

EXAMPLE WORKSHOP PROBLEM-SOLVING GUIDE

Hitachi EX110-5: bucket curl weak under load

EX110-5 hydraulic excavator | Example diagnosis | September 2026

Reported: Bucket curl moves through its full range unloaded, but struggles to curl into material. At first glance boom, arm, swing and both tracks perform normally. The bucket may creep outward when held with a load. This is an illustrative complaint; no cylinder, valve or pump has yet been proved faulty.

The important distinction

- A weak bucket circuit alongside apparently normal other functions directs the first tests toward the bucket command, circuit relief, cylinder, valve and linkage. It does not justify changing the main pump.
- "Normal" boom and travel should be recorded under comparable load and engine speed. A weak pump or engine can still appear adequate in light operation.
- Bucket movement and apparent drift can also be mechanical: check whether the linkage or attachment binds and whether any quick couplers or added pipework are fitted.

First-pass sequence

Order	Check	Why it matters
1	Confirm EX110-5 identification, serial and fitted bucket/auxiliary plumbing.	Selects the correct circuit and test data.
2	Record loaded and unloaded curl, dump, engine response and comparison functions.	Separates force from speed and command response.
3	Inspect external linkage, pins, hoses, leaks and oil condition.	Finds low-cost mechanical or supply causes.
4	Perform a controlled holding/drift observation without anyone near the attachment.	Provides evidence for internal leakage, but does not identify its route alone.
5	Arrange pilot, work-port, relief and leakage tests to the matching procedure.	Distinguishes control, valve, cylinder and supply paths.

Safety: Keep every person outside the excavator working radius. Lower and secure the attachment, stop the engine and relieve stored pressure before opening a line. Never place hands near a suspected hydraulic leak; high-pressure oil can penetrate skin. A suspended bucket can fall without warning.

1. How this EX110-5 symptom narrows the search

The bucket cylinder is supplied through the hydraulic control system. The pilot command and bucket valve section direct oil; circuit reliefs limit pressure; cylinder seals and external hoses carry the load. A fault in any one of these areas can make the bucket weak while other services appear usable.

Area	How it could cause the symptom	Evidence to collect
Bucket linkage / pins	Binding or damage consumes force or restricts travel.	Uneven movement, dry/seized pins, bent linkage, recent attachment change.
Oil / common supply	Low oil, aeration or engine/pump output shortage can reduce performance.	Oil appearance, noises, other functions under a real load.
Pilot command	Insufficient command may not fully shift the bucket valve.	Lever response, pilot pressure at specified port, whether one direction differs.
Bucket valve / relief	Internal leakage or relief opening early can dump working oil.	Work-port pressure and return behaviour by specified test.
Cylinder / hose / coupler	Internal bypass, external leakage or restriction can limit force and holding.	Drift pattern, oil leaks, port isolation test by a technician.

Curl versus dump

If curl is weak but dump is normal, note the direction difference. Some faults lie on one side of a double-acting cylinder or one bucket work-port path; however, engine and pump conditions can still change the result. If both directions are equally slow, command, supply and mechanical restriction rise in priority.

What "drift" does and does not prove

A loaded bucket that creeps away from its held position indicates oil is escaping through some path or the attachment is moving mechanically. The path may be the cylinder seals, control valve, relief or related plumbing. Visual drift alone cannot locate it.

Working priority: Confirm a real loaded single-circuit fault, rule out external binding and leaks, then test command and circuit pressure. Test cylinder leakage only after the pressure evidence and the safe isolation method are clear.

2. Record the fault before opening the system

Perform the observations in an open, level area with the correct bucket fitted, clear of people and structures. Do not use a raised attachment as a work platform or stand below it. Note oil temperature, engine speed and operating mode for each comparison.

Observation	Record the result	What it helps separate
Curl unloaded versus digging	Is motion smooth and full range without resistance? Does it slow only on contact?	A force problem versus a general movement restriction.
Dump compared with curl	Is one direction weaker, slower or more erratic?	Direction-specific work-port or command route.
Boom, arm, swing, left/right travel	Which operations have actually been tried under load?	Local bucket fault versus wider engine/supply fault.
Engine and hydraulic sound	Does engine labour, almost ignore the command, or audibly bog? Is there pump whine?	Load response and possible supply/control issues.
Position holding	With the machine immobilised and nobody near, does bucket angle creep after controls return to neutral?	A possible leakage route requiring controlled tests.
Cold versus hot	Does weakness become markedly worse after oil heats?	Temperature-sensitive internal leakage, not a component diagnosis.

Basic stopped-machine inspection

- Inspect bucket teeth, linkage, pins, bushes and cylinder mounts for distortion, cracks, seizure and interference. Check for recent attachment or quick-hitch changes.
- Check hydraulic oil level and condition by the specified procedure; note foaming, water, overheating, metallic debris and filter service history. Repair visible hose or coupling defects before pressure testing.
- If auxiliary hoses, quick couplers or third-party controls are installed, record their routing and position; do not assume the bucket circuit is factory-standard.

Photographs of the linkage and a short video from a safe location showing unloaded and loaded curl are useful evidence. Do not hold the bucket against a stalled stop for a long recording.

3. Use the observations to choose a branch

Pattern	Leading possibilities	Next proof
Weak curl only, dump strong	Curl-side work-port relief, spool travel, cylinder-side leakage or hose/coupler issue.	Compare pilot command and specified work-port pressures in both directions.
Both bucket directions poor	Pilot/valve issue, shared flow/supply shortfall, restriction or linkage damage.	Inspect linkage and oil; compare other functions under equivalent load.
Bucket drifts in neutral	Cylinder bypass, valve leakage, relief path or altered auxiliary plumbing.	Approved cylinder isolation/leakage test; do not infer from drift alone.
All functions lose force as oil warms	Engine, common oil supply, pump/regulation, relief or widespread leakage.	Move to whole-machine hot performance procedure.
Boom/arm also affected but swing/travel appear normal	Possible supply split, control issue or apparent comparison under unequal loads.	Map affected circuits on the correct hydraulic diagram before parts removal.

Distinguish lack of force from lack of flow

A slow but strong bucket may indicate insufficient flow or limited valve travel. A bucket that moves at a reasonable speed without a load but cannot generate force when digging needs circuit pressure and leakage checks. Both can coexist, so record cycle behaviour and pressure rather than diagnosing by feel.

Avoid the expensive wrong turn

Replacing a pump because the bucket is weak is premature. The other functions provide evidence, but do not clear the pump until it has been tested at the specified condition. Equally, replacing the bucket cylinder from drift alone can miss valve or relief leakage.

Stop work: A cracked linkage, severe pin damage, pressurised leak, contaminated oil with metal or unexpectedly moving attachment needs repair or controlled technician assessment before further loaded trials.

4. Workshop tests and interpretation

A qualified hydraulic technician should use the EX110-5 identification, fitted circuit and approved procedure. Record oil temperature, engine speed, command direction and gauge position. Exact ports, pressures and isolation steps come from the matching Hitachi technical information.

Command and pilot route

- Check whether full pilot command reaches the bucket control section in curl and dump. A command problem can mimic a valve or pump fault; inspect lever action, linkage/lines and relevant pilot controls before disturbing main components.

Circuit pressure and relief route

- Measure bucket work-port pressure by the prescribed short-duration method. Compare the weak direction with the specified value and with the opposite direction; do not treat another function as a substitute for the published test.
- Low pressure may reflect an early-opening or leaking bucket relief, incomplete spool travel, pump/supply shortage or internal leakage. Adjusting a relief before proving its cause can damage the system.

Cylinder and valve leakage route

- If pressure/holding results support leakage, use the approved cylinder isolation or leakage test with the attachment mechanically supported and residual pressure safely released. Observe whether the loss is within the cylinder or upstream through valve/relief/plumbing.
- Never loosen a line on a suspended attachment to "see whether it moves". Oil can be trapped under pressure even after shutdown.

Test result	Interpretation to investigate
Adequate command, low bucket pressure only	Bucket relief, valve section or local leakage path.
Command fails in curl, adequate supply elsewhere	Pilot control/line or mechanical valve actuation.
Correct circuit pressure but poor speed	Flow restriction, pump regulation or valve travel; measure flow/cycle time.
Cylinder fails approved internal leakage test	Cylinder sealing becomes a justified repair target.
Multiple functions fail standardized load tests	Return to common engine, oil supply, pump and control checks.

5. Practical diagnostic order

Step	Action	Record or decision
1	Confirm the EX110-5 model/serial and document attachments and altered plumbing.	Choose the correct hydraulic and repair information.
2	Safely compare bucket curl/dump unloaded and with a modest controlled load.	Direction, force, speed, engine response.
3	Compare boom/arm/swing/travel under meaningful load.	Local bucket problem or broader supply fault.
4	Inspect linkage, cylinder mounts, hoses, couplers, oil and filter history.	Repair obvious mechanical or external defects first.
5	Check pilot command and valve travel if bucket response is limited.	Fault upstream of bucket power circuit?
6	Test bucket circuit and relief pressures at specified temperature/speed.	Low pressure location and direction.
7	Measure cycle/flow and perform the approved leakage isolation test.	Cylinder, valve/relief or supply demonstrated.
8	Repair the evidenced component, retest the same scenario and check for leaks.	Proof that the fault is cured.

After the repair

Repeat the recorded loaded/unloaded curl and dump comparison at a similar oil temperature. Confirm holding behaviour, verify there is no external leak and check oil level after the circuit has been bled by the specified method. A parts replacement without the same before/after test does not show whether the original fault was solved.

Service decision: Pump work becomes a candidate only if common supply tests show the pump or its control cannot meet the applicable standard after oil supply, engine operation and circuit leakage have been assessed.

6. Recommended manual and personal guide

Hitachi EX110-5 Excavator Technical Repair Manual

This is the Agrimanual manual chosen for this example. Use its EX110-5 repair groups for hydraulic components, the pump drive, excavator attachment and swing repairs. Confirm the exact manual and machine serial before using repair dimensions, torque values or a test specification. Diagnostic performance tests may require the matching technical troubleshooting volume if they are not included in the repair volume supplied.

[View the Hitachi EX110-5 Repair Manual on Agrimanual](#)

Check the listing and model details against your machine before ordering.

What to send for a guide on your own machine

Send us	Why it changes the diagnosis
Exact model and serial, bucket and coupler/auxiliary setup.	Matches the correct circuit and technical publication.
Which direction is weak, whether motion is slow or lacks force, and whether it changes hot/cold.	Separates a command/flow problem from a pressure/leakage problem.
What boom, arm, swing and each track actually do under load.	Tests whether the fault is local or shared.
Oil/filter history, recent repair and any measured pressure/leakage result.	Ranks further tests without repeating work.

A personal Workshop Problem-Solving Guide would use those details to set out likely causes in order, safe initial checks, the workshop tests needed and the relevant Agrimanual repair information. This example is a decision path, not a diagnosis of an individual machine.

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