

HIGH TORQUE COUPLING

CASE STUDY



STEEL MILL

Coupling Selection

Gear Couplings vs. Elastomeric Couplings

When choosing couplings, it's important to consider issues such as maintenance, downtime, lubrication and the environment, as well as the torque and the speed of the application.

You would be hard pressed to enter a typical manufacturing plant, whether it was mining, agricultural or industrial, and not find gear couplings churning away. The question is, "Is this by demand or design?"

Generally this is by design, but rarely by necessity, rather familiarity. Standard gear couplings have been considered the norm for decades for handling high peak loads and in rugged and destructive applications. As new technology and design innovation evolve, so does the field of coupling power transmission components. Advances in Elastomeric Couplings can now provide benefits over gear couplings in a vast array of applications. Torque, reliability and lubrication-free advantages have provided reliability, cleanliness and improved preventative maintenance, which can substantially reduce failures and equipment down-time.

Although carbon steel Gear Couplings are effective and easily understood, they do have inherent issues that can not be ignored. Lubrication, preventative maintenance and environmental concerns are a few that are the most common. Lubrication is one of those Catch-22 situations, as a gear style coupling needs lubrication or it will fail. This can only be done while the drive is not running – whether planned or not. So with fingers crossed till the next shutdown, we wonder why we are still lubricating gear couplings.

Next is predictability. It is not the easiest or cleanest job to disassemble a greasy coupling to determine its remaining lifespan. This is a very time consuming process but is important for the proper function of the machines.

Also to consider are environmental issues, with the ever-increasing focus on manufacturing's environmental impact, the continuous lubrication requirements of the gear coupling can not be ignored. Records show that for every dollar spent on grease, there is five times that being spent on environmental cleanup.



An elastomeric coupling replaced a gear coupling in this state-of-the-art coil processing facility.



An evaluation of the elastomeric coupling was done on the plant's continuous descaling cold mill looper drive, a double-driven, high torque winch assembly.

The reason we do all of the above is because of issues like downtime and change-out. When a coupling does fail, changing the hubs requires equipment to be moved and then realigned properly, a very timely and costly procedure.

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Elastomeric couplings are flexible shaft couplings that transmit power from one rotating shaft to another using non-metallic elastomeric

elements incorporated into the coupling. Elastomers are resilient materials having elastic properties and include rubber, synthetic rubber and plastics.

Elastomeric couplings of the past were looked at areas where high speeds and low torque were present, while leaving the high torque, low speed applications to gear couplings.

However, with QM Bearings new technology and design innovation with their Quick-Flex Couplings, their elastomeric couplings now handle the same or higher torque requirements of gear couplings, without the need to increase the overall size of the coupling.

Quick-Flex Couplings have no metal to metal contact, which reduces the replacement components to just the elastomeric element. This also reduces the amount of vibration and shock being transmitted through the coupling. In the rare event that an insert does fail due to extreme torque or excessive misalignment wear, a new insert can be installed in minutes and the coupling is as good as new again.

Regarding predictability, the inserts can be inspected and changed as desired with minimum downtime. As far as lubrication is concerned, due to the lack of metal to metal contact, there is no lubrication required. This means that there are no costly lubrication costs as well as cleanup.

Many companies are beginning to look at ways to run more efficiently, to reduce downtime, and to lower maintenance costs. By implementing a change to elastomeric couplings many of these companies are getting a higher Return on Investment.

An example of this replacement came in a steel Mill in Ohio. This state of the art coil processing plant recently replaced all of the gear couplings in the mill for elastomeric couplings. This facility was designed to process 5,000 metric tons of steel per day. Coils are received, end welded and set on a process that will go through continuous pickling and a four stand tandem reduction mill followed by a continuous annealing line and then re-coiled. Although a simple process, at these speeds, equipment downtime costs accumulate quickly.

The experienced maintenance staff at this coil processing facility was determined to find solutions to problems that many operational

departments may have had the tendency to accept as inherent. From the beginning the mechanical resource and engineering personnel knew they would experience lubrication and mechanical issues with the some of the gear couplings in critical drive applications, and they did.

When these failures occurred, it was no small task to rectify the problems. Motors and rolls had to be removed so the couplings could be cut or sweated off. Motors had to be re-aligned and the couplings had to be assembled and lubricated.

In 2004 it was decided to try a QM Bearings Quick-Flex elastomeric coupling on an extreme application

to test its feasibility. The chosen application was the continuous descaling cold mill looper drive, which is a double driven, high torque winch assembly. Since Quick-Flex Couplings can be supplied with inserts of varying durometers that can handle over 1,600,000 in-lbs of torque, sizing this application was not a problem.

To compound the difficult application of heavy forward and reversing loading while testing the QM Bearing's claim of the ability to handle extreme misalignment, the Quick-Flex Coupling was intentionally left substantially out of alignment (1/4").

The first inspection after six weeks

of operation showed only minor cracking on the webbing between the wedges, while the torque transmitting wedges were still in place and showed only minor signs of misalignment wear. The test was proving to be very successful.

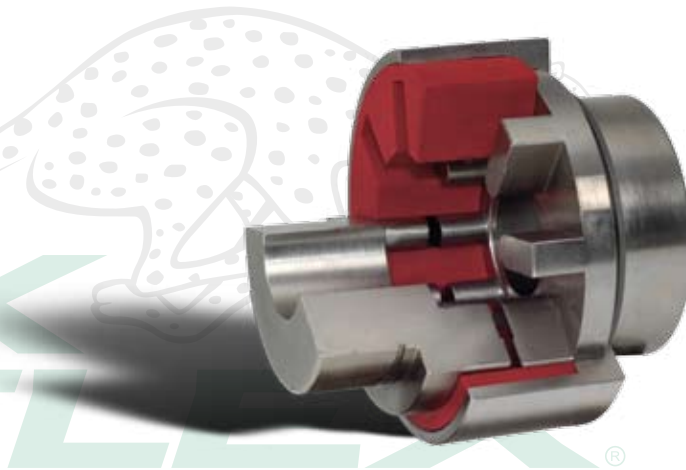
Since the initial trial, mechanical and engineering personnel have been successfully replacing the OEM Gear Couplings with properly selected Quick-Flex Elastomeric Couplings with no failures. The most extensive change outs were to their double ended bridle drives as pictured on page 1. The double ended drives are interesting because of the unique design of these couplings, it is possible to assemble them in the same

fashion you would assemble a flex/rigid coupling. Note the long solid intermediate shafts in the picture.

On a recent unplanned shut down, five rolls of the Skin Pass Mill Exit Bridle had to be changed. This task would normally take 12 hours with gear couplings, but required only 6 because of the ease of working with the Quick-Flex elastomeric couplings. A similar cost reduction was seen on the Bridle Roll change that used to take 48 man hours, which now takes only 24 hours.



Quick-Flex Couplings are the only non-lubricating elastomeric coupling that can go size for size with gear couplings. Not only do you get a coupling that never needs to be lubricated, you also get torque ratings that exceed almost anything on the market today.



	Gear Coupling Torque Rating	QM Quick-Flex Coupling Size	Quick-Flex Maximum Shaft Size (in.)	Quick-Flex Misalignment Tolerance	Quick-Flex Torque Rating*	Torque Improvement
N/A	N/A	QF5	1-1/4	2°	819	N/A
N/A	N/A	QF15	1-5/8	2°	4,001	N/A
1010G	7,560	QF25	2-1/8	2°	12,448	64%
1015G	17,010	QF50	2-3/8	2°	26,478	56%
1020G	31,500	QF100	3	2°	53,641	70%
1025G	56,700	QF175	3-7/8	1.3°	88,206	56%
1030G	94,500	QF250	4-1/8	1.3°	118,929	26%
N/A	N/A	QF500	4-1/2	1°	219,429	133% ¹ - 52% ²
1035G	144,900	QF1000	6-3/16	1°	310,465	116%
1040G	220,500	QF1890	7-9/16	1°	553,981	151%
1045G	302,400	QF1890	7-9/16	1°	553,891	83%
1050G	409,500	QF3150	9-1/8	1°	871,138	113%
1055G	535,500	QF10260	11-1/4	1°	1,670,825	212%
1060G	693,000	QF10260	11-1/4	1°	1,670,825	141%
1070G	1,008,000	QF10260	11-1/4	1°	1,670,825	66%

*Rated with split-style cover and black insert

¹1030G ²1035G



SWITCH

IT'S EASY TO SWITCH TO QUICK-FLEX

Quick-Flex couplings are direct replacements for virtually all comparable couplings in use. Want to learn more about which Quick-Flex coupling is right for you? Log on to www.qmbearings.com to find out more. You can also contact your local distributor or QM representative or give us a call at (800)-661-5568.



North American Locations: Western Canada – Prince George, BC Eastern Canada – Mississauga, ON Western US – Ferndale, WA Southern US – Irving, TX Eastern US – Cuyahoga Falls, OH

QM Bearings designs, manufactures and markets rugged Blue Brute bearings, Quick-Flex couplings and rigid compression couplings. The company's precise manufacturing methods and innovative solutions have won over thousands of customers in over 40 countries. For more information, visit www.qmbearings.com for the distributor nearest you or call (800) 661-7991 or (360) 384-6673.

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