APEX RELIABILITY ENGINEERING / COMPONENT LAB

The running train: evidence packet

Original fictional case | v0.3 | 2026-11-19

A fictional transfer pump feeds a process header. The operator reports low delivery after a batch change. A drive trip is in the history, and the motor is running again. Follow the records across the complete train before naming a failed component.

Original fictional teaching case. Values, times and records are invented for learning, not customer evidence. Safe response and the actual OEM/site procedures govern any real investigation. This case provides no reset, live-test or bypass instruction.

1. Define the function

09:12 - The batch record notes a change in process demand. At 09:14 an operator reports low delivery. The only flow evidence in this packet is the reported indication; its accuracy and timing have not been independently checked.

Ask: Where should this investigation begin?

2. Read the drive record

09:14 - The available event snapshot records current while accelerating. 09:17 - A separate observation after stopping shows zero current. The packet does not preserve an exact fault/auxiliary code or establish which signals the actual drive stores.

Ask: What does this pair of records establish?

3. Check shaft work

09:30 - In this invented post-restart record, the documented motor is a four-pole induction motor supplied at a 50 Hz fundamental. An existing synchronized shaft-speed record shows 1,455 rpm. No matching torque, cooling or hydraulic-duty evidence accompanies it.

Ask: What can this record support?

4. Follow the liquid

The batch history shows a lower source-tank level after the change. A maintenance note mentions a valve-lineup change, with actual position and timing unverified. This packet has no synchronized suction/discharge, head/flow or independent signal-quality comparison.

Ask: Which evidence best separates the remaining explanations?

5. Build the next step

Across this packet: low delivery is reported; event-time and post-stop readings differ in timing; a post-restart motor record describes motion; and system conditions changed. There is still no synchronized record establishing actual hydraulic duty or a unique cause.

Ask: What is the defensible outcome of this exercise?

Use the interactive case to compare choices and explanations. Every record in this packet is fictional. No root cause or remedy is established.

What the records establish

Fictional case / facilitator notes. No cause, repair, savings or qualification is assigned.

1. Define the function

Known: Low delivery is reported; required duty and independent flow evidence are missing.

Still missing: Actual flow/head, applicable duty requirement and clock alignment.

2. Read the drive record

Known: An acceleration snapshot and a later zero-current reading belong to different operating states.

Still missing: Exact code, signal definitions, command/load context and event-clock relationships.

3. Check shaft work

Known: The fictional post-restart record is consistent with 1,500 rpm synchronous speed and 3% slip.

Still missing: Actual torque/load, condition at the earlier event, cooling and delivered hydraulic duty.

4. Follow the liquid

Known: Source level changed; a lineup change is recorded but unverified; hydraulic and signal comparisons are missing.

Still missing: Actual operating point, suction conditions, lineup/timing and whether the flow indication reflects the process.

5. Build the next step

Known: The supplied records support an investigation plan, not a unique cause or verified remedy.

Still missing: Which explanation fits the synchronized equipment/process evidence and what action would resolve it.

Primary sources for the teaching principles

Technical guide No. 4: Guide to variable speed drives / 3AFE61389211 Rev C, 2011-05-12; printed pp. 13-16
https://library.e.abb.com/public/5212850908d44d979d34b61b703feeaa/ABB_Technical_guide_No_4_REVC.pdf

ACS580 standard control program firmware manual / 3AXD50000016097 Rev J, 2025-10-01; printed pp. 538-539 and 209
https://library.e.abb.com/public/d03c76db17d34239a838ed3baf814028/EN_ACS580_FW_J_A5.pdf

Premium Efficiency Motor Selection and Application Guide / 2014 guide; glossary pp. vii-ix; application context in chapters 5-8
https://www.energy.gov/sites/default/files/2014/04/f15/amo_motors_handbook_web.pdf

Variable Speed Pumping: A Guide to Successful Applications - Executive Summary / 2004 executive summary; pump/system curves and static-head discussion
https://www.energy.gov/sites/prod/files/2014/05/f16/variable_speed_pumping.pdf

Volute casing pump / Undated web reference; read 2026-11-19
https://www.ksb.com/en-global/centrifugal-pump-lexicon/article/volute-casing-pump-1117514

Plan your next evidence review

Blank offline worksheet. Do not delay safe response to collect evidence. Follow authorized OEM/site procedures.

Equipment / function / required duty

Event time, time zone and clock differences

Observed facts and their source / operating state

Interpretations that remain hypotheses

What is unknown or not comparable?

Which existing record could distinguish the explanations?

Qualified owner / safe acquisition plan / review date

How will a later action be checked against the required function?

Keep confidential plant records under your site policy. This PDF is an offline planning aid, not an authorization to reset, bypass, change settings or perform an energized test.