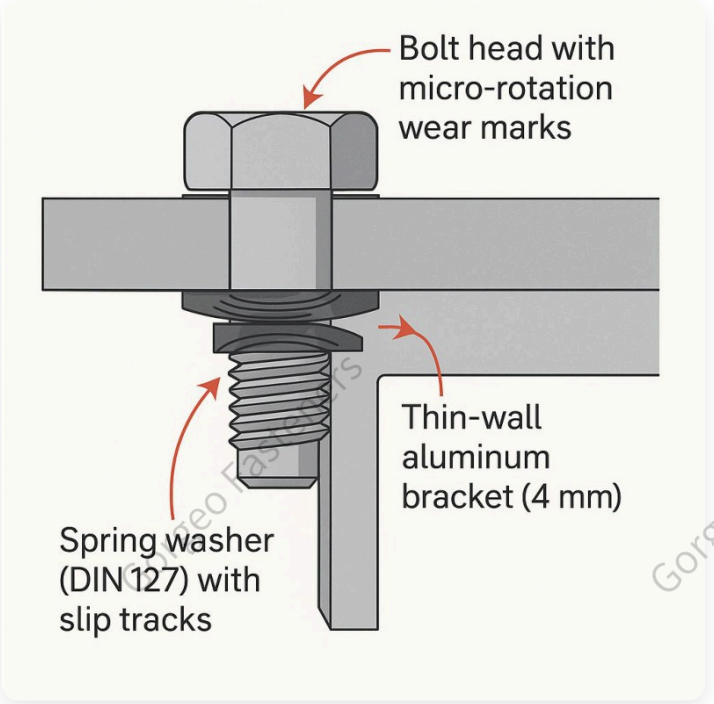
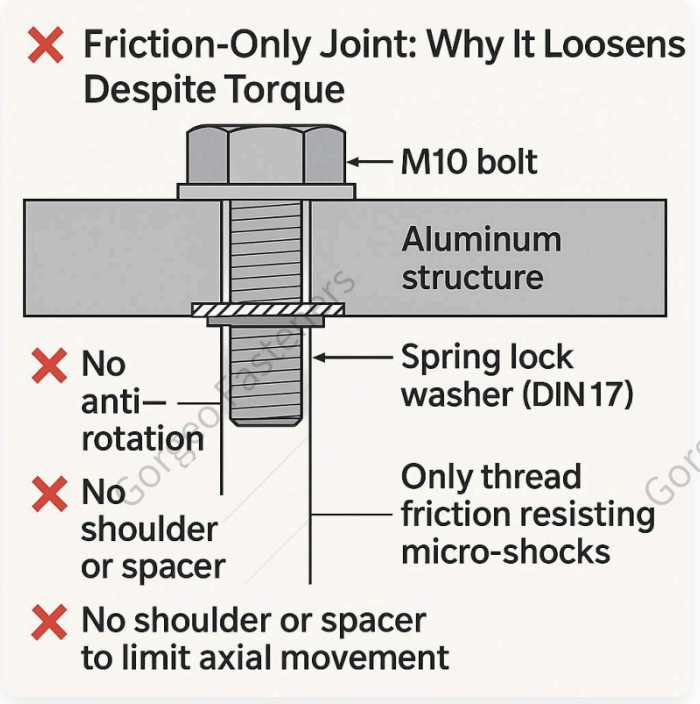
Why It Loosened — Even When Torque Was Right

Field findings from 3 conveyor modules with vibration-induced loosening
How OEMs prevented downtime — without redesign
(Reference: DIN 65151, ISO 898-1)



What Was Happening on the Floor



3 sorter modules. All torqued correctly. Still loosening.

Modules:

- Brackets, motor bases, vertical supports
- Operated 12 h/day, 7 days/week in high-speed sortation
- Monitored over 3 months runtime

Setup:

- M10 bolts, torqued to 38 Nm (ISO 898-1 spec for 8.8 property class)
- Thin-wall aluminum structure (4–5 mm, common in diverters)
- Spring lock washers (DIN 127 B)

Operator feedback:

- “We re-torqued Monday. By Wednesday, it was misaligned again.”
- “Bracket looks fine, but the joint keeps walking back.”
- “Tried upping torque — didn’t help.”

What We Found After Disassembly

Torque wasn’t the problem. The structure was.

Observed condition:

- Bolt heads with micro-rotation wear marks
- Washers with circular polish tracks
- Thread bores ovalized after multiple cycles

No material defect. No torque loss. Still: frequent rework.

Root Cause: Not Torque — But Structure

Vibration creep under DIN 65151 test conditions.

Structural analysis showed:

- ❌ No anti-rotation geometry under bolt head
- ❌ No shoulder or spacer to limit axial movement
- ❌ Only thread friction resisting ~4000 rpm micro-shocks

When thread friction is your only defense, even a perfect torque value can’t hold against vibration-induced slip.

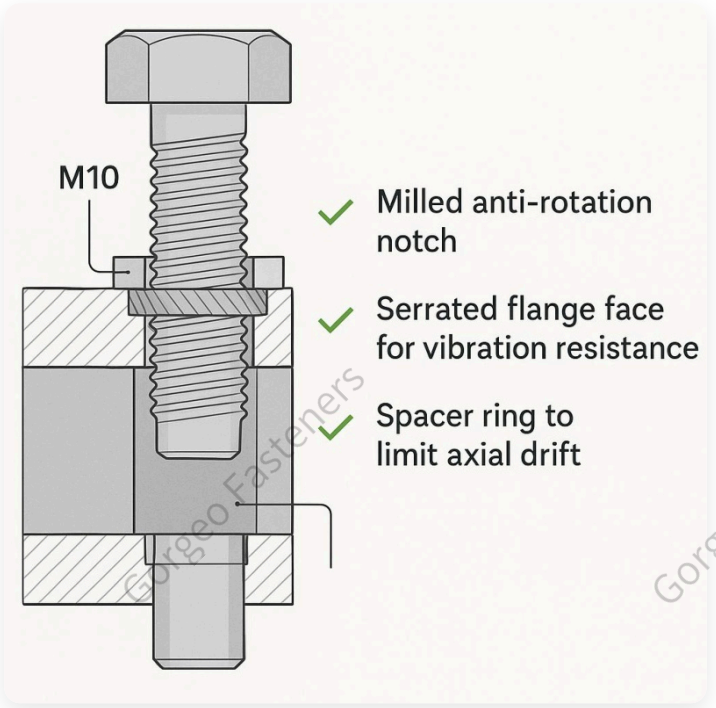
This was a classic case of self-loosening, not preload loss.

No Redesign Needed — Just These 3 Fixes

We tested 3 interface upgrades across all modules. No change to bolts, torque, or tools required.

- **Torque:** 38 Nm
- **Assembly time:** ~90 seconds per joint
- **Component type:** All from standard fastener catalogs (no custom machining)

3-Month Field Comparison (Before vs After)



Metric	Before Fix	After Fix
Loosening Events	Every 1-2 weeks	No rework needed
Bolt Hole Wear	Ovalized	Intact
Assembly / Maintenance	Re-torque every 1-2 weeks	Held at 38 Nm
Operator Feedback	"Loosened again after 2 days"	";Stable after 3 months."

Where These Failures Typically Occur

- Joints without anti-rotation geometry
- Thin aluminum frames (diverter arms, guide rails)
- Motor base joints without locking features
- Any setup under cyclic vibration (DIN 65151) that relies on torque alone

✅ Quick Self-Check: Is Your Joint at Risk?

☐ No anti-rotation under bolt head?

☐ No spacer or axial stop?

☐ Just torque + spring washer?

☐ Washer shows slip marks after removal?

☐ Increased torque more than once already?

☐ Alignment drifts — even though bolts are intact?

Checked 2 or more? Your joint is likely suffering from vibration-induced loosening — just like these OEMs before redesigning the interface.

Why Lock Washers Weren’t Enough

Spring washers (DIN 127) delayed failure briefly. But in high-speed cyclic vibration, friction fatigue still occurred.

Only geometric constraints — not higher torque — successfully blocked the slip.

Working on Something Similar?

If you're seeing loosening, misalignment, or unusual wear… We can help by offering:

- **Photo / drawing review** → We'll mark risk points directly
- **Spec-based check** → Bolt spec + joint layout vs vibration standard

Just send a drawing or joint photo — We'll reply with field-tested suggestions from similar use cases.

No commitment. Just engineering help.