

NTN's LLU Double-Lip Seals



The Industry's Best Seal

NTN offers a variety of shield and seal types for our ball bearings; however the best contact seal in the marketplace for excluding contamination and keeping grease inside the bearing is NTN's LLU double-lip seal. The inner lip of a double-lip seal is pressed against the inside surface of the V-groove; the outer lip is spread open by the elastic force of rubber to create a small gap between the outer lip and the inner ring, creating a labyrinth effect (*Figure 2*). Should the inner lip wear, the contact pressure will decrease; however, the outer lip will get closer to the inner ring (*Figure 1*). In effect, a constant degree of sealing will be maintained; and, as a result, bearing service life will be noticeably lengthened.



Figure 1

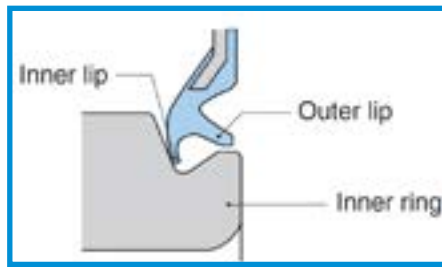


Figure 2

Water ingress testing information for NTN's LLU seal versus industry competitors is located on the back side of this document.

NTN LLU Seal Success Stories

NTN has had many cost saving success stories across a wide variety of industries and applications. Two such examples follow. For information on LLU seal successes in additional industries and applications, please contact your NTN Sales representative.

LLU Seal Success Story #1

(Cost Savings Reference: CS-1734)

A major producer of potato chips and other snack products was experiencing monthly bearing failures on its potato chip bag seal checking line resulting in over \$25,920 in bearing spending and about \$10,000 in downtime and maintenance costs annually at the facility. NTN's Engineering and Sales support team performed a thorough evaluation of the production line and recommended the implementation of our LLU sealed ball bearings as a replacement for the competitor's bearings with single-lip seals. NTN's LLU sealed ball bearings utilize double-lip contact seals to improve sealing, prevent contamination ingress and reduce grease washout. NTN's LLU seals doubled bearing life and cut maintenance in half, resulting in **\$26,964 of cost savings** for the customer.



LLU Seal Success Story #2

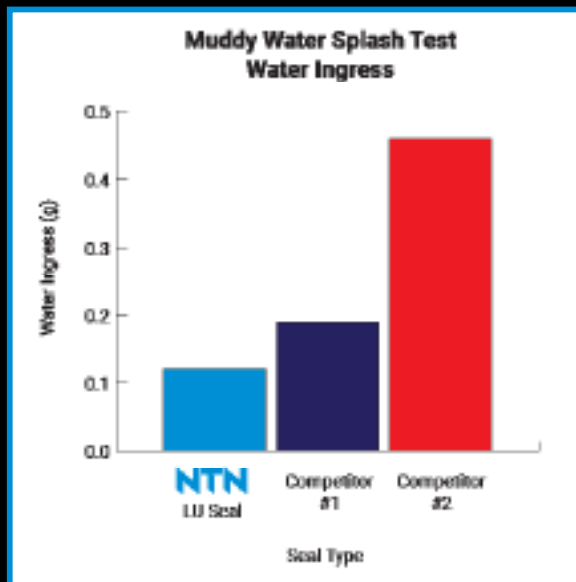
(Cost Savings Reference: CS-0322)

A major North American based steel mill was experiencing bearing failures on the anti-crimping and anti-flutter rolls in its cold rolling mill that cost an estimated \$33,000 per roll failure. NTN's Engineering and Sales support team reviewed the anti-crimping and anti-flutter roll operation and NTN's team of experts determined that, after analyzing various sealing options and considering added torsional stress on upstream drives, our LLU seal would maintain smooth operation while minimizing water ingress and optimizing added friction. NTN full-contact LLU sealed deep groove ball bearing has successfully run longer than the conventional open-type solution, as well as the competitor's spherical roller bearing, resulting in triple the uptime and **over \$477,000 in annual cost savings**.



NTN LLU Seals vs. the Competition

In an effort to gauge the durability and quality of NTN's LLU seals against the seals of our competitors, NTN performed a muddy water splash test to determine the effectiveness of our seal at reducing the risk of failure when exposed to environmental contaminants. Water was sprayed onto the bearings for 240 cycles, each lasting 300 seconds, for a total of 20 hours. The graph below shows the results of how much water made its way into the bearing during the test.



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