PREDICTIVE FEASIBILITY

PFA

## Real-World Validation Case 03

## Similar Systems. Different Predictive Feasibility.

### Question

Do similar physical systems necessarily support the same predictive strategy?

To investigate this question, multiple cells from the NASA Battery Aging dataset were evaluated using the Predictive Feasibility Assessment framework.

At first glance, the cells appear highly similar:

- Same dataset family
- Similar degradation behavior
- Similar operating conditions

However, the underlying predictive structure proved significantly different.

## What Was Evaluated?

The analysis focused on:

- structural behavior
- cross-run consistency
- prediction stability
- predictive feasibility

Each cell was evaluated independently.

## Result

Different cells occupied different predictive regimes.

**B0053**

High consistency.

**Classification: LIMITED**

## B0054

Low consistency.

**Classification: NO-GO**

## B0055

Moderate consistency.

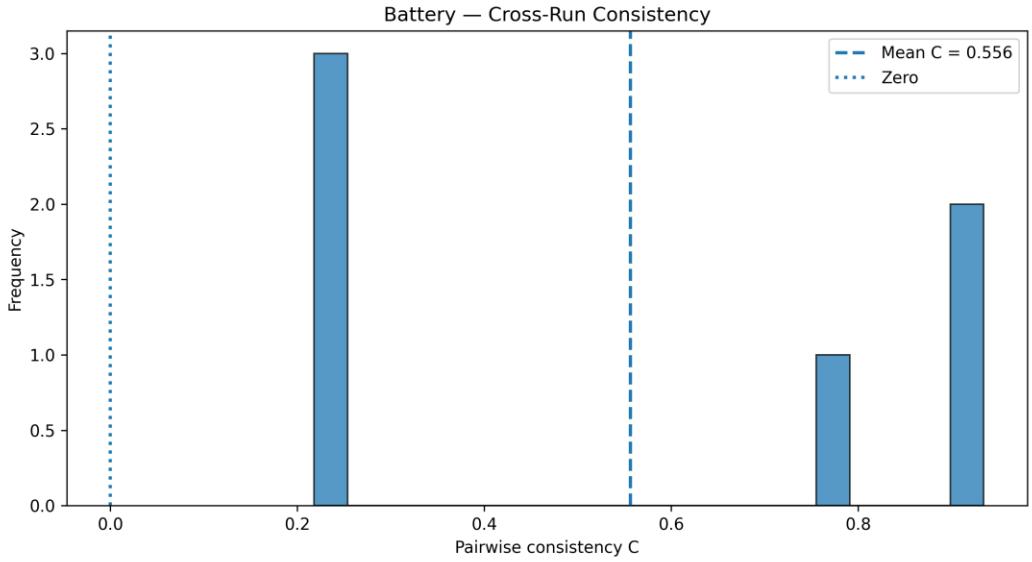
**Classification: LIMITED**

## B0056

Borderline consistency.

**Classification: LIMITED**

## Figure 1 — Predictive Feasibility Across Battery Cells



## Caption

Predictive feasibility across multiple NASA battery aging trajectories.

Although all cells belong to the same physical system class, substantial differences emerge in structural consistency and predictive behavior.

The figure illustrates that predictive feasibility is not uniform even within a single dataset family. Similar systems can produce fundamentally different predictive outcomes.

## Why This Matters

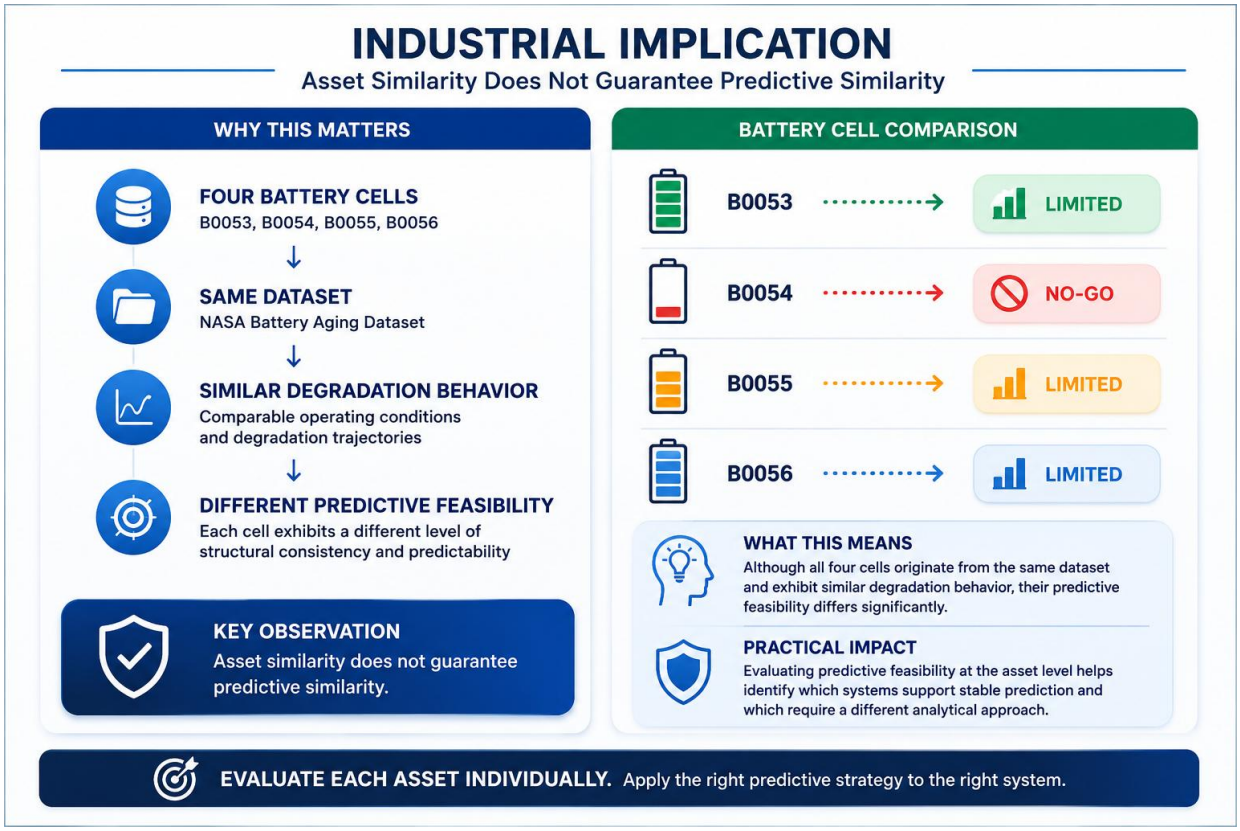
Many predictive maintenance projects assume that similar assets support identical predictive workflows.

This case demonstrates that predictive feasibility must be evaluated individually.

## Industrial Implication

Although all four cells belong to the same dataset family and exhibit similar degradation behavior, their predictive feasibility differs significantly.

The infographic below summarizes the practical implications of asset-level predictive feasibility assessment.




## Key Takeaway

Physical similarity does not guarantee predictive similarity.

Different assets may require different predictive strategies, even when they appear nearly identical.