



IMPROVING STRUCTURAL BRIDGE STABILITY AND SAFETY

Engineers chose J.Lanfranco locknuts to reconstruct bridge after collapse



CHALLENGE

Bridge Collapses Under the Stress of Heavy Train Traffic

A steel railway bridge spanning 450m over a major South American river was constructed using swage collar bolt and nut assemblies. Subjected to heavy tonnage from freight trains carrying agricultural and chemical products, the bridge's bolted joints had to be regularly inspected.

Although it did not experience any loosened bolts, the bridge collapsed while a 700m long train crossed. Six tanker cars fell into the river and compromised water quality. After inspecting the accident site, a private engineering firm, working in conjunction with government agencies, concluded that the failure was in part due to compromised fasteners.

The swage collar and bolt assemblies did not separate, but they did experience an undetected loss of clamp force. As a result, the through holes became elongated. This created **cyclical fatigue** that eventually caused the bridge to collapse when the bolts sheared.



Installing ESL locknuts using hand tools

ESL LOCKNUT CHARACTERISTICS

Prevailing torque

ASME B18.16.6
(IFI 100/107)

Mechanical

SAE J995- Gr.5 & Gr.8
ASTM A563, A194
ASME B18.16.6

Features

Installs with standard tools
Suitable for hand tools
Locks in any position
Highly reusable



WHY USE THE ESL?

Benefits of ESL Locknuts

1 Improve safety

of structural bridges by ensuring integrity of all bolted fasteners with minimal maintenance.

2 Improve operational efficiency

by eliminating the need to send maintenance crews to repair or re-tighten loosened fasteners.

3 Reliable and predictable performance

with no galling and no damage to bolt threads.

4 Easy to install

with standard tools and bolts — no need for specialized equipment or training.



ESL on bridge

What are ESL locknuts?

With an all-metal design made of a single unique material, the J.Lanfranco ESL locknut requires no insert. It derives its prevailing torque from two radially de-pitched locking slots positioned parallel to the thread pitch in the turret portion of the nut.

The locking slots are opened by the bolt threads and apply precise and controlled locking torque directly on the thread flank. As a result, this non-galling fastener technology resists all forms of dynamic and cyclical vibration without damaging the bolt threads.

SOLUTION

An Easy-to-Manage Solution to Solve a Complex Problem

Engineers looked for a solution that uses **traditional service-proven bolting technology** with **self-locking capabilities**. This would allow inspectors to easily verify torque retention and periodically re-apply (if required due to expansion or contraction) using standard tools.

After a yearlong evaluation by a private engineering firm, specially dimensioned J.Lanfranco ESL lock-nuts were selected in three sizes to assemble the new bridge. **Over 180,000 individual nuts were used** and the bridge has now been installed. The ESL, in sizes 7/8", 1" and 1"1/8, were installed with hardened washers (ASTM F436) and structural bolts (ASTM A325).

The ESL has proven to be the perfect choice when it comes to torque retention.

