



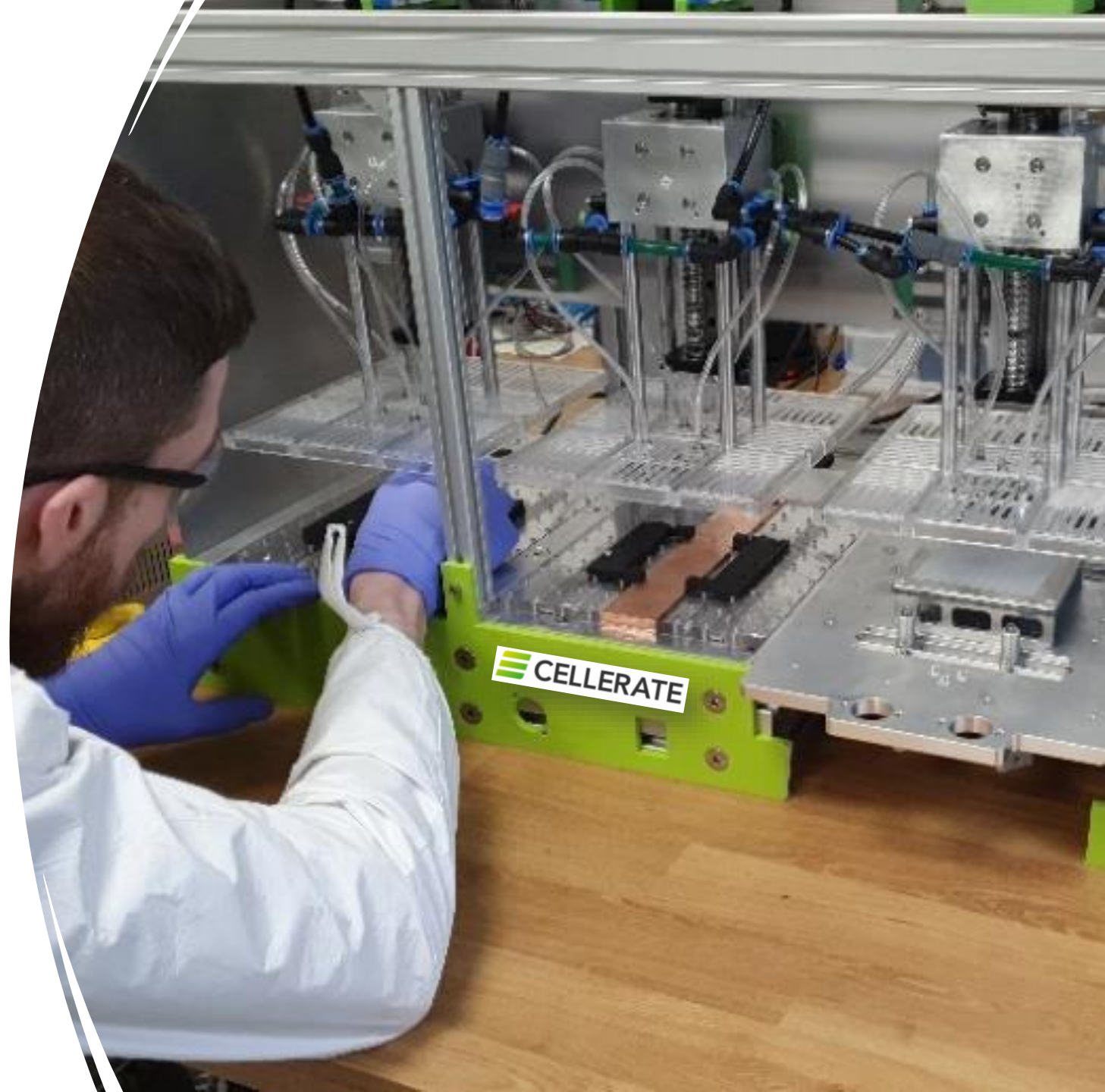
Automation for Batteries



Contact Details:  [richard@cellerate.co.uk](mailto:richard@cellerate.co.uk)  [www.cellerate.co.uk](http://www.cellerate.co.uk)

The opportunities  
behind identifying  
and applying  
automated  
solutions

---



The opportunity to automate  
Can itself create new opportunities

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# Common Opportunities in Automation



Increase  
efficiency



Improved  
quality



Reduced costs



Enhanced  
safety



Improve staff  
moral

# New Opportunities from Automation



CONFIDENCE IN  
AUTOMATION



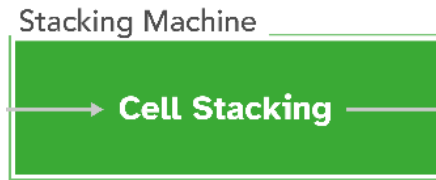
MARKET  
EXPANSION



NEW BUSINESS  
VENTURES

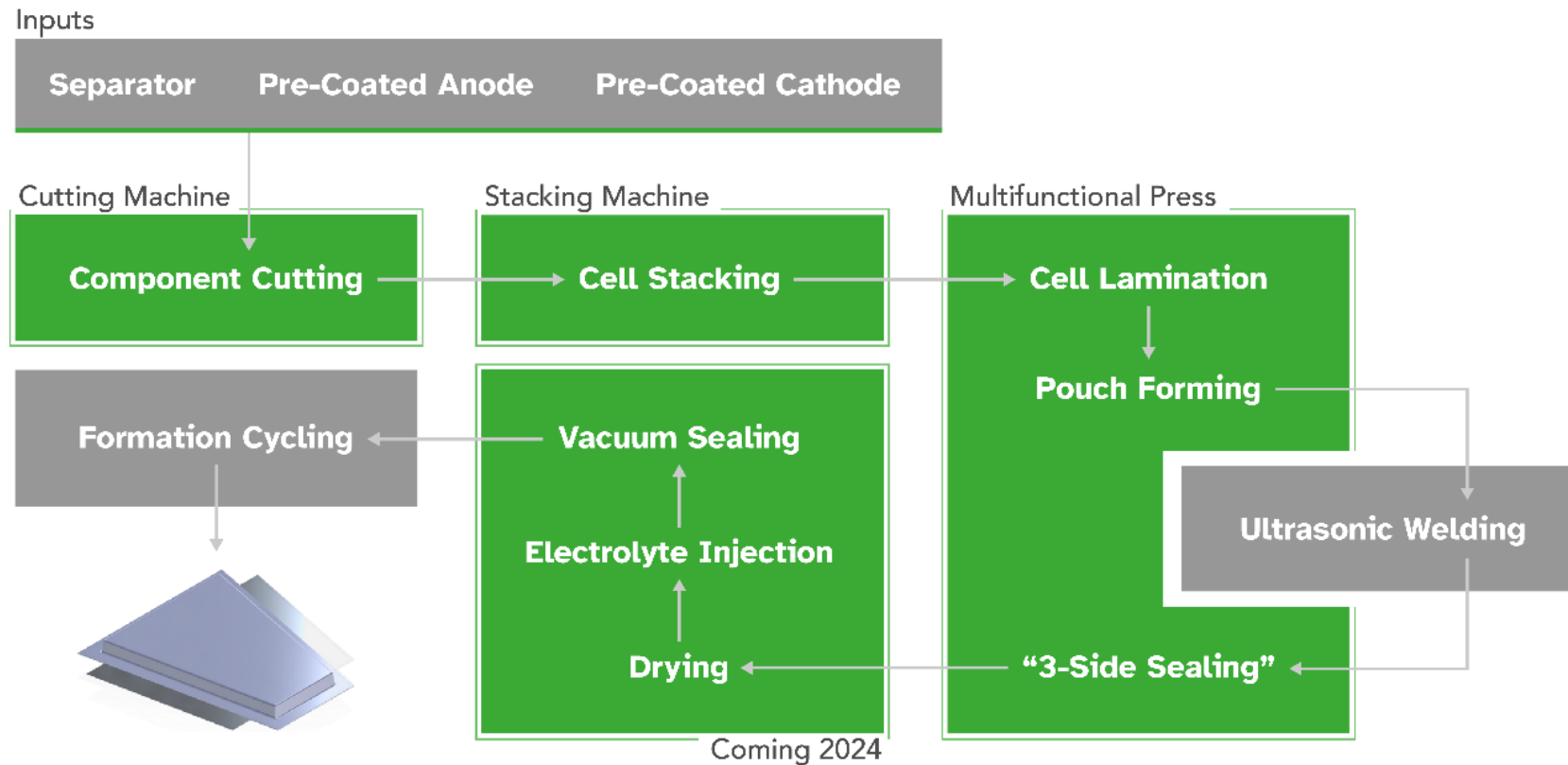


# Confidence in Automation



Once you pop

# Confidence in Automation



You just can't stop

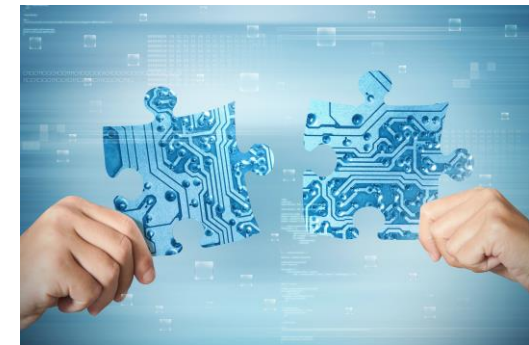
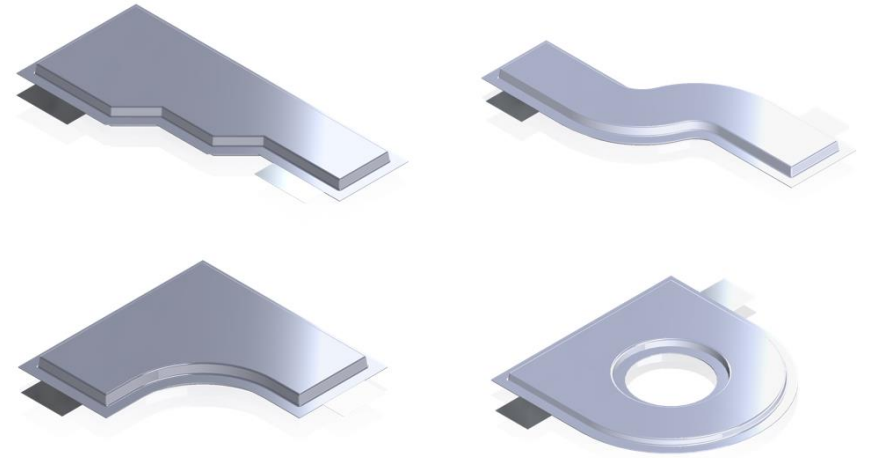
# Market Expansion

Extreme customisation

Do things which couldn't be scaled before

Provide solutions to suppliers and competitors

Their success is now your success





# New Business Ventures

Spin out a new automation company (harder)  
or make a joint venture (easier)

- Benefits of market expansion, but externalised risk
- Distribute the cost of developing automated solutions for your sector
- Learn about broader market needs and requirements

# New Business Ventures

Research Associate  
University of Manchester

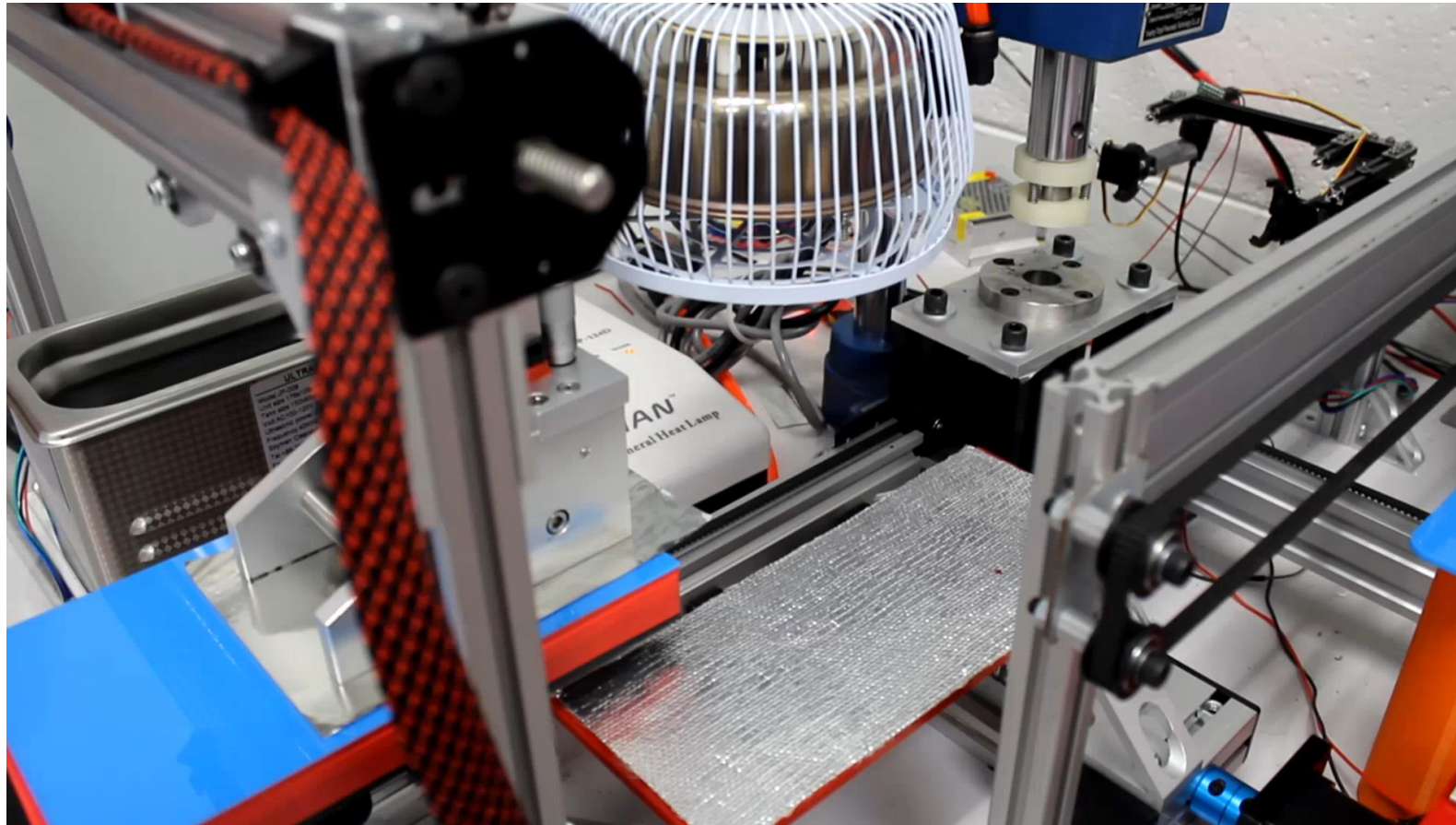
Managing Director  
Cellerate





Sounds great.  
How do we automate it?

Put a scientist, an engineer and software developer  
in a room for 3 months.



# Make a Plan

The one below is for making a new business

1	2	3	4	5
Proposition	Discovery	Validation Plan	Validation	Confirmation
1 week	2-4 weeks	2 week	3-6 months	6+ months
<b>Documents:</b> 1.1 Proposition Brief 1.2 Proposition Checklist 1.3 Discovery Pitch	<b>Documents:</b> 2.1 Discovery Roundup 2.2 Product Concept 2.3 Business Models 2.4 Sales CAD	<b>Documents:</b> 3.1 Validation Plan 3.2 Validation Pitch 3.3 Risk Register	<b>Documents:</b> 4.1 Customer Development Review 4.2 Product Development Review	<b>Documents</b> 5.1 Formulaic Share Agreement 5.2 Product Development Review

Don't be afraid to admit failure



# Discover the Pain

- Talk with scientists → Future process challenges
- Talk with technicians → Current process challenges
- Talk with customers → Business challenges
- Talk with competitors → Widespread industry challenges

# Understand What Is Needed

1

Review pain points  
Identify the links

2

Conceptualise  
the process  
for pain reduction

3

Identify high value  
process sections  
(break it down)

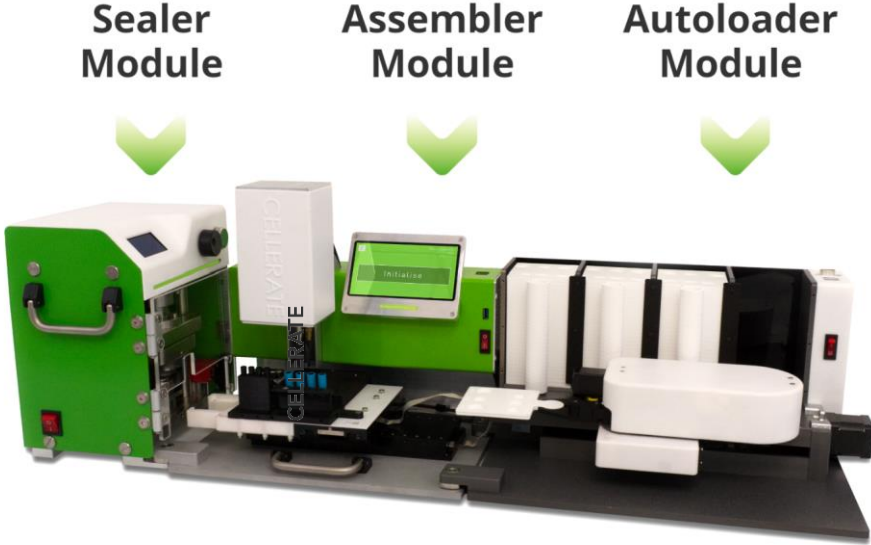
4

Learn how this  
process can be  
automated

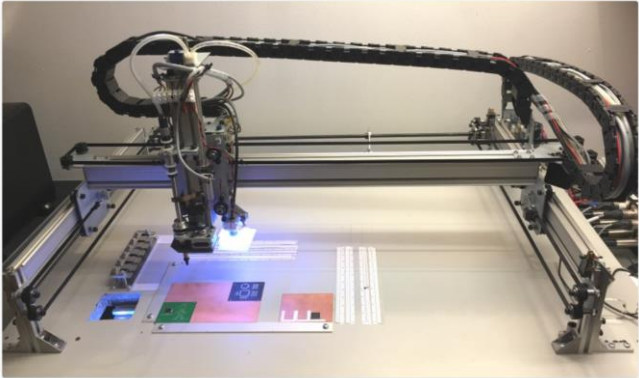
# Review the market, it might already exist



General Automation



Application Specific Automation



Repurpose other automated solutions



Ask CPI for help



**Biologics**



**Biotechnology**



**Pharmaceutical Processing**



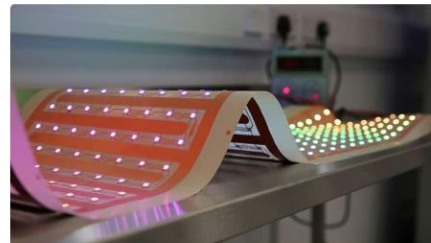
**Formulation, Materials and Manufacturing**



**Photonics**



**Printed Electronics**



**Flexible Hybrid Electronics**



**Digital and Data**

Great Company Names!

# Ask Specialist Automation Company



# We Are



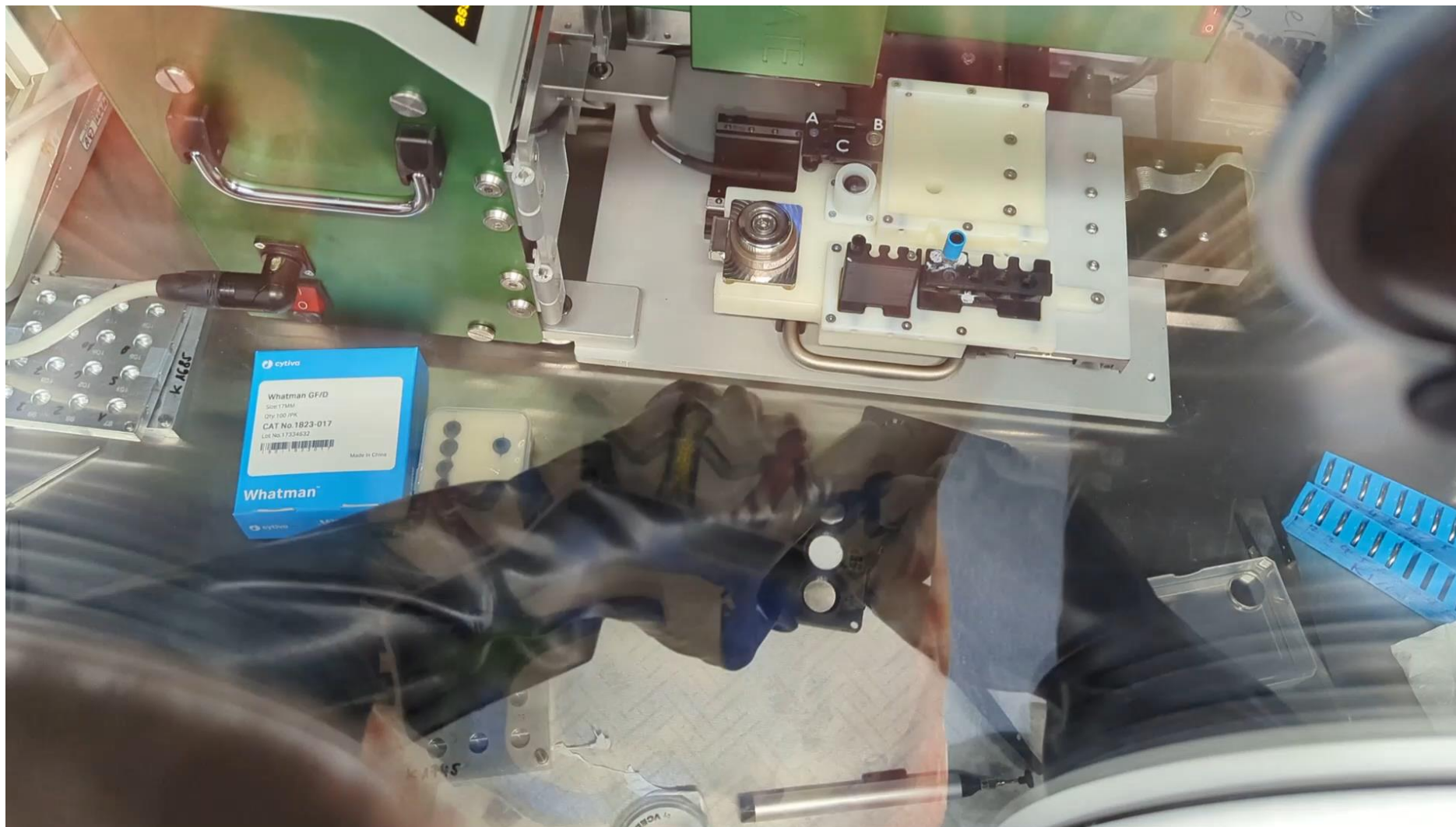
We are a UK based company helping world-class researchers improve their throughput and data quality

Our mission is to accelerate discoveries across battery research, development and quality control using automation



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# Coin Cell Assembly



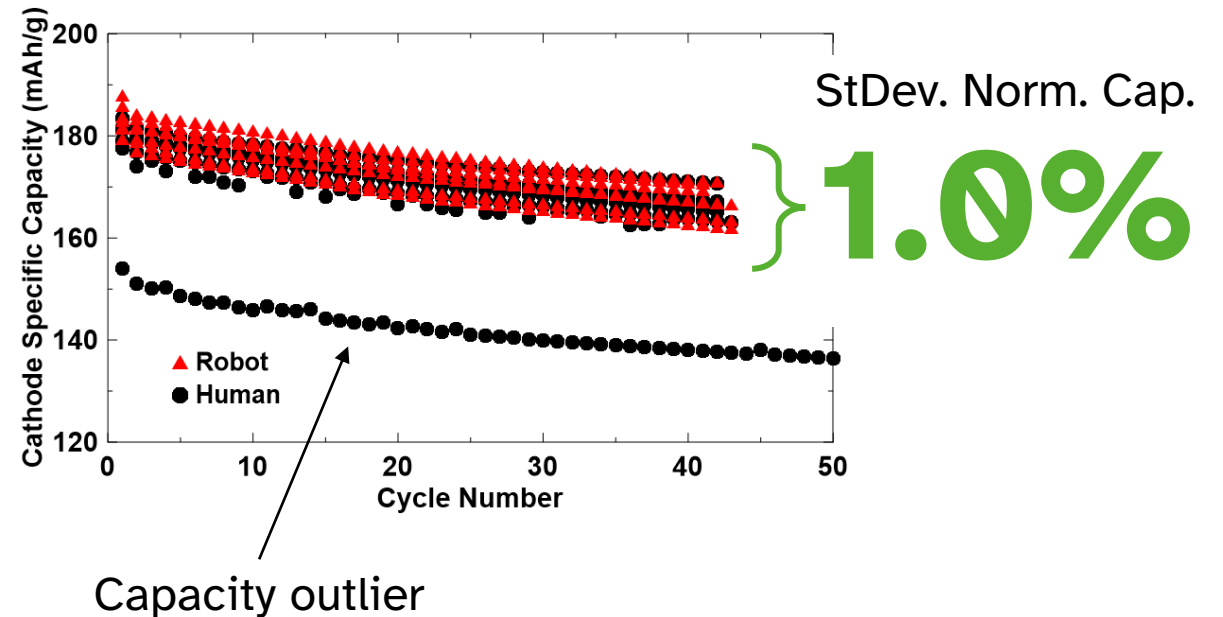
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# Trial with Prof Jeff Dahn

# 41%

faster cell building in  
semi-automated mode

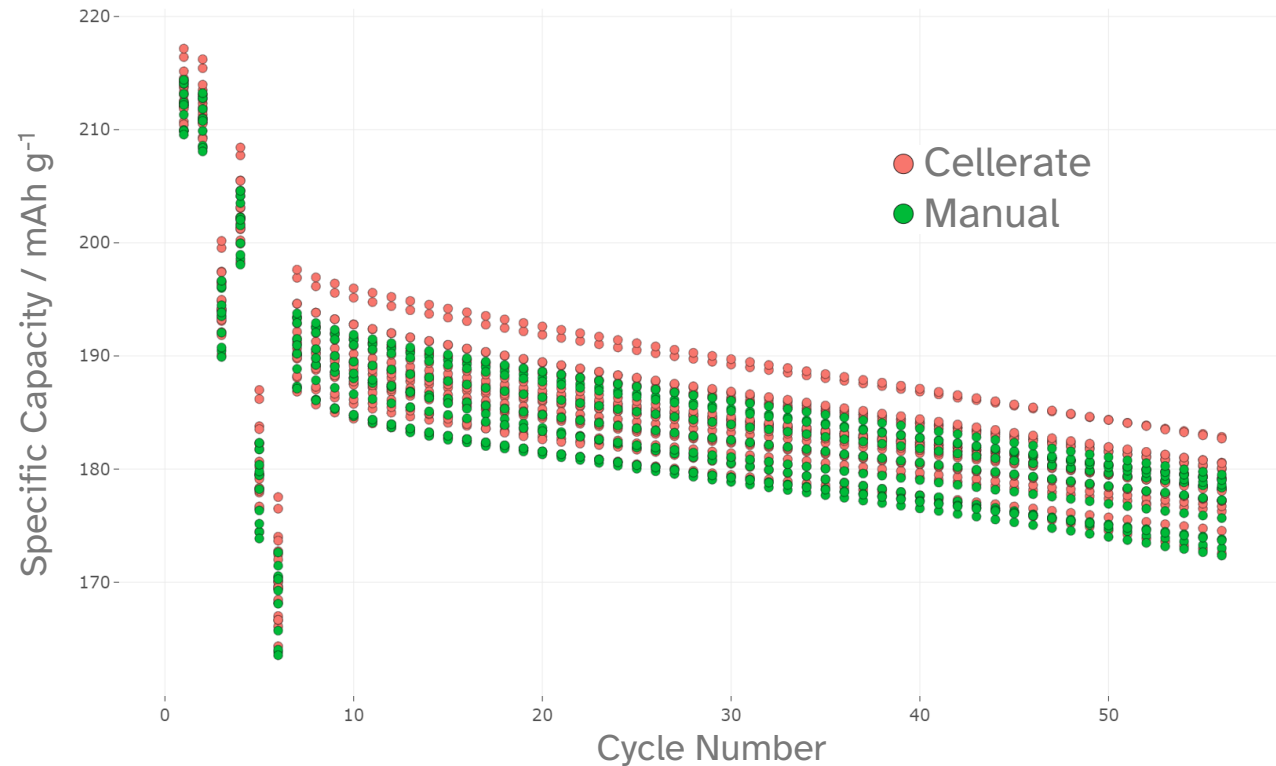
	Human	Cellerate
Total Cells	26	26
Failed Cells	2	0
Outliers	3	0
Yield	80%	100%



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# Trial with a Global Materials Supplier



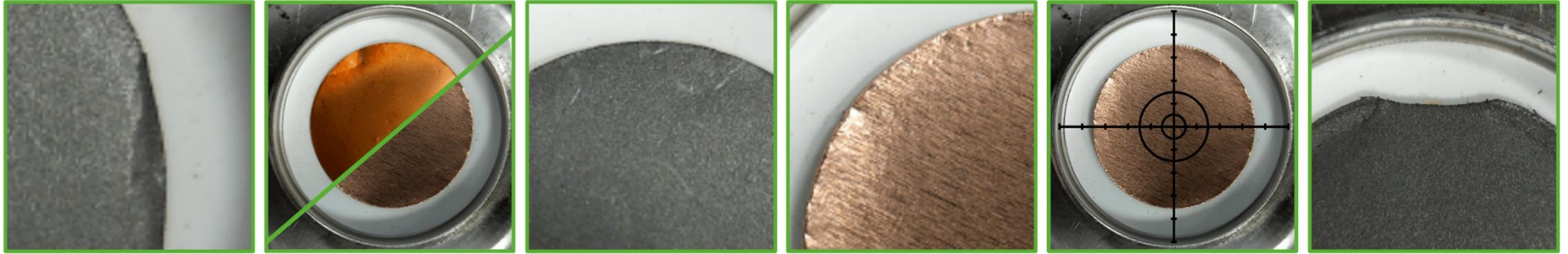
mAh/g	Cycle 10 Cap. / mAh g <sup>-1</sup>	Cycle 56 Cap. / mAh g <sup>-1</sup>
Manual	188 ± 1.4%	176 ± 1.5%
Automated	190 ± 1.6%	179 ± 1.4%

- Cells made with the Cellerate system gave **higher capacity and comparable standard deviation** to the manual ones.
- The R&D manager at the company said that with electrode alignment this consistent **you can clearly see the effects of coating quality.**



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# AI Quality Control



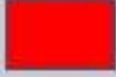
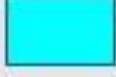


Component Capture Image

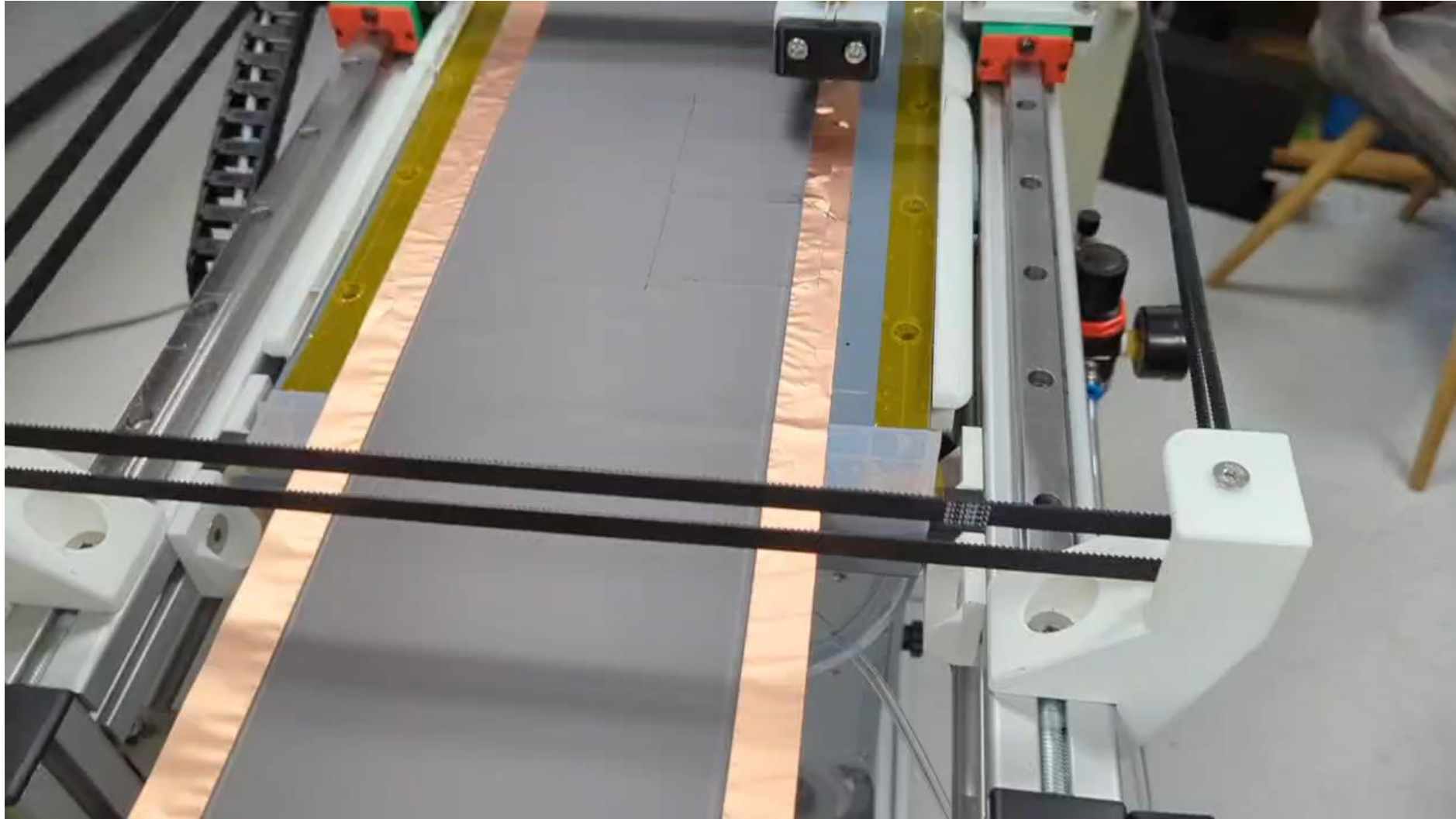


AI CellSight Prediction



Colour	Defect	% Area
	Crease	0.07%
	Scratch	1.89%
	Crack	0.06%
	Flaked Coating	0.00%

# Electrode Cutting

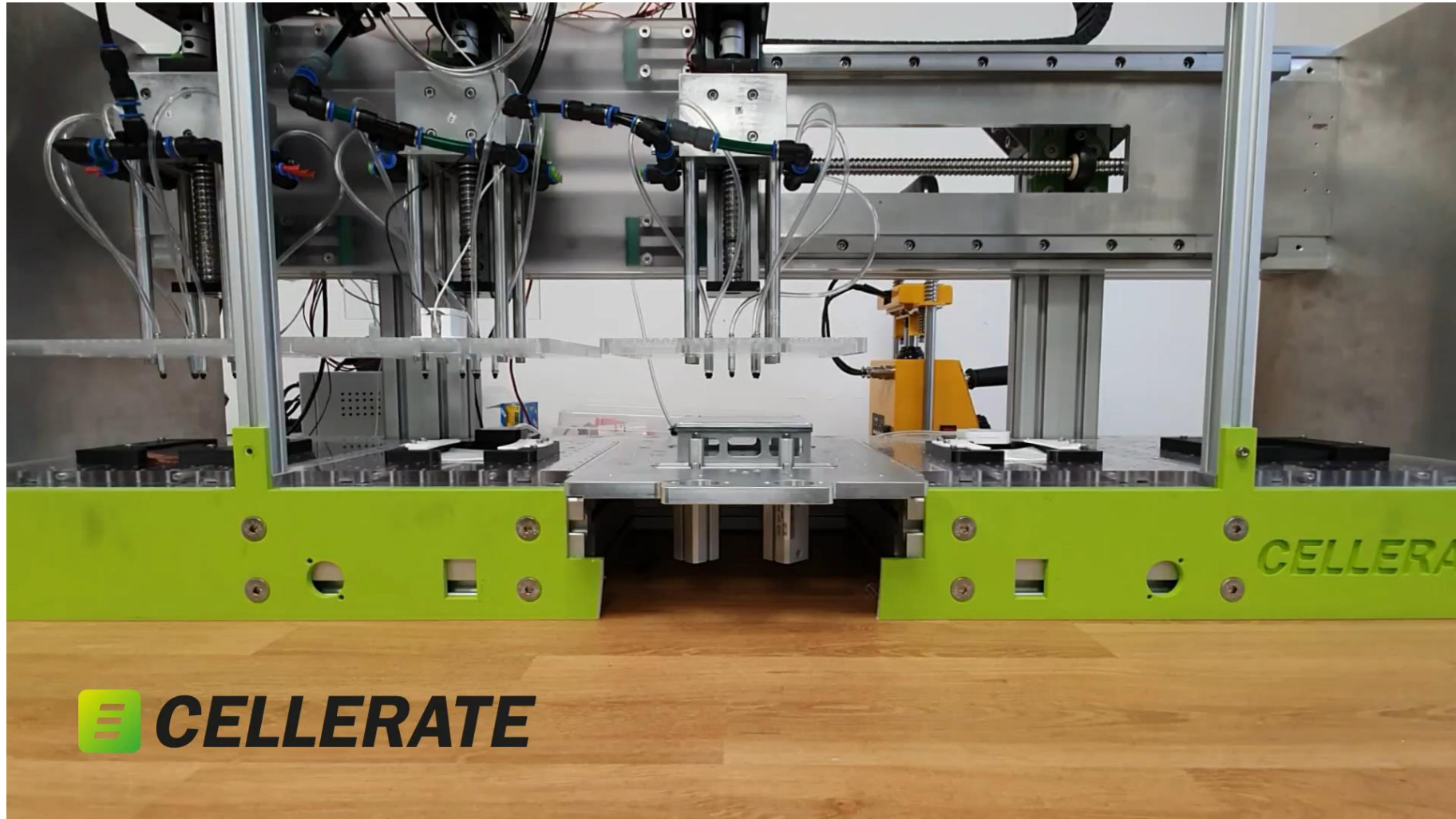


 **CELLERATE**

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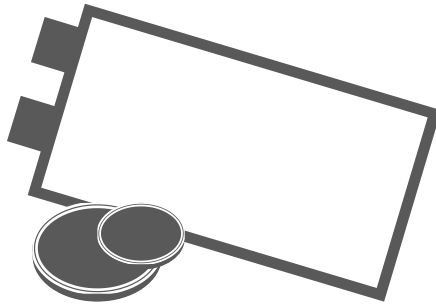


# Automated Cell Stacking



 **CELLERATE**

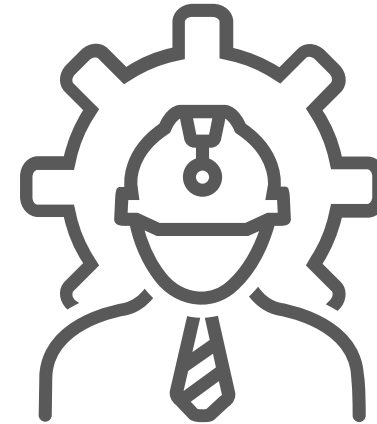
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Faster Battery  
Innovation



Cost  
Reduction



Gratifying Work  
Processes

All along the battery value chain

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Automation for Batteries



Thank you!

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