICAL & OPERATIONAL FACTORS**
  The "How"
- **HUMAN & ORGANISATIONAL FACTORS**
  The "Who"

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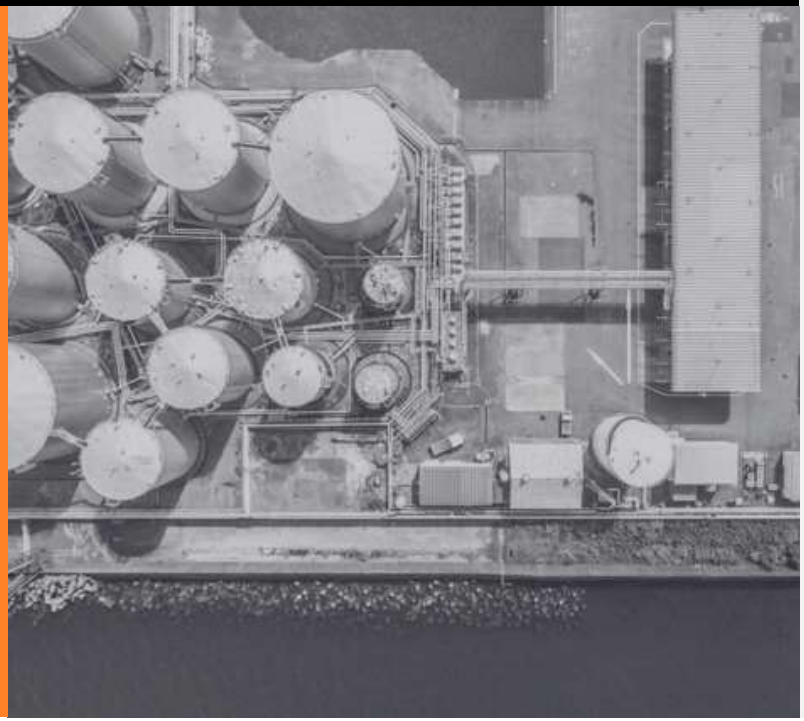
# STRATEGIC & ECONOMIC FACTORS



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## CLEAR BUSINESS CASE & ROI

- What is the specific problem we are solving? (e.g., bottleneck, quality issue, ergonomic risk)
- Calculating Total Cost of Ownership (TCO) vs. Return (ROI): Hardware, software, integration, maintenance.

## STRATEGIC ALIGNMENT

- Does this support broader business goals? (e.g., "Industry 4.0", "Reshoring", "Quality Excellence")

## FINANCIAL JUSTIFICATION

- Upfront investment vs. long-term savings (reduced scrap, higher throughput, less downtime).

# TECHNICAL & OPERATIONAL FACTORS

## TASK SUITABILITY & FEASIBILITY

- Is the task repetitive, tedious, or physically demanding? (e.g., pick-and-place, screwdriving, packaging, machine tending).
- Is the workspace predictable and structured enough?

## INTEGRATION WITH EXISTING SYSTEMS

- How will it connect with current machinery, ERP, and MES systems?
- **Interoperability** is key.

## SAFETY & RISK ASSESSMENT

- **Mandatory**: A formal risk assessment must be conducted.
- Even collaborative robots require safety measures (e.g., light curtains, speed/force monitoring).

## EASE OF USE & PROGRAMMING

- Can your existing workforce be trained to program and troubleshoot it?

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This is often the **most critical**, **overlooked**, factor.

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# TECHNICAL & OPERATIONAL FACTORS

## WORKFORCE DYNAMICS & CHANGE MANAGEMENT

- Addressing the "Fear Factor": Will robots take our jobs?
- Communication is critical: Frame cobots as tools that augment and assist, not replace.

## TRAINING & UPSKILLING

- Shift from manual labor to robot management, programming, and maintenance.
- Empowering the workforce leads to higher adoption.

## NEW ROLES & JOB DESIGN

- Creating new positions like "Cobot Technician" or "Automation Coordinator."

## LEADERSHIP & CULTURE

- Does leadership champion the project? Is there a culture of innovation and continuous improvement?

# INTERACTIVE EXERCISE

## IS YOUR TASK A GOOD FIT?

### INSTRUCTIONS:

**Think of a repetitive task in your own operation, and ask yourself:**

- Is  it Dull, Dirty, or Dangerous? (High suitability)
- Is the cycle time relatively long? (> 5 seconds is often ideal)
- Are the parts and processes consistent?
- Would freeing a worker from this task add more value elsewhere?

### DISCUSSION:

**Share your task and assessment with the group.**

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# THE IMPLEMENTATION ROADMAP

A 6-STEP CHECKLIST

STEP 01

## Identify & Select

Pinpoint a high-ROI, suitable application

STEP 02

## Feasibility Study

Conduct a technical and economic analysis

STEP 03

## Proof of Concept (PoC)

Run a small-scale pilot project

STEP 04

## Plan & Prepare

Develop a full project plan, including change management and training

STEP 05

## Implement & Integrate

Install, program, and conduct the safety risk assessment

STEP 06

## Scale & Optimize

Monitor performance, gather feedback, and identify new applications

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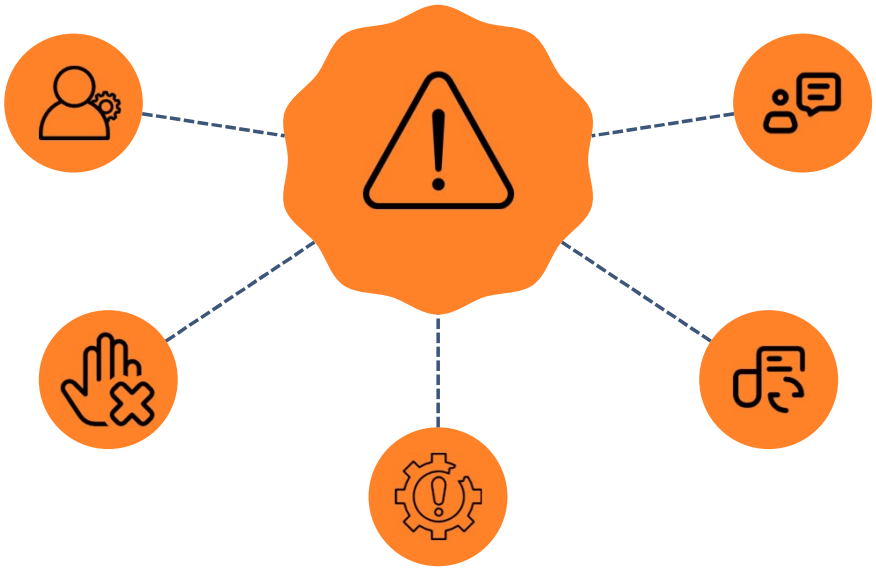
# COMMON PITFALLS TO AVOID

## PITFALL 1

Treating it as a pure technology project, ignoring the people.

## PITFALL 2

No clear business case or unrealistic ROI expectations



## PITFALL 3

Choosing the wrong application (too complex for a first project)

## PITFALL 4

Skipping the formal risk assessment and safety protocols

## PITFALL 5

Lack of internal expertise and long-term support plan

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# THE FUTURE IS COLLABORATIVE

- Cobots are becoming **smarter**, **more sensitive,** and **easier to use**.
- AI and vision systems will enable more complex, adaptive tasks.
- The focus will shift from automation to **true collaboration**, where humans and robots leverage their unique strengths.

***Final thought**: The goal is not to create a fully automated factory, but to build a more productive, safe, and engaging workplace where humans and machines work together.*

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COBOT USAGE &

# WORK DESIGN

Presented by Phuong Anh Tran

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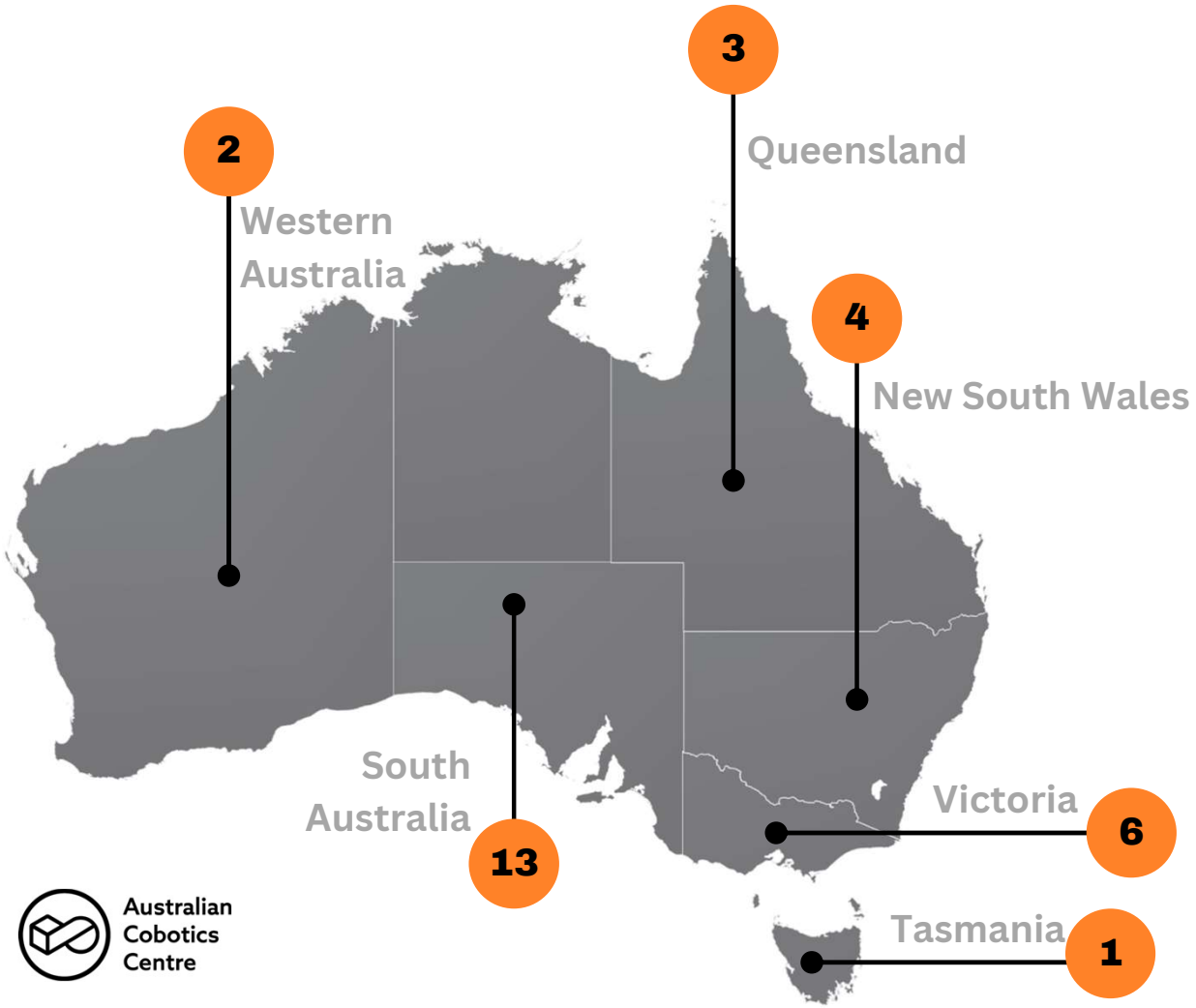
# COBOT USE CASES*

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## INDUSTRY SECTORS

Broad spread across different sectors (e.g., food & beverage, steel/metal fabrication, electronics, plastics/packaging, meat processing, household appliances, aircraft manufacturing)

## ADOPTION STAGE

The majority are operational, with some trials/pilots

## NATURE OF TASKS

Commonly labour-intensive, high-volume, repetitive, needing precision/consistency

## COBOT BRANDS

e.g., Universal Robots, KUKA, Doosan, Techman, Fanuc

*Data complied from public sources (2020-2025), identified via the ACC network, and direct company contacts

# REPORTED IMPACTS

## PROCESS REDESIGN

Changes in workflow & task allocation, & efficiency gains

## PHYSICAL DEMAND & SAFETY RISKS

Reduction/removal of repetitive & manual tasks, injuries & hazard exposure

## JOB CHARACTERISTICS

Freeing operators for higher-value/more meaningful work

Source: Create Digital

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Source: Freelance Robotics

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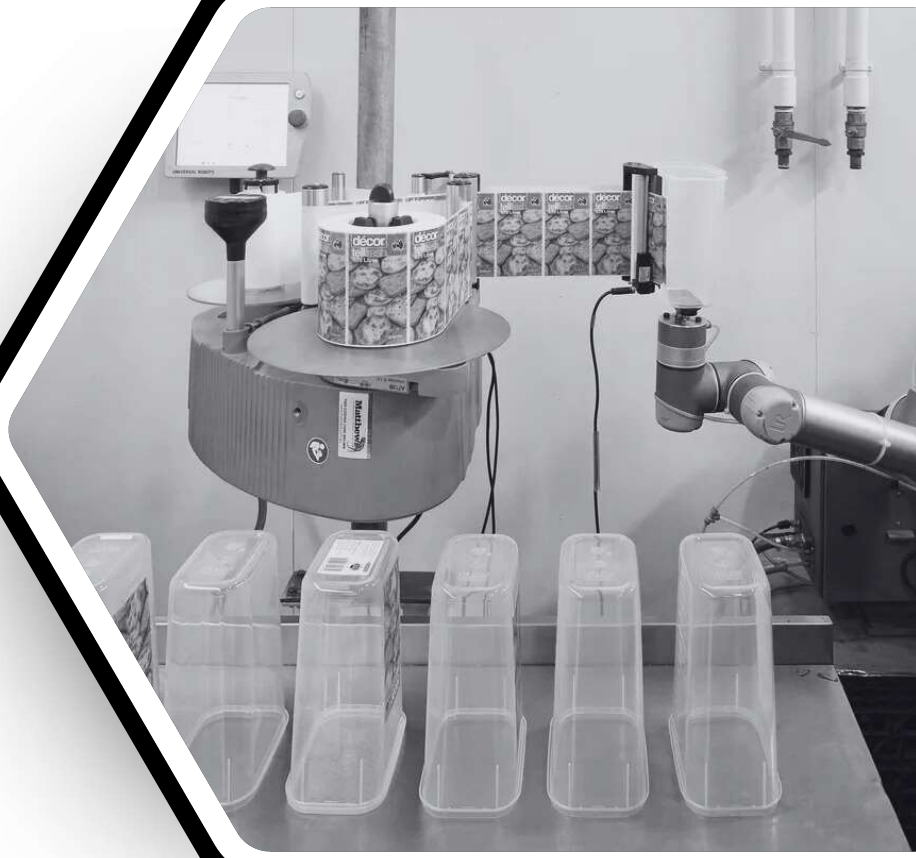

Source: Universal Robots

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# WORK DESIGN

## HOW JOBS ARE PUT TOGETHER

### DRIVES PERFORMANCE

The way jobs are designed can have a profound impact on employees

### SAVES MONEY

Design out hazards, design in safety & efficiency

### PREVENTS WORKPLACE ISSUES

Fewer injuries, lower turnover & training waste

### MEETS WHS OBLIGATION

Build safe systems of work for physical & psychological health

### ENSURES TECHNOLOGY PAYOFF

Thoughtful work design maximises benefits & minimises unintended harms.

Source: Safe Work Australia

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# WORK DESIGN IMPACT CHECKLIST

**PHYSICAL**
**CHARACTERISTICS**
e.g., chemical hazards

1

4

**PSYCHOSOCIAL**
**CHARACTERISTICS**
e.g., job control, feedback

**BIOMECHANICAL**
**CHARACTERISTICS**
e.g., manual handling demands

2

3

**COGNITIVE**
**CHARACTERISTICS**
e.g., mental complexity

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Good work design addresses **multiple characteristics** of work, and **the need and capabilities of the people involved**.

Source: Safe Work Australia

# FUTURE

## OF MANUFACTURING WORKFORCE

Presented by Akash Hettiarachchi and Jacqueline Greentree

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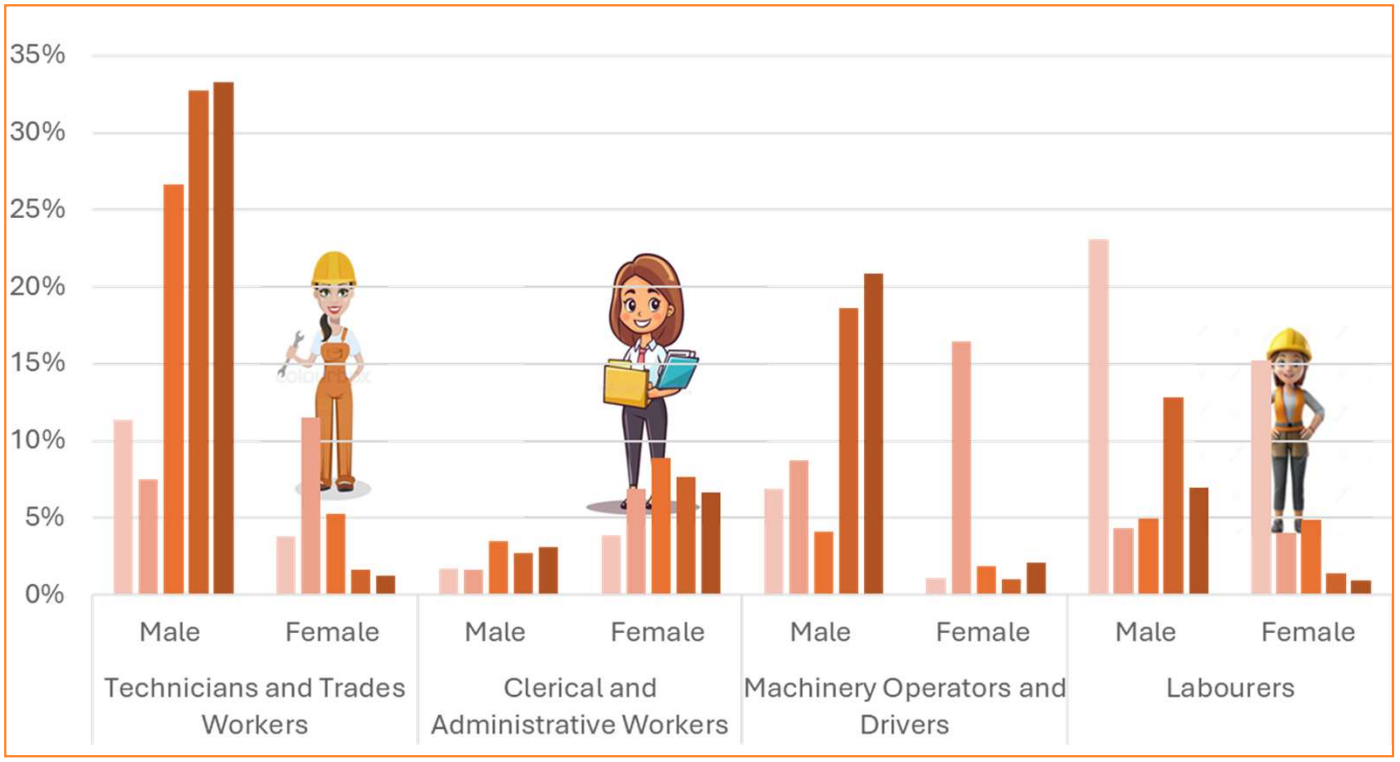
# OCCUPATIONAL GENDER SEGREGATION




**Workforce gender distribution based on job categorisation**

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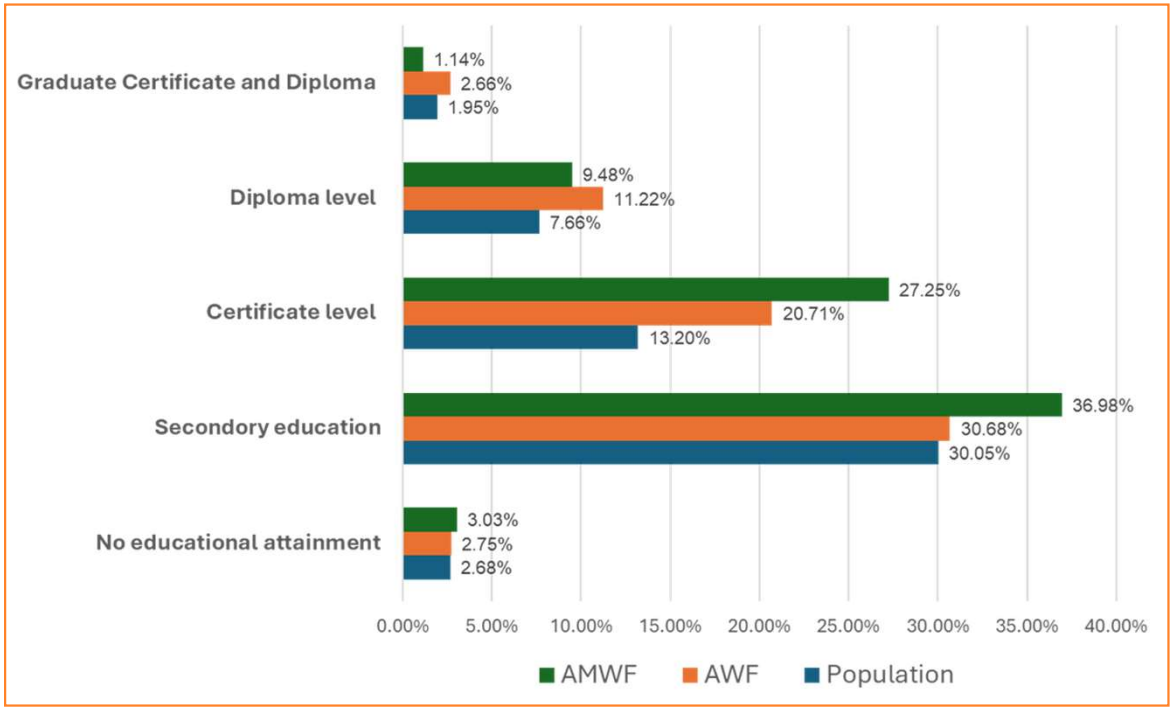
## How to attract women to male-dominated jobs?

# QUALIFICATIONS OF THE MANUFACTURING WORKFORCE




**Highest educational qualification of the Australian workforce and the manufacturing workforce**

**Do I 4.0 and advanced manufacturing demand the same qualification composition?**

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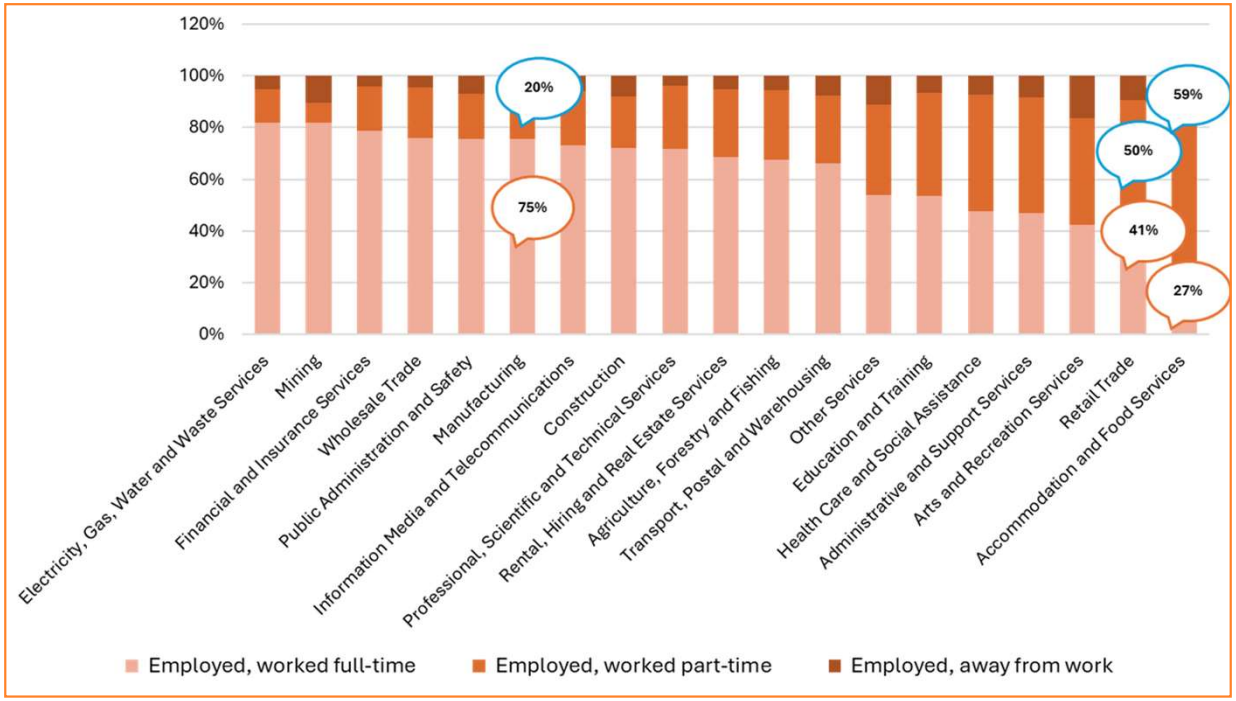
# PROPORTION OF FT & PT EMPLOYEES




**Job type of Australian manufacturing workforce and other industries**

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**Do new generations look for more casual opportunities to experience the industry?**

# TRAINING & QUALIFICATION

- To provide skills needed as technology changes work training is evolving beyond traditional qualifications (Cert III/CertIV)
- New partnerships between VET and higher education emerging
- New pathways include higher apprenticeships and "technical roles" aligned with Cert IV and Diploma qualifications
- Upskilling includes microcredentials and skills sets

# SKILLS FOR
# INDUSTRY 4.0

**Traditional hand** and **technical** skills are still important

**Transversal** skills – skills that cross boundaries and are transferrable

**Soft** skills needs are increasing

## ACTIVITY (5-10 MINS):

- Think/pair/share about transversal & soft skill identification/ development
- Use skill tool

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# PROPOSED SOLUTION

### New Work Environment

### Hand/Technical Skills

Traditional skills development models support this skill acquisition

### Soft & Interpersonal Skills

Harder to teach/embedded and evidence

# NEXT STEPS

1.Your key takeaway from this workshop

2.Your 'next Monday' step

3.Your 'next year' step

SCAN HERE

**Workshop resources**

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