KNOW YOUR MAGNET CHAIN

by Hank Walma
Taylor Chain

The humble magnet chain is a critical link (pun!) in the safe handling of ferrous metals in scrapyards, yet many times it gets overlooked in the rush to start work. As simple as it appears, the chain assembly provides the connection between the material handler's boom and the lifting magnet. Since it is an overhead lifting device, the chain is subject to additional scrutiny in order to provide safe, reliable service. Given that an average scrap magnet weighs 5,000lbs and carries a 3,000lb load, a lot of danger is up in the air. Failure to pay attention to the magnet chain can result in disastrous events including death, injury or damage to equipment.

A chain assembly is composed of a Master Link, chain legs and connecting links. The Master link is the large Oval, Pear or 'D' shaped link that attaches to the boom tip. The chain supplier will usually determine what shape master link will be used, with NASCO-OP typically offering the Pear shape. Depending upon the number of magnet lugs, either 3 or 4 chain legs will be installed on the master link, although most scrap magnets make use of the 3-leg version. In a typical 3-leg assembly the center leg is intentionally longer than the two outside legs to insure the magnet hangs level after installation. The last component, the connecting link, attaches the leg to the magnet lug. The size of an assembly references the diameter of the chain in the leg, not the master link or the connecting link.

Particular care should be taken when ordering a chain assembly to insure the connecting link is compatible with the magnet lug; in particular that the link will fit between the lug's sides and that there is sufficient clearance between the pin and top of the magnet case. There is no standard for magnet lugs; each manufacturer produces their own unique version. Furthermore, it is not uncommon to find altered lug dimensions caused by years of use or maintenance.

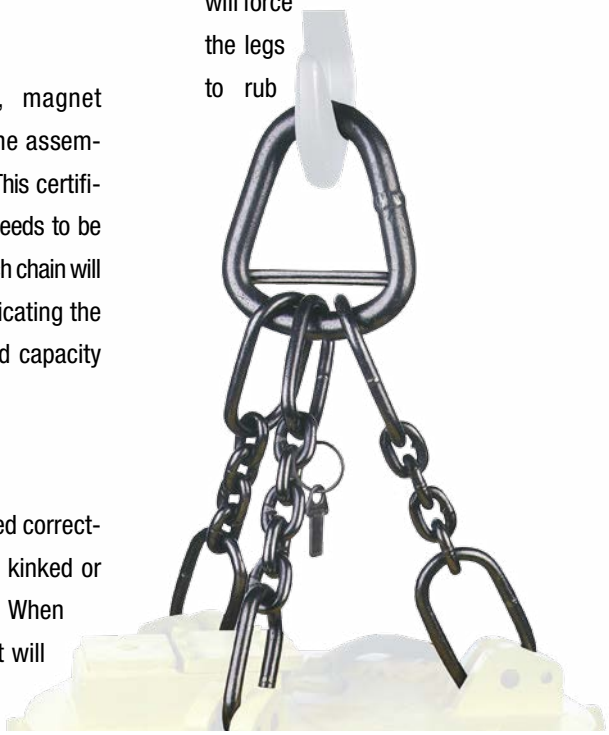
The length of the chain leg, and thus the number of links, is determined by the chain supplier. The supplier will select a length that will result in a leg that will be at a 60 degree angle with the horizontal. Working load limits (WLL) and proof testing are determined referencing this angle. Legs shorter than standard will result in smaller angles with the horizontal and, as a result, WLL will be reduced. Longer leg lengths will have larger angles with the horizontal and, while the WLL will increase, the magnet may tend to pendulate and be more difficult to control.

To provide high WLL, alloy steel is used in magnet chain construction. Since metal to metal contact will occur between the alloy chain assembly and the points of connection, the pins used in the boom tip and magnet lugs are typically of non-alloy material. This arrangement allows the softer, non-alloy, pins to wear before the chain.

As an overhead lifting device, magnet chains require a certificate that the assembly was successfully proof tested. This certificate is shipped with the chain and needs to be retained by the user. Additionally, each chain will have an ID tag on the center leg indicating the serial number, size, reach and rated capacity of the assembly.

1. Safe Operation
   a. Insure the assembly is installed correctly and that no leg is twisted, kinked or crosses over an adjoining leg. When installed properly the magnet will hang level.
   b. Never subject a magnet chain over its rated load, which is identified on the chain's proof test certificate and ID tag.
   c. Avoid shock loading, or yanking, the chain from a slack condition. This is damaging not only the chain, but also the material handler.
   d. Do not weld or modify a magnet chain. Damaged chains should be removed from service, repaired by an authorized party or discarded.
   e. Do not rest the material handler boom on the chain, the weight of the boom can deform and damage links.

2. Daily Inspection, insure the following:
   a. The topmost master link is in proper position, especially insure that the small end of a pear shaped master link is up and the larger end is down. The larger radius of the bottom of the pear link allows for proper clearance between the legs. A master link in the wrong position will force the legs to rub



against each other and prematurely wear.

b. Chain legs are straight and not twisted or kinked. Twisted or kinked chain will wear prematurely.

c. Clean and free of oils and greases. Oil and grease will attract abrasive materials that will shorten the chain's service life.

3. Remove a magnet chain from service if any of the following occurs

a. The ID tag is missing or illegible.

b. Cracks form on any of the chain components.

c. Stretched, bent, twisted, gouged or distorted chain links or components.

d. Excessive corrosion is present.

e. Any component of the assembly shows excessive wear.

Chain Wear Chart

Original Chain & Component Diameter	Minimum Diameter (fractional equivalent)	Minimum Diameter (decimal equivalent)
5/8”	31/64”	0.4844”
3/4”	19/32”	0.5938”
7/8”	45/64”	0.7031”
1”	13/16”	0.8125”
1-1/8”	29/32”	0.9063”
1-1/4”	1”	1.0000”
1-3/8”	1-3/32”	1.0938”
1-1/2”	1-3/16”	1.1875”
1-3/4”	1-13/32”	1.4063”
2”	1-43/64”	1.6719”
2-1/4”	1-13/16”	1.8125”
2-1/2”	2”	2.0000”