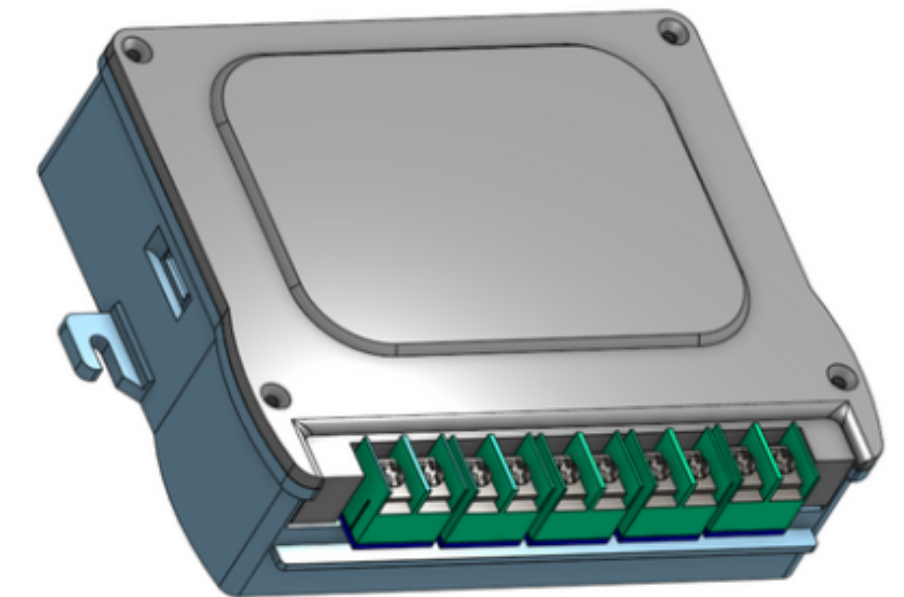
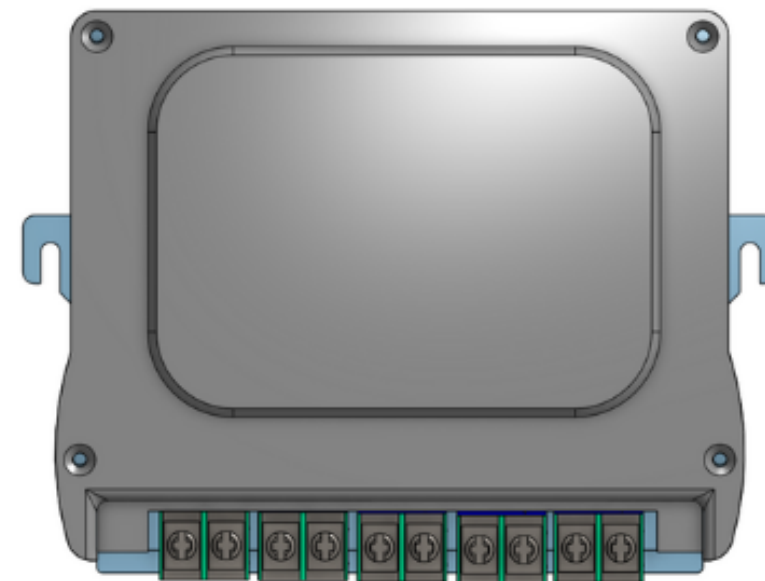


# SMARTER OVEN MONITORING: TELEMETRY FOR GEOTECHNICAL LABS

A PRACTICAL PATH TO BUILDING ROBUST  
TOMORROWS





# Agenda

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- Who we are
- The Problem
  - The Challenge
    - How oven's temperature is collected for certification purposes
  - Client Specific needs
    - Cost effective solution
    - Large number of applications
- Solution
- What next can be done ?



# Who we are ?

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- Rubens Moreno
  - IoT Engineer
    - My focus is on making data accessible, actionable, and aligned with project goals



# Who we are ?

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- Geotechnics

Since 1959, Geotechnics has been New Zealand's foremost civil engineering testing company. We operate internationally, offering a suite of testing and monitoring services, as well as taking care of all equipment needs.

- Cirro

Cirro combines trusted geotechnical expertise with modern connectivity, offering smart solutions for monitoring even the most remote or challenging environments. Designed for efficiency and built to adapt, Cirro keeps your data flowing, your teams informed, and your projects moving, no matter the terrain.



# The Challenge: A Manual Process



- Civil Engineer Labs pursue IANZ accreditation, which require daily or frequent reading of ovens' temperature
- Humans are susceptible to errors
  - Misreading
  - Forgetfulness
  - Typos



# What can be done generally ?

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- Implement Digital Data Logging
- Utilize Telemetry Systems: Introduce remote monitoring using dataloggers and the Industrial Internet of Things (IIoT) to capture and transmit data continuously.
- Digitize Records and Reporting (Spreadsheets)



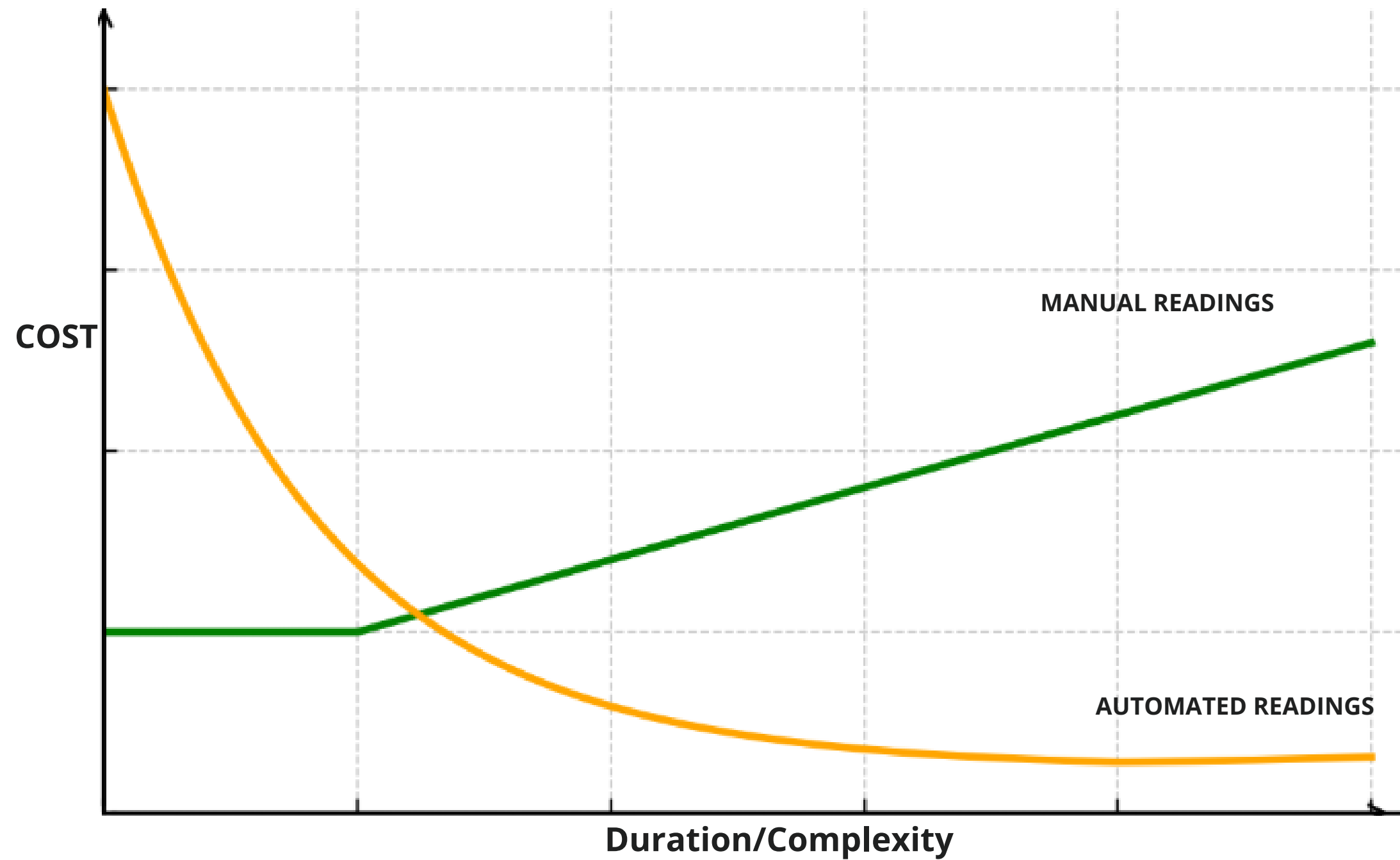
# What can be done generally ?

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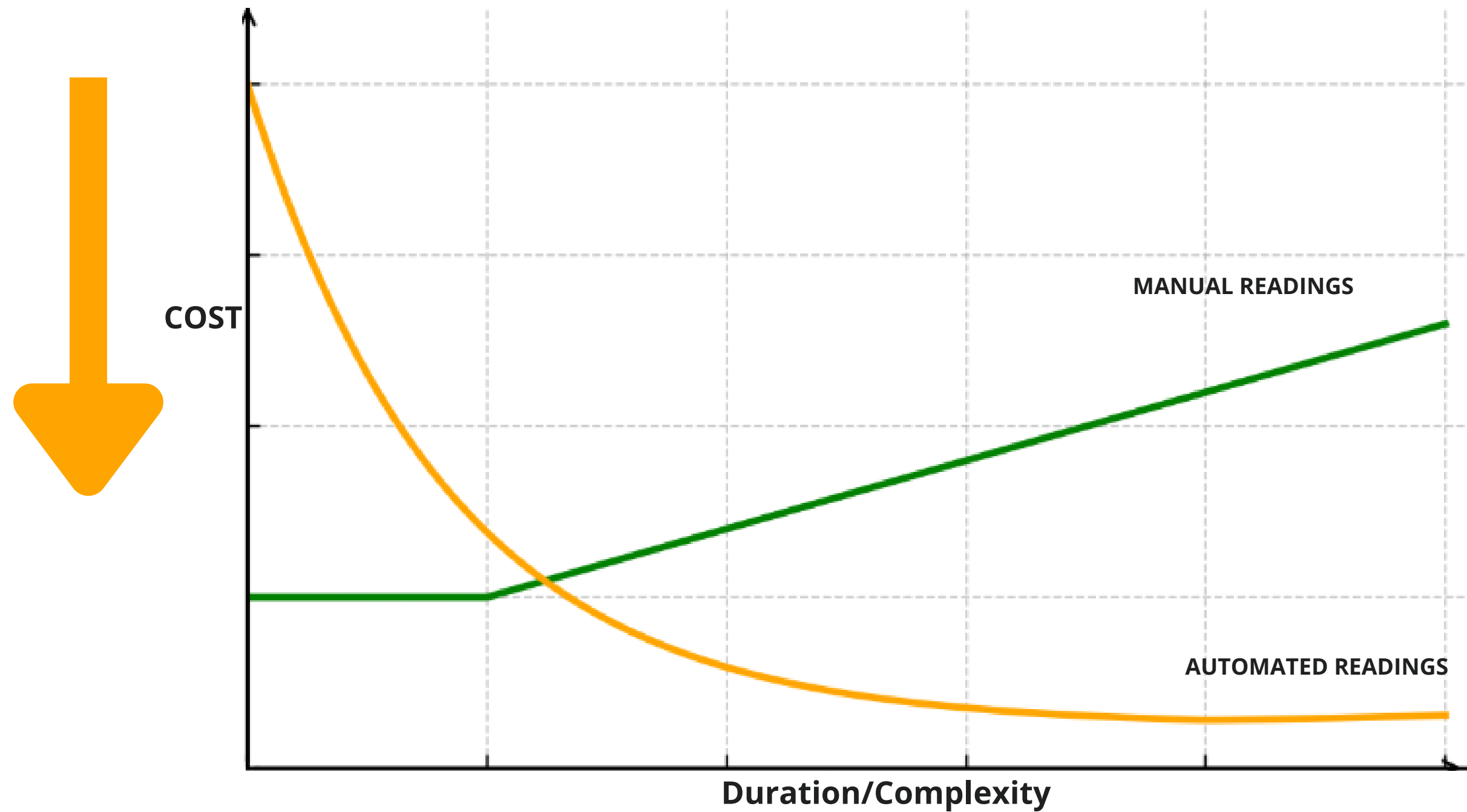
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# What can be done generally ?



# What can be done generally ?



# Short answer

It's worth !

Charge rate  
 $100\$ \times 20 \text{ days} =$

**2000\$**



Cirro =  
**35\$**  
 $\times 1 \text{ month} =$

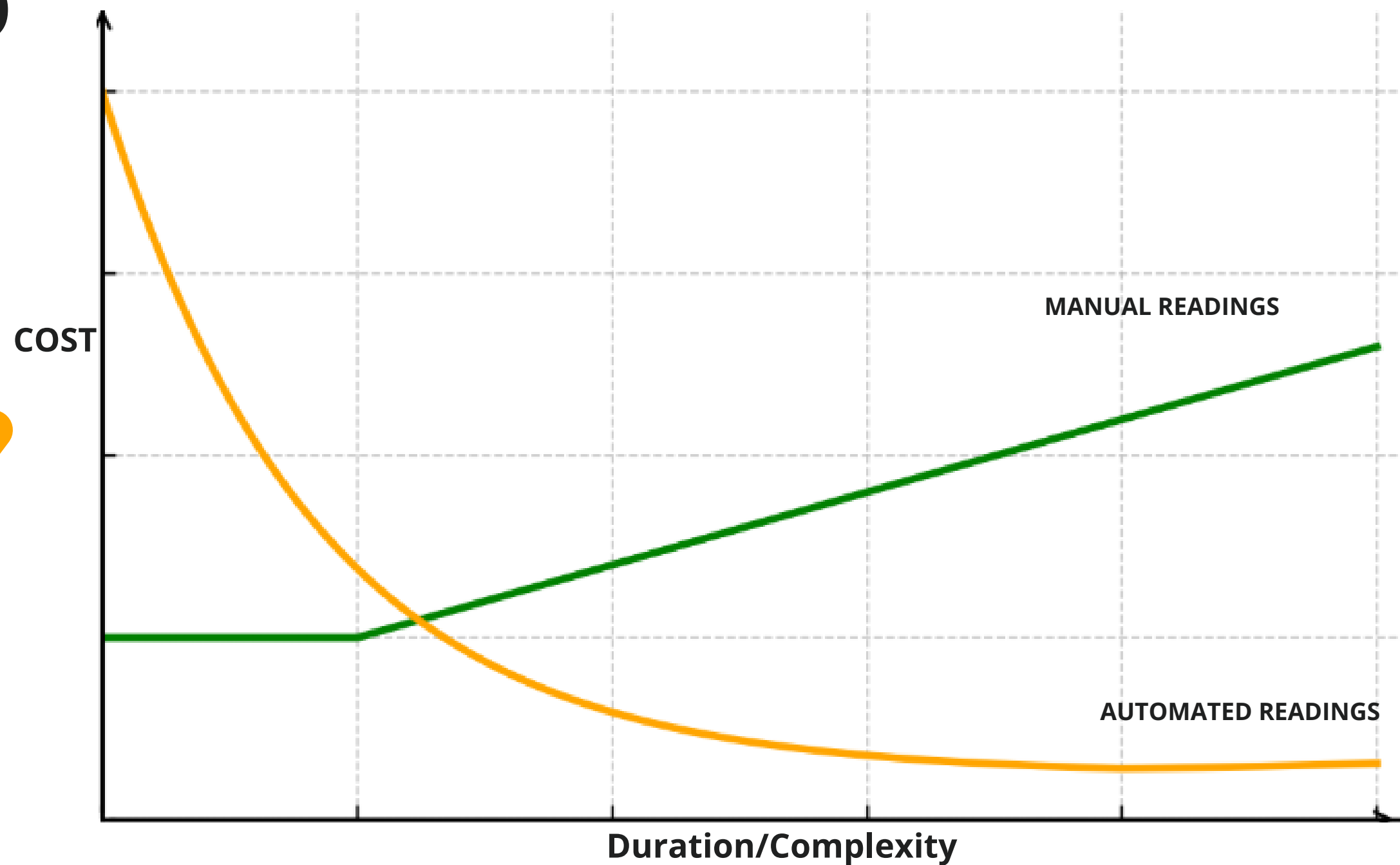
**35\$**



Smart Choice  
Significant Savings

# What can be done generally ?

1500NZD





# A Specific Problem

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- Automated temperature monitoring for other Geotechnics labs.
  - The challenge? **A large number of ovens to monitor.**
- Existing Wi-Fi dataloggers were prohibitively expensive, especially with a limited capacity of just **three** sensor inputs / 3 thermometer probes.



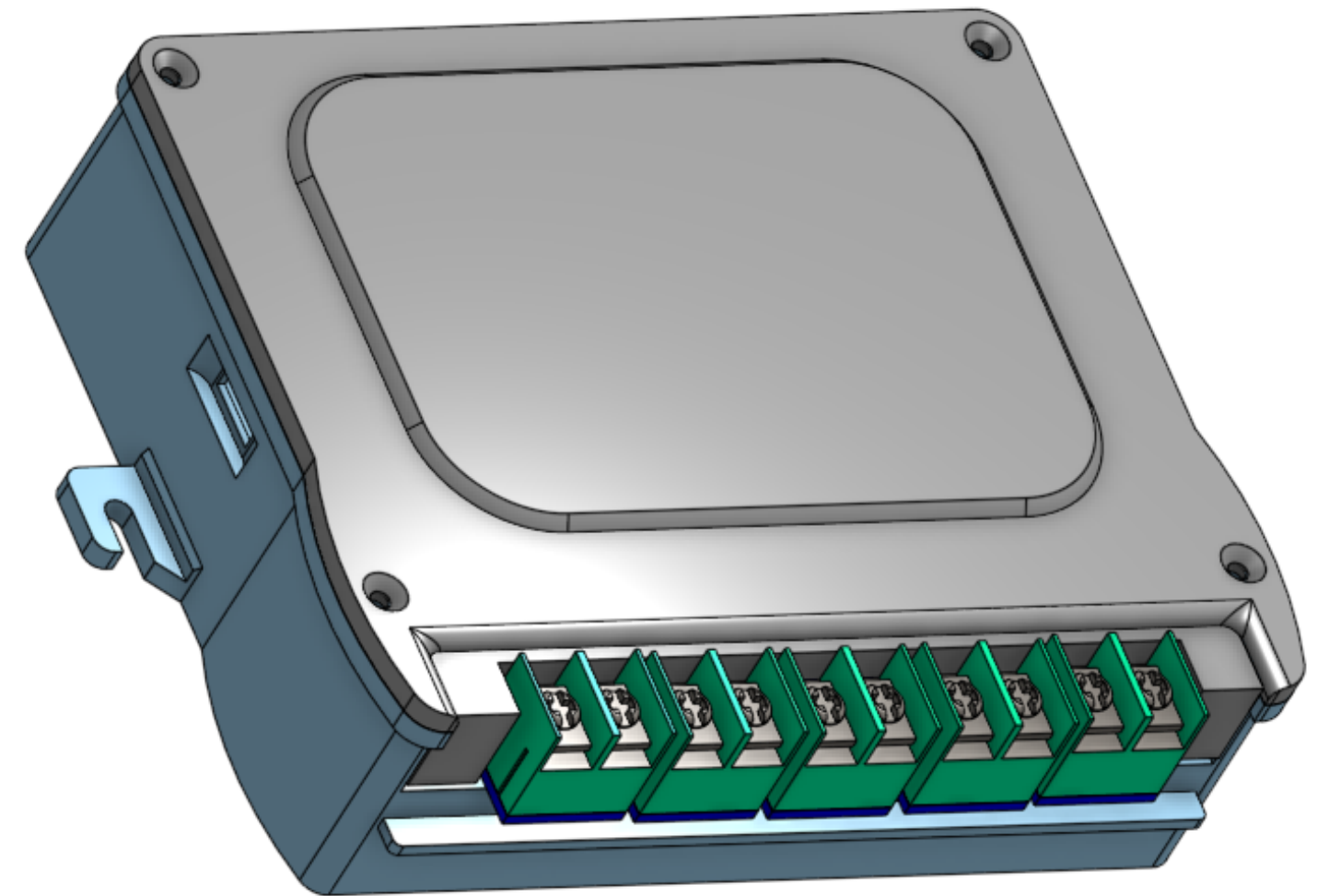
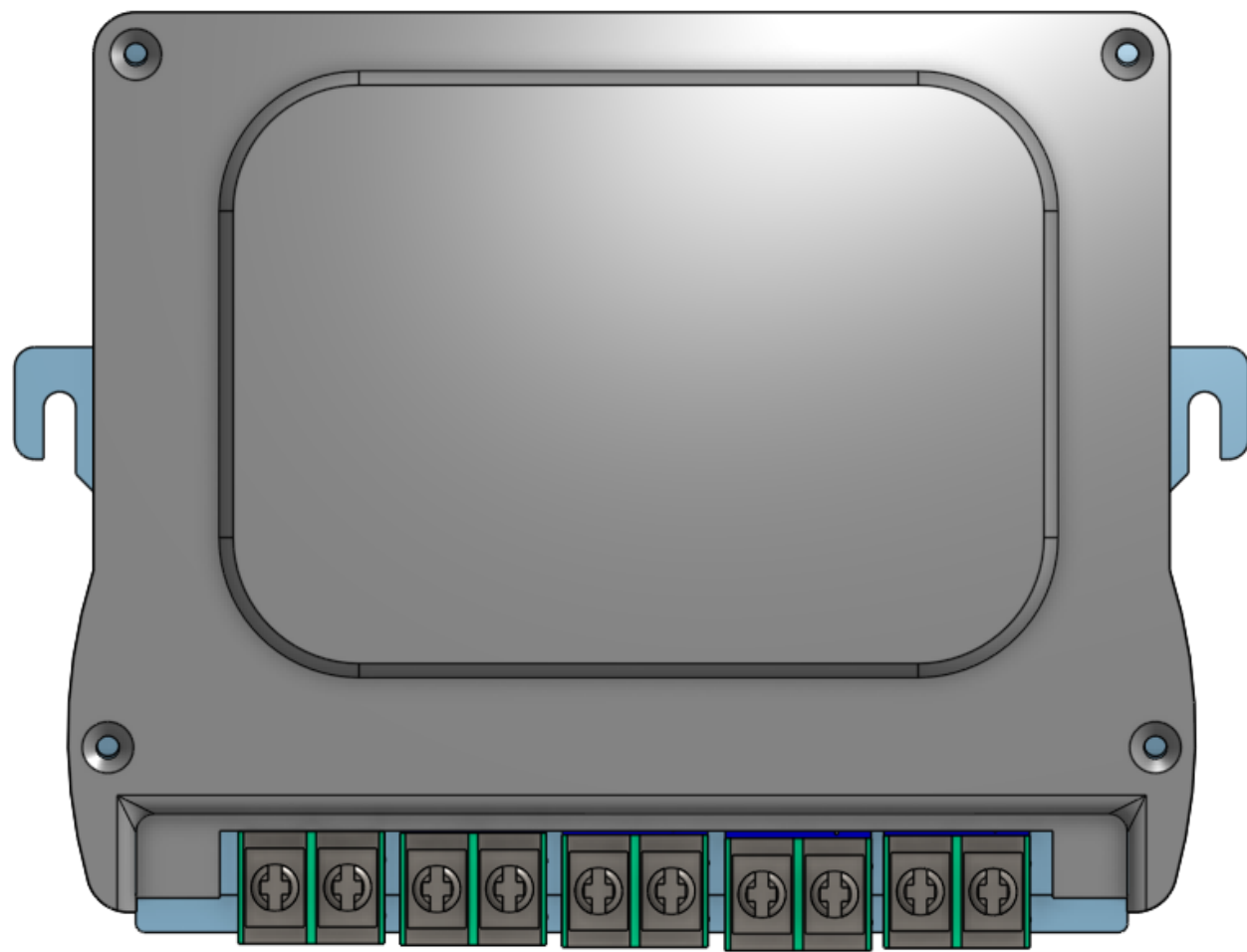
# A Specific Problem

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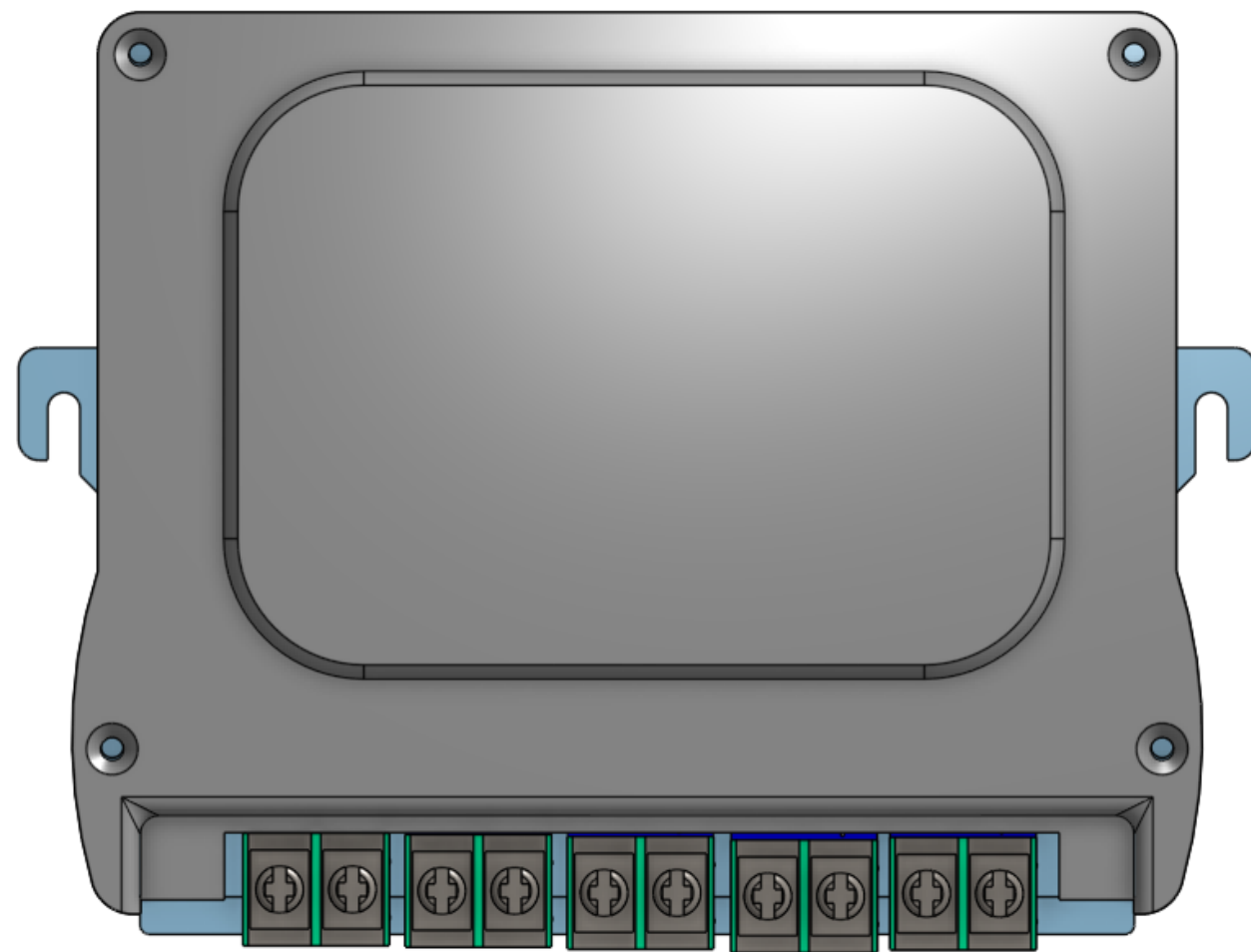
- Imported hardware from overseas complicated logistics and made local support difficult to obtain.
- We needed a solution that was both cost-effective and reliable, with strong local support.

# The Solution: Our In-House Datalogger

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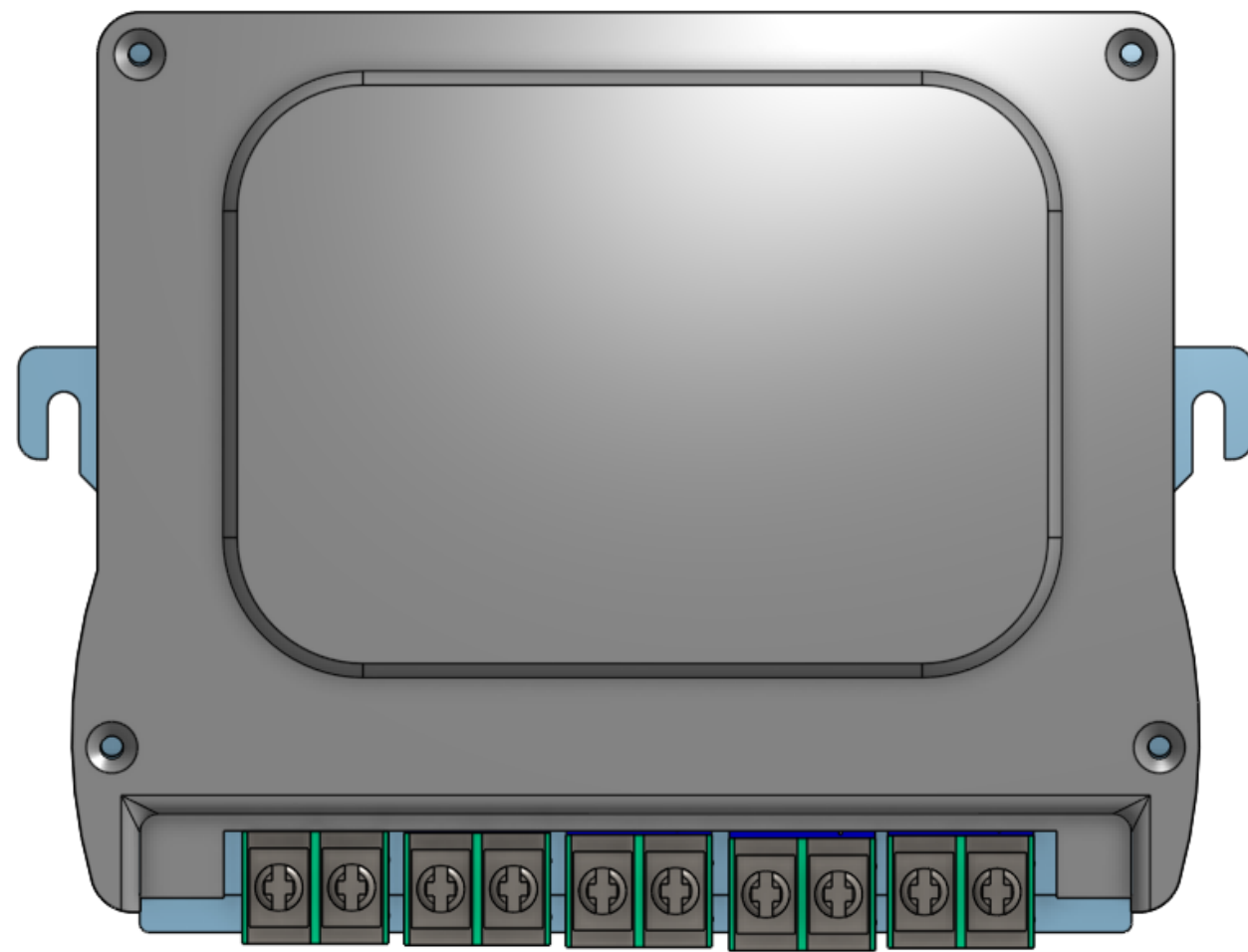


# The Solution: Our In-House Datalogger

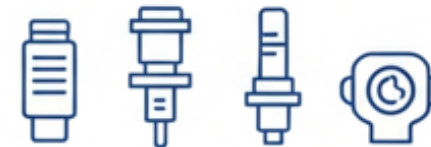


- Thermologger lite
  - 5 Thermocouple type K inputs
  - WIFI Connectivity with MQTT communication
  - Easy install
  - Proprietary software to configure.

# The Solution: Our In-House Datalogger



Market  
Datalogger



**NZD\$1,500 ~**

3 sensor inputs

In-House  
Datalogger



Superior  
Functionality

**~ NZD\$854**

5 sensor inputs

**-43%**  
Cost  
Reduction

# The Power of Collaboration & Value

- A Continuous Improvement Process: We didn't develop this solution in isolation.
- Through a collaborative, continuous improvement process with the many clients, we were able to identify critical pain points and refine our hardware to better meet their needs. This partnership was key to building a robust solution.





# The Power of Collaboration & Value

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- We've been working with Geotechnics and external clients to make the logger easier to use and more accurate.
- Their feedback helps us refine calibration and boost reliability.
- Our temperature readings now show a standard deviation between 0.232°C and 0.458°C.
- For comparison, Type K thermocouples allow an error of  $\pm 2.2^{\circ}\text{C}$  or  $\pm 0.75\%$  (whichever is greater).

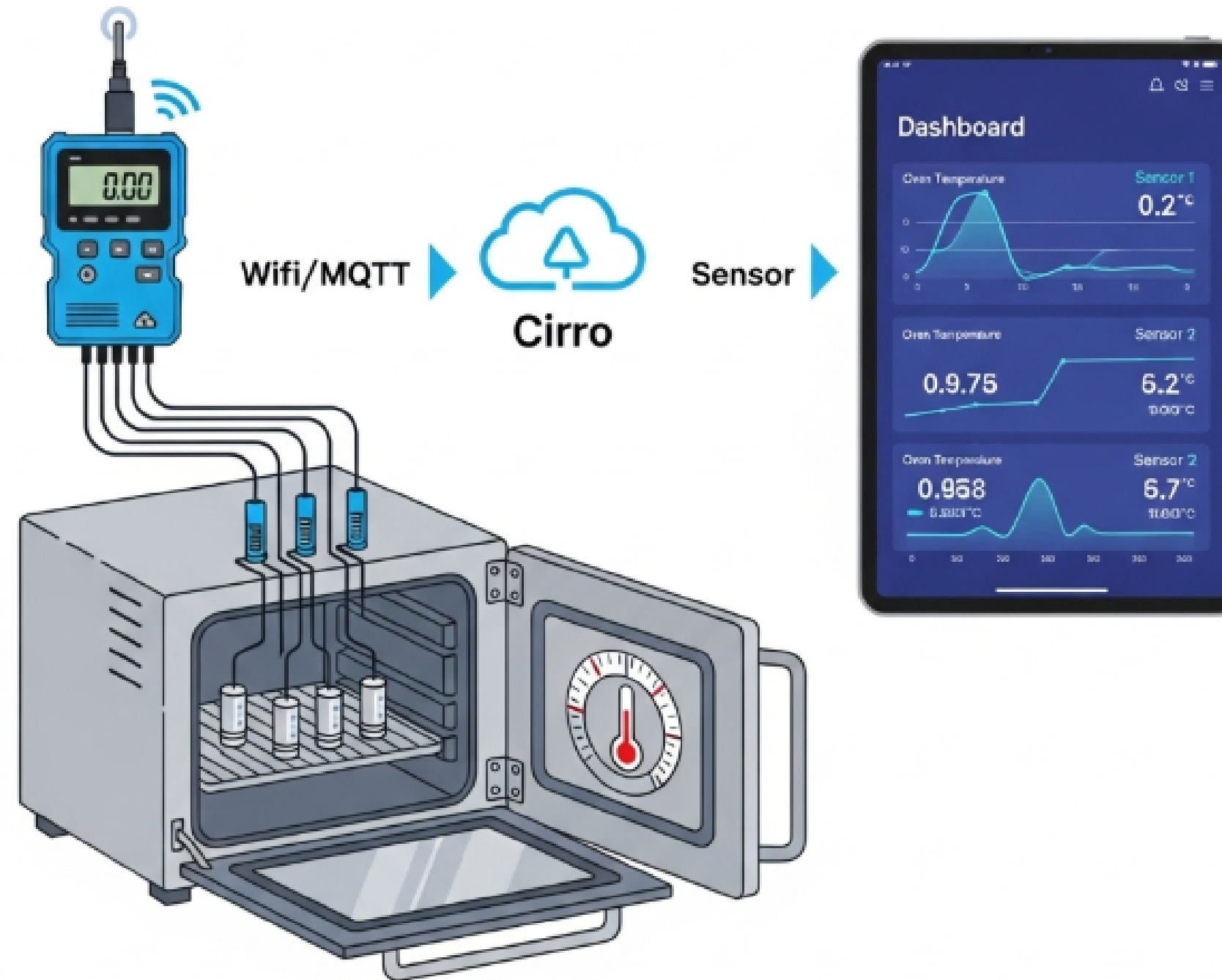


# The New Workflow

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- How It Works:
  - Our dataloggers are installed on the ovens.
  - They automatically transmit temperatures throughout the day on the Cirro web platform.
  - Lab technicians can access real-time data, and comprehensive reports are generated automatically.
- Before vs. After:
  - Before: Manual checks with a thermometer, handwritten logs, tedious admin.
  - After: Automated, high-frequency readings, digital records, no manual admin, and peace of mind.

# The New Workflow

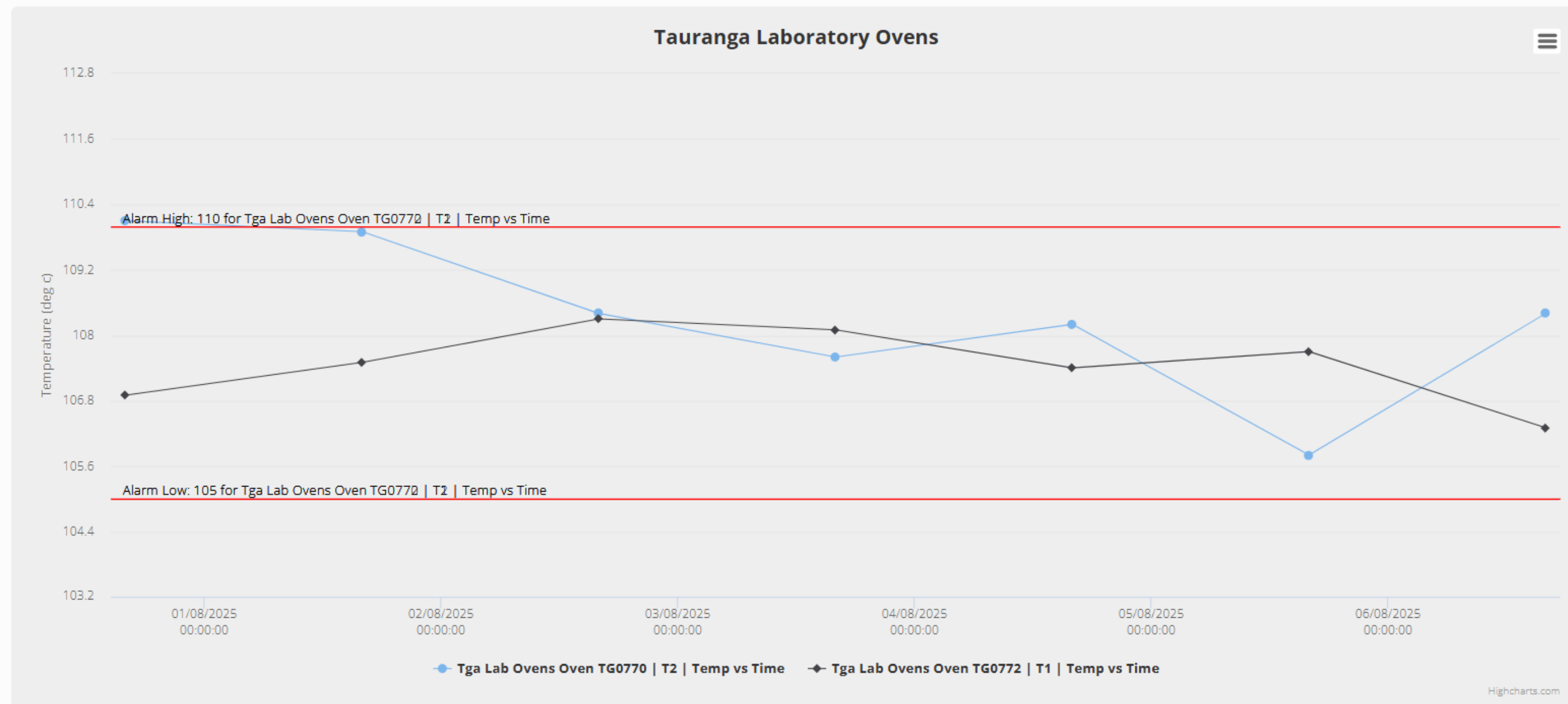


# The New Workflow

- Less paper work and more digitalisation of the business
  - Real time graphs
  - Historical log about equipment calibration
  - Alerts and alarms



# The New Workflow



# The New Workflow



Subscriptions

History

### Alert History

| Device Friendly Name | Trigger Type | Schema                | Time             |                                                      |
|----------------------|--------------|-----------------------|------------------|------------------------------------------------------|
| Ham Lab Ovens        | Alert        | Sensor 1 Temp (deg c) | 04/07/2025 17:00 | <a href="#">View Graph</a> <a href="#">View Data</a> |
| Ham Lab Ovens        | Alert        | Sensor 1 Temp (deg c) | 09/06/2025 14:45 | <a href="#">View Graph</a> <a href="#">View Data</a> |

1

20

items per page

1 - 2 of 2 items



# The Impact: Building Robust Tomorrows

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- By implementing this telemetry system, we saw immediate, positive results:
  - Improved Accuracy: Consistent, reliable temperature records with a much higher frequency of readings.
  - Reduced Workload
  - Effortless Compliance: Easy-to-access digital data simplifies the auditing process and ensures compliance with accreditation standards.
  - Staff Empowerment: Technicians can be more assertive and productive in their core roles, knowing that critical data is being reliably captured in the background.



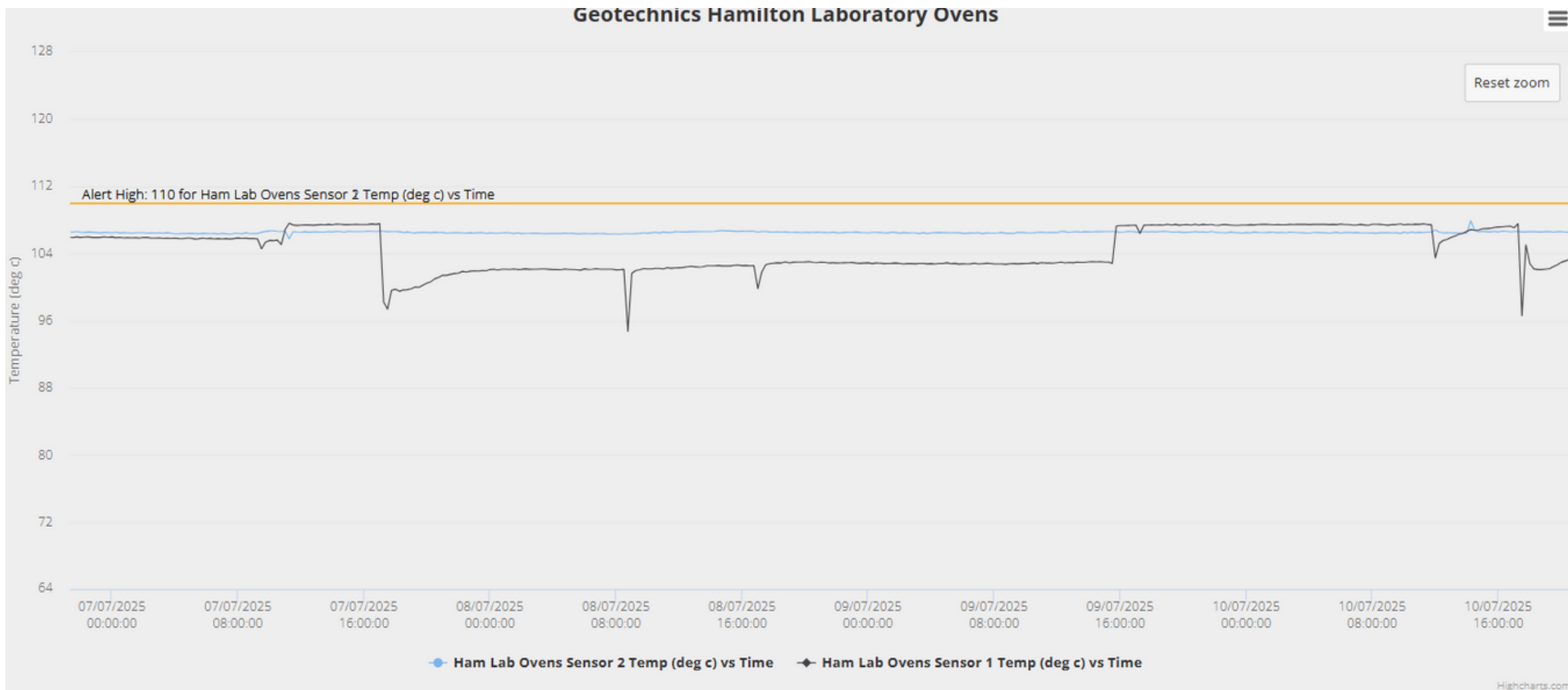
# What's next ?

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- Open door sensor.
- Increase the number of inputs.

# What's next ?

- Open door sensor.
- Increase the number of inputs.





# Conclusion

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- A Smart, Small Change: This project highlights how a smart, and small change in our workflow, can lead to a significant impact.
- It demonstrates how we can leverage technology to improve efficiency and reliability without the need for a complete overhaul of the laboratory.
- This is how we, as an industry, can build robust tomorrows: by using smart, practical solutions to automate and simplify our work.