
HARDLOCK NUT



Safety is Power



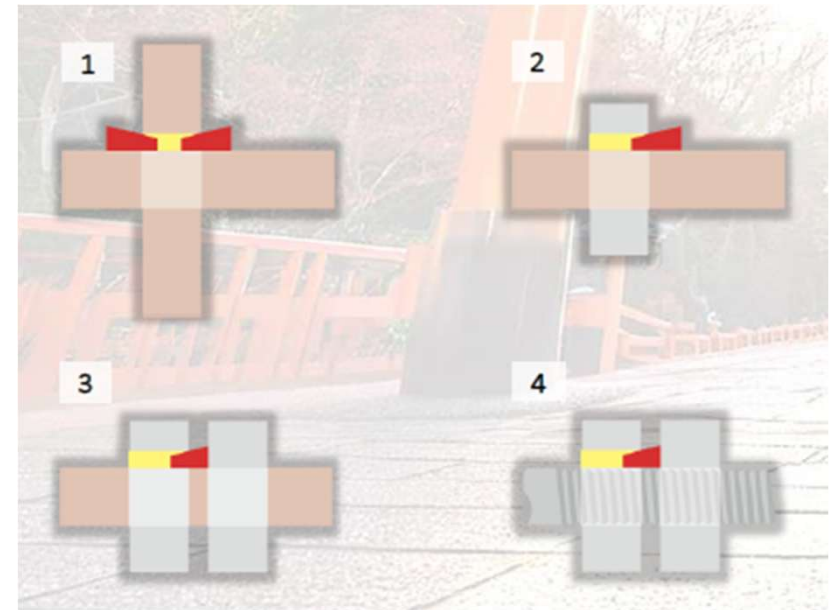
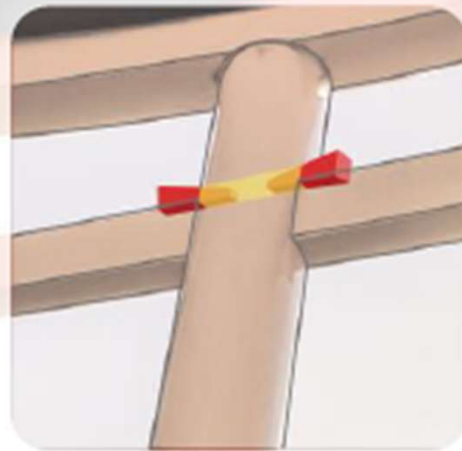
Safety is power!

HARDLOCK®

A Safer Locking Solution: HARDLOCK Nut

Driven by the desire to create a truly reliable locking solution, **Katsuhiko Wakabayashi** founded **HARDLOCK Industry** over **50 years ago** after identifying flaws in existing locknut designs.

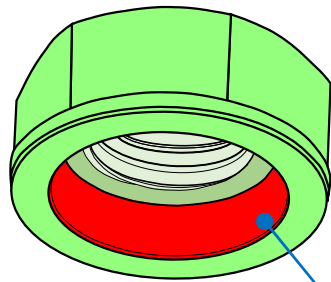
This concept was inspired by the **traditional Japanese Torii gate**, a symbolic structure seen at Japanese shrines.



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HARDLOCK®

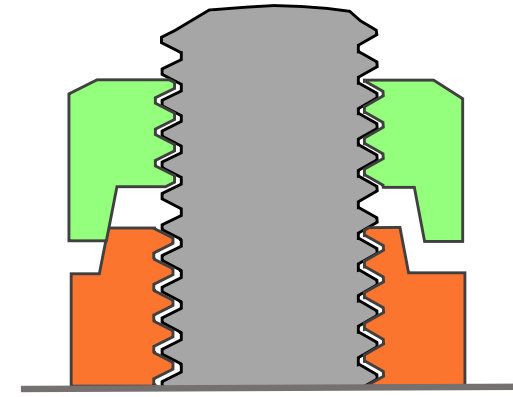
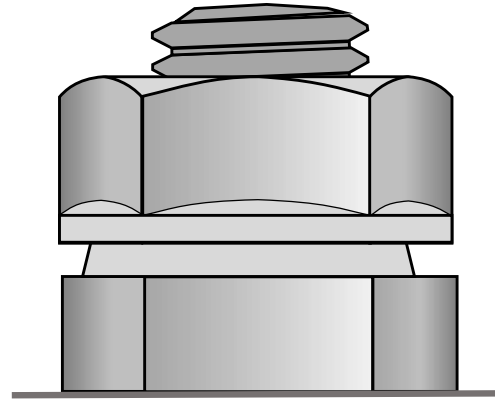
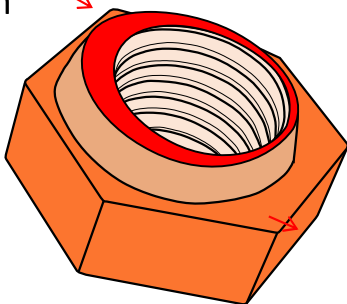
Structure and locking mechanism of HARDLOCK Nut (HLN)



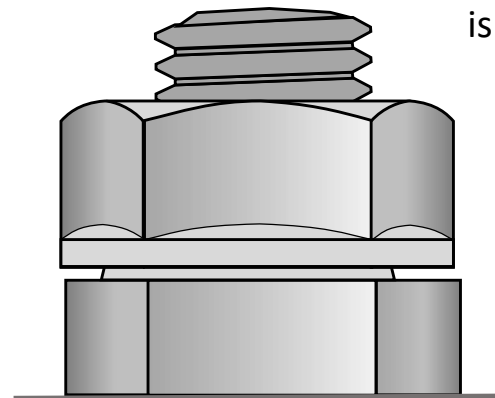
Concentric recess

(1) Convex Nut

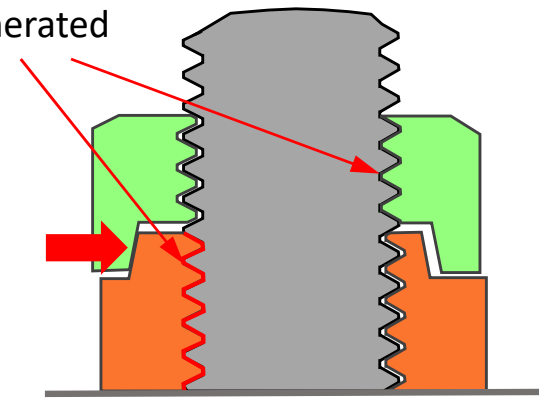
Eccentric protrusion



The first nut **(1) Convex Nut** (clamping nut) has an **eccentric conical protrusion** on the upper surface. The Convex Nut that has the same strength class as a regular hexagon nut is to be tightened to the appropriate torque for the application. The Concave Nut is screwed down manually by hand until it no longer turns.



High-power friction is generated



The second nut **(2) Concave Nut** (locking nut) is designed with a concentric conical recess that contacts the protrusion of Convex Nut to generate a strong perpendicular load with resultant elimination of the play (gap) between the Convex Nut and bolt.

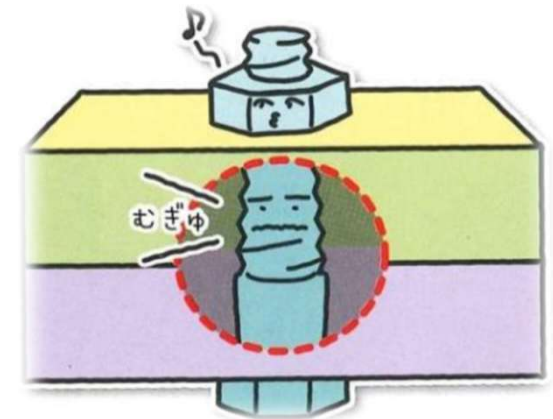
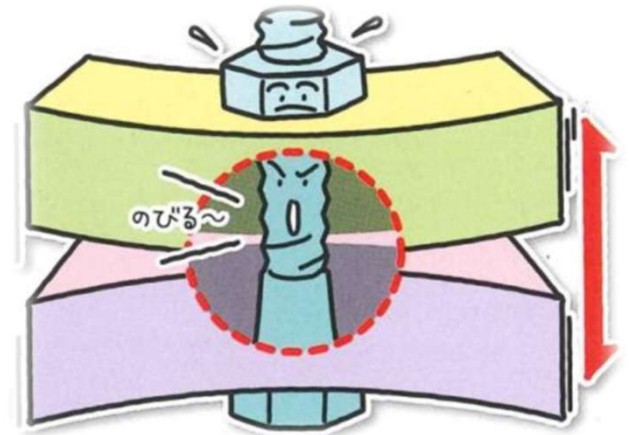


Importance of Proper Bolt Axial Force

If the bolt is **not tightened with enough axial force**, most of the external **load acts directly on the bolt**. This increases the stress on the bolt and raises the **chance of breakage or loosening**.

When the bolt is **tightened with the correct axial force**, the external load is **shared by all the connected parts**. As a result, less stress is placed on the bolt, making it **less likely to break**.

Proper bolt tightening is **essential to prevent bolt failure**.



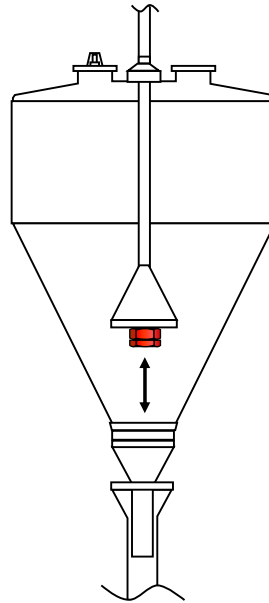
HARDLOCK Nut Use on Food & Beverage Applications



In food and beverage applications, **equipment operates under constant vibration, temperature changes**, and continuous processing conditions. Over time, these conditions can cause fasteners to loosen leading to safety risks, contamination, and unexpected downtime.

Application

In this application, an M24 A4 HARDLOCK Nut is used on the cone valve of an IBC tank handling powders and granules, ensuring secure fastening and preventing loosening during operation.”



Cone Valve (IBC Tank)



Powders / Granules Size: M24 A4

Why HARDLOCK?

👉 Prevents loosening under vibration



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Application

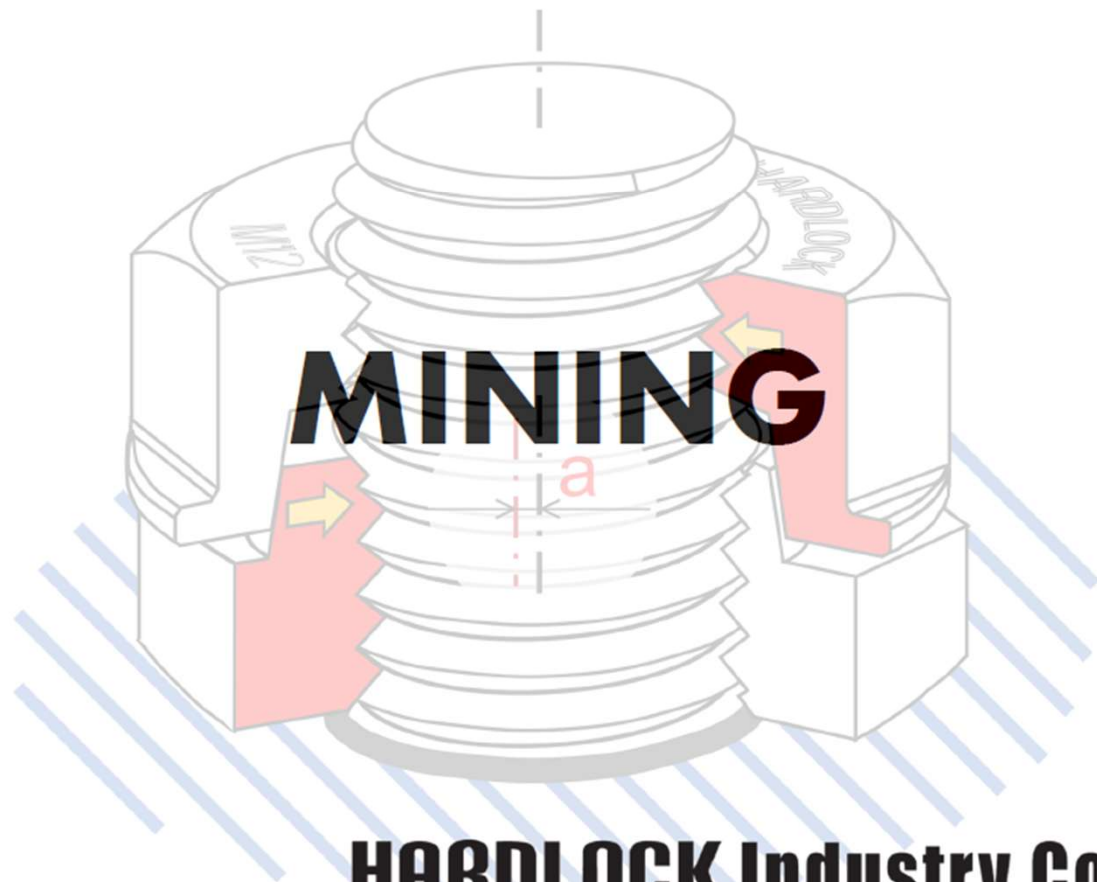
In sake (rice wine) production tanks, HARDLOCK Nuts are used in multiple areas such as handrails (M6 A2), internal filters (M8 A2), and conveyor systems to ensure secure **fastening where welding is not possible** and to **prevent loosening caused by vibration and continuous operation**.

Why HARDLOCK?

👉 The tank wall is too thin for welding, so bolted fastening is required. HARDLOCK ensures the joint remains secure without loosening.

Thermal Tank (Sake Production)





HARDLOCK Industry Co.,Ltd.



Mining is one of the most **hazardous industries**, involving **heavy machinery**, **extreme environments**, and **constant operational risks**. Without proper safety measures, even small failures can lead to serious accidents and operational disruptions.

HARDLOCK Nut has demonstrated reliable anti-loosening performance **under severe vibration and heavy-load conditions** in mining applications



HARDLOCK Nuts use in Mining

Vibrating Screen (Mining Equipment)

Used for material separation (ore, rocks, minerals)
Operates under continuous vibration & heavy load



HARDLOCK Nut (Rim / Basic Type) Size: M16–M56 Material: High strength steel
(ASTM A194 Gr.2 / MP)



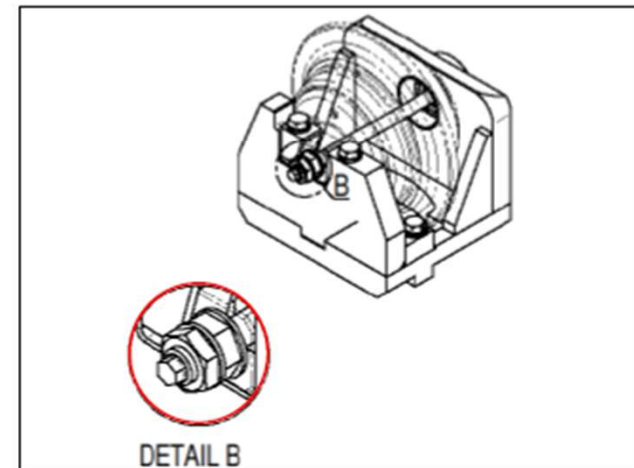
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HARDLOCK Nuts use in Mining

TBM (Tunnel Boring Machine)

Heavy load + constant vibration Bolts can loosen over time



M30 HARDLOCK Nut (Rim type) used Prevents loosening and keeps joint secure



HARDLOCK[®]

Oil Gas Plant Solutions



Ras Laffan Liquified Natural Gas Company Limited, Ras Laffan Qatar

Application

Regeneration Gas Heater Pipe
Header Connection

HLN Nuts Used

HARDLOCK Nut 1 1/4-8
UN ASTM A194 Gr.4
Unplated 96pcs



Oil Refining Complex in Tatarstan

TAIF-NK used HARDLOCK Nut on flange connections where is susceptible to vibrations and corrosions

Application

Bolted flange connections of pipes are subject to repeated bending, vibration, constant pressure and temperature changes, which may cause bolt loosening

HLN Nuts Used

HLN Thin type M16x2.0 Class 8 2,111pcs

HLN Thin type M16x2.0 A2 1,121pcs

HLN-R M12x1.75 Class 8 973pcs

HLN-R M12x1.75 A2 513pcs

HLN Thin type M20x2.5 Class 8 5,907pcs

HLN Thin type M20x2.5 A2 1,057pcs

HLN Thin type M39x4.0 Class 8 577pcs





The certified and proven locking nut for RAIL TRACKS & TRAIN CARS applications

Where you can find the advantage of HARDLOCK Solutions:

- (1) The applications are exposed to strong external load in addition to severe vibration**
- (2) Switching from welding to improve workability of maintenance**
- (3) Difficult to re-tighten or inspect the bolted joints once they are installed**
- (4) Strict safety is required**
- (5) Joints are not or very small preloaded**
- (6) Necessary to retrofit to existing worn bolts**

Updated: Apr 2026



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The Incident Potters Bar Derailment (UK, May 2002).

Impact: 7 deaths, over 70 injuries.



The Hook: A stark reminder of the catastrophic cost of joint failure.



The Technical Failure

Missing Nuts: Vibrations caused the nuts securing the track stretcher bars (both front and rear) to completely come loose and fall off.

Fatigue Crack: Without the proper clamping force (preload), the structural lock stretcher bar suffered severe fatigue failure, fracturing right through a bolthole.

The Resolution

The Mandate: Network Rail and London Underground mandated a switch to high-security **HARDLOCK Nuts** (M30 and M20).

The Result: Over 500,000+ installations across the UK rail network with 0% failure.



Improvements with underfloor equipment mounting

(Japanese Bullet Train: Shinkansen)

HARDLOCK Nuts have replaced **welding** to fix underfloor equipment of Shinkansen since 1992, which makes possible a tremendous amount of reduction in maintenance work after every 750,000 miles running (1.2mil km).



300 Series
Built: 1990 - 1998



Switched from welding to HARDLOCK

Maintenance is the most controllable expenditure



HARDLOCK Nuts use in Railways

700 Series

Built: 1997 - 2006



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E2 Series

Built: 1995 - 2010



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HARDLOCK Nuts use in Railways

The British Rail 395 Series



Dual-voltage electric multiple unit(EMU)
Manufacturer: Hitachi
Max speed: 140mph (225km/h)
Operator: Southeastern
Number of Built: 29
Year Built: 2007 - 2009
Cars per Set: 6



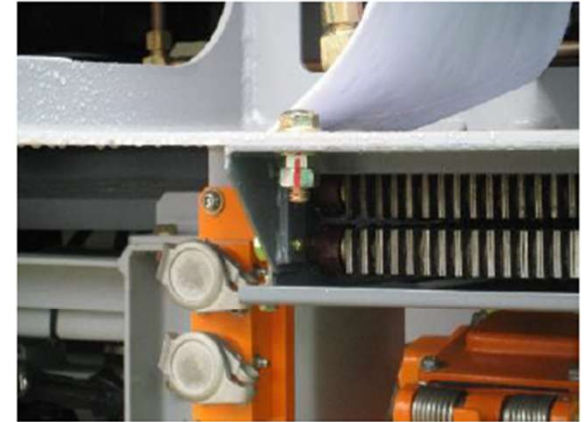
M16 A2



Coupler base M36 Class 10



M12/M16



M12



Cover plate holder M10 Class 4



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29167A 12 00M01

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HARDLOCK Nuts use in Railways



West Japan Railway 225 Series



Dual-voltage electric multiple unit(EMU)
Max speed: 81.3mph (130km/h)
Operator: West Japan Railway (JR-West)
Manufacturer: Kawasaki Heavy Industries, Kinki Sharyo
Year Built: 2010 -



Coupler M20



Coupler Hanging Block M20



Equipment Hanging M20



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25161A 12 00MEL1



HARDLOCK Nuts use in Railways

Train operator's seat (swivel chair) on NYC subway



R188 made by Kawasaki Rail Car



To fix swivel parts (5/8"-11 UNC)





The proven locking nut for Steel Mill applications

Where you can find the advantage of **HARDLOCK Solutions**:

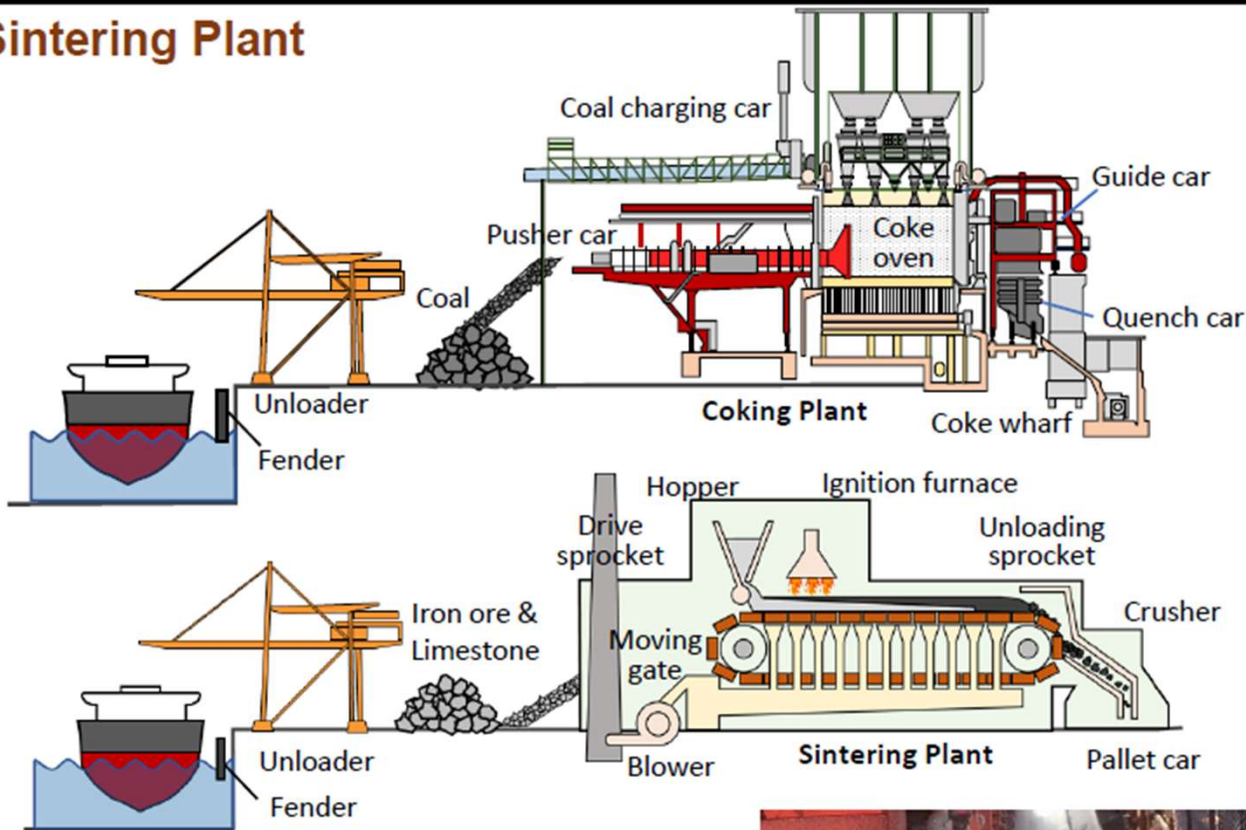
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HARDLOCK Nuts use in Steel Mills

Coking & Sintering Plant

- **Fender**
- **Unloader**
 - Bucket
 - Rail track
 - Stacker
 - Hopper Liner
 - Chain Conveyor
- **Coking Plant**
 - Backstay Bolt
 - Guide Car
 - Insulation Shield
- **Sintering Plant**
 - Hopper liner
 - Conveyor skirt
 - Moving gate
 - Sprocket wheel
 - Pallet Car



Coal Charging Car
HLN M8~M33 SS400, SUS304



Sintercar
HLN M24 S45C



Fender
HLN M56 SUS304



Unloader
HLN M5~M52
SUS304, SS400/HDZ, SCM435/DACROTIZED



Conveyor skirt
HLN M8~M24
SUS304,
SS400/HDZ



Hopper liner
HLN M16 SS400/HDZ



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HARDLOCK Nuts use in Steel Mills

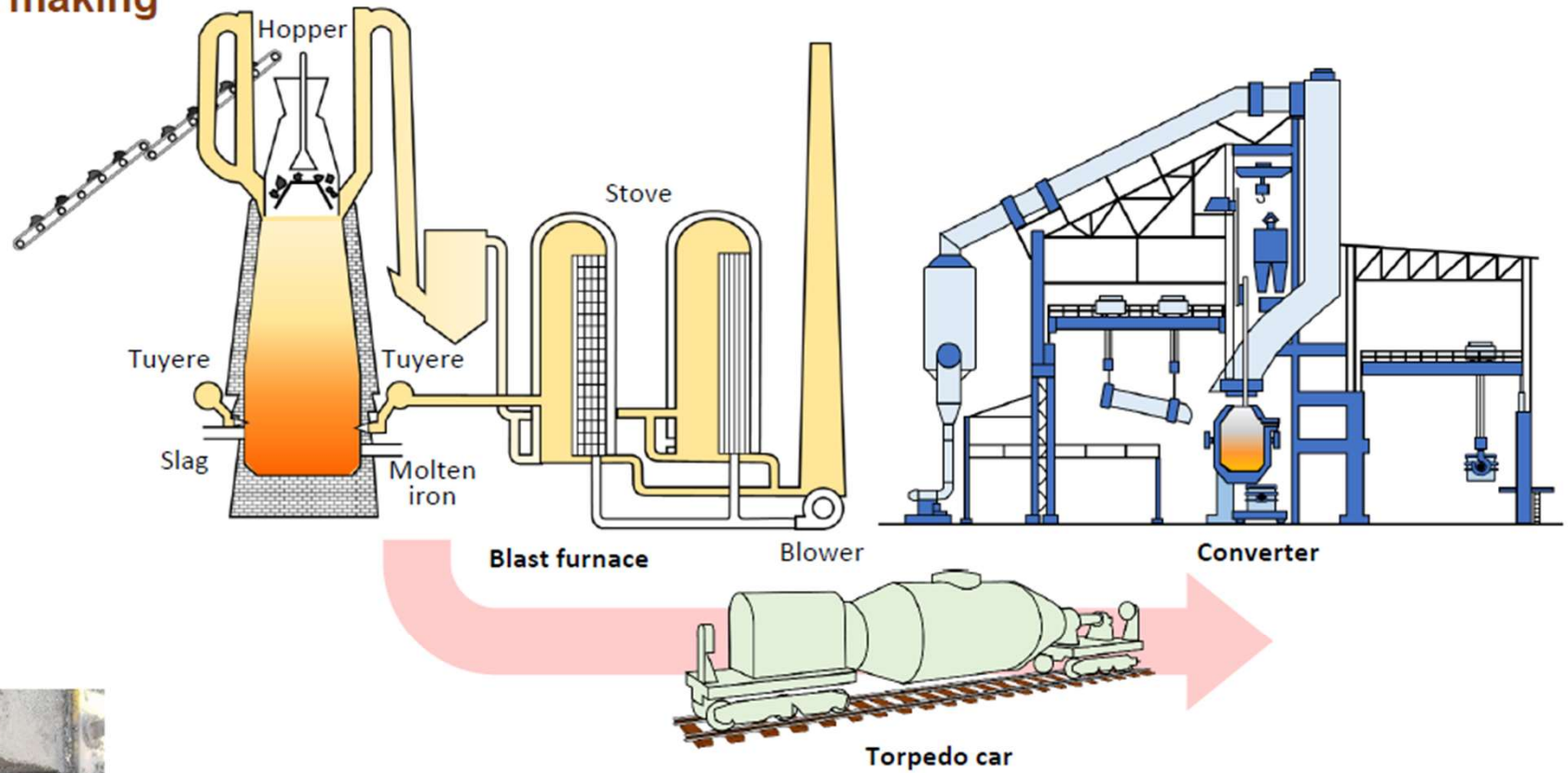
Iron Making ~ Steel making

• Blast furnace

- Stove gas cut off equipment
- Stove valve flange bolt
- Tuyere branch heat-resist bolt
- Blower

• Molten iron transport

- Fishplates bolt
- Rail track turnbuckles



Turnbuckle for rail track
HLN M30 SS400 & M30 Left handed
* to ensure strengthen the track so that the rails are held in position



Fishplates
HLN M20 S45C



Blower
HLN M16 S45C



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Roll lifter
HLN M24 SS400



Feed Roller HLB M45 S45C



Hydraulic tank
HLN M24 SS400





HLB (HARDLOCK Bearing Nut)
M140 SS400



High-Risk Operating Environment

Heavy machinery + constant vibration
High-temperature processes & thermal cycling
Complex operations across smelting, refining, and casting

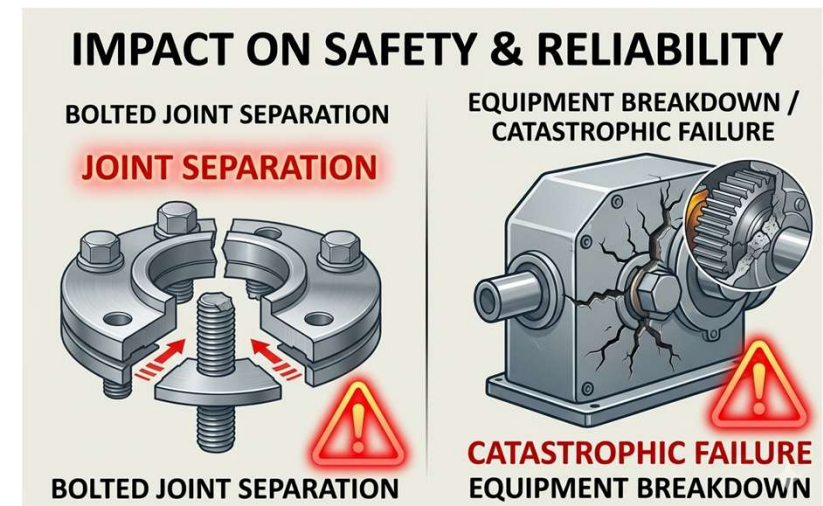


Hidden Risk: Fastener Loosening

Bolted joints = critical but vulnerable connection points
Vibration leads to loss of preload (clamping force)
Thermal cycling can cause: 50–60% preload loss in real conditions

Impact on Safety & Reliability

Reduced preload → reduced joint integrity Leads to:
Component separation Fatigue failure Equipment
breakdown / catastrophic failure



Reasons to Implement HARDLOCK NUT

- ➡ An Anti- Loosening locking effect recognized by the world!
- ➡ Available in various materials and surface treatments tailored to the environment!
- ➡ Reusable without reduction in performance!
- ➡ Full torque management and completely fastened even with zero (0) axial force!
- ➡ Maintenance-free reduces total cost!



A close-up photograph of two hexagonal metal nuts. The nut on the left is a standard metal nut. The nut on the right is a Hard-Lock nut, which has a circular, dark-colored insert in its center. The words "HARD-LOCK" are engraved in a circular pattern around the insert. The background is a plain, light-colored surface.

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