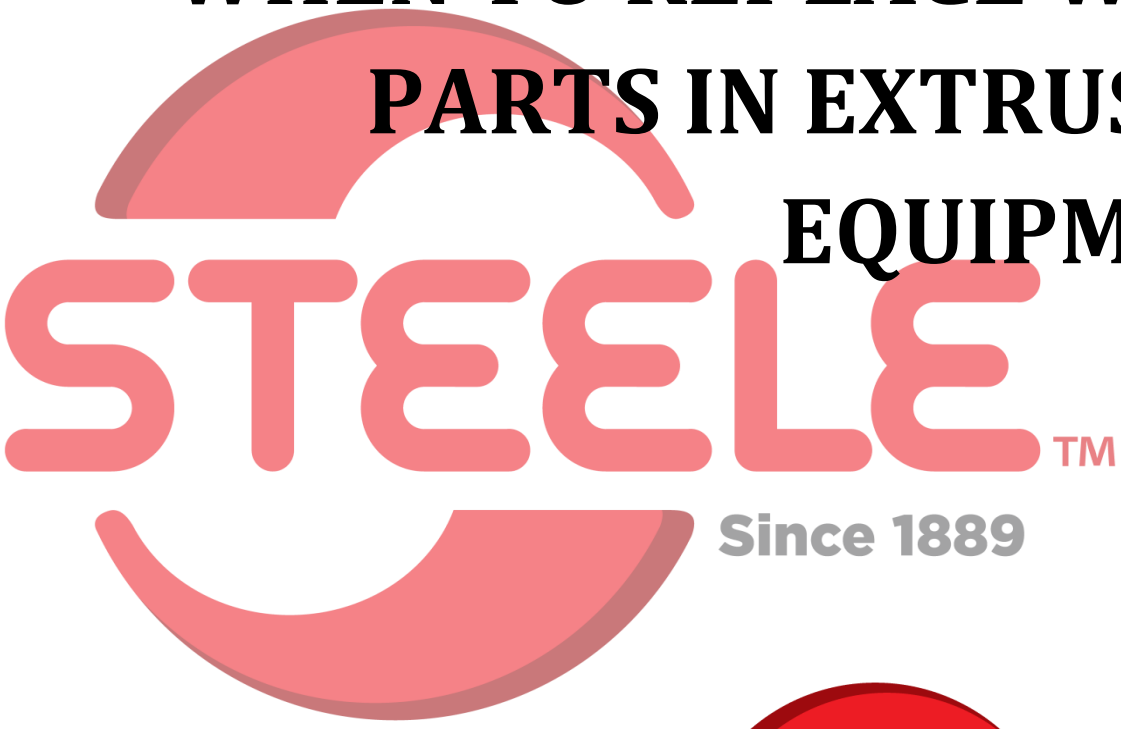
TSB DXX 0011

TECHNICAL SERVICE BULLETIN

WHEN TO REPLACE WEAR PARTS IN EXTRUSION EQUIPMENT



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INTRODUCTION

The replacement of wear parts is a very process-sensitive issue. Economically, it is a question of the efficiency of the extrusion process versus the cost to replace wear parts versus the value and physical requirements of the extruded product. This document focuses on the absolute mechanical constraints of the wear parts. If the wear parts are worn past the limits indicated in this document, unintended forces and exposure may be introduced to non-wear parts, causing more expensive damage. These limits are meant to protect more expensive damage from occurring.

JCSS machine design principles utilize the idea that the wear parts should be designed to be a mechanical failsafe. Wear items are designed to be the simplest and least expensive components to replace. The brittle nature of 28PC allows for a fracture point well below mechanical yield points of the other components (shafts, bearings, etc.). While other means of machine protection are also required (such as amperage monitoring or shear pin failure in the case of a hinged mouthpiece design at the exit or in the feed roller shaft in some models), the wear items allow for another failsafe point by utilizing the material properties of high chrome iron. As wear on these items reduce overall mechanical strength, the likelihood of a system failure resulting from the wear items themselves increases.

FIG 1: Photos of auger wear

AUGERS

There are two types of possible wear for augers: wear in the outer diameter of the augers and wear in the auger width. Pug sealer sealing auger replacement follows the same guidelines described in this section.

O.D. WEAR

A decrease in the outer diameter of the auger causes a larger gap between the auger and the liner. This gap between static and dynamic surfaces causes increased friction, creating more heat, therefore accelerating hardcaking (see TSB GEN 0004). Hardcaking can cause decreased auger efficiency and column speed as well as inflated motor amperage and gearbox torque.

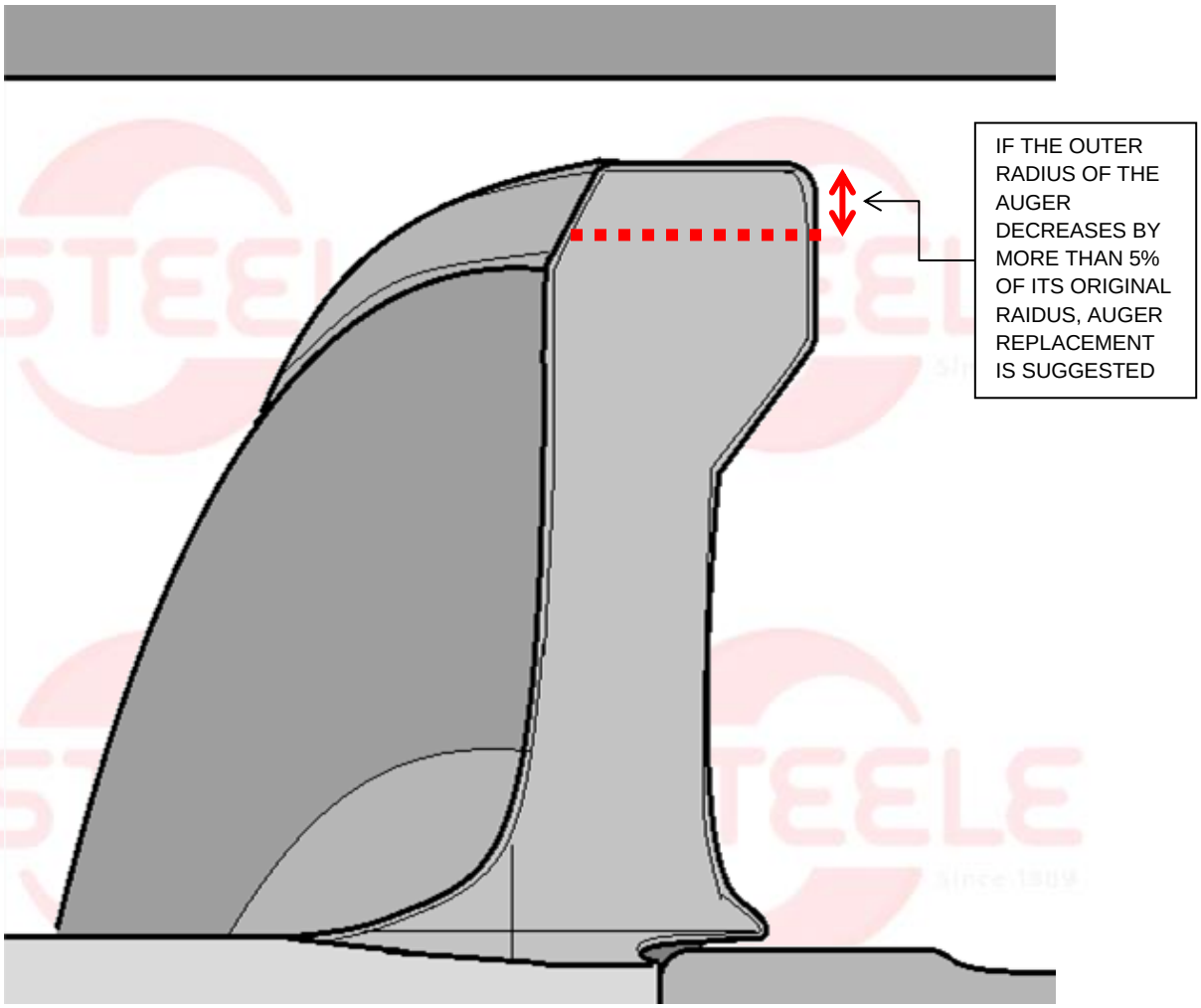

FIG 2: Typical auger O.D. wear

EFFECTS OF HARDCAKING

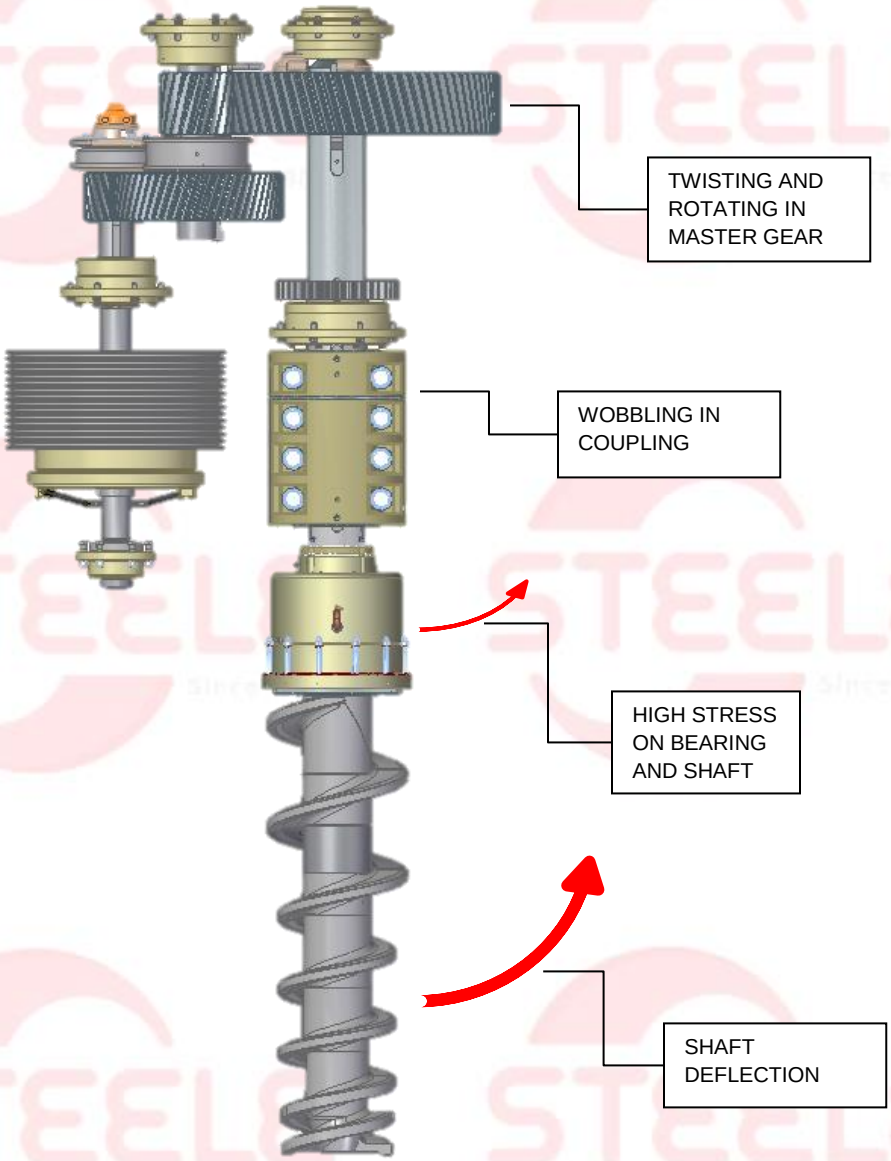

FIG 3: Hardcaking effects

As shown in Figure 3, hardcaking can cause shaft deflection, which can lead to a variety of problems. Another effect of outer diameter wear is increased backflow, which affects extrusion efficiency (see TSB GEN 0001). If the O.D. of the augers decreases by more than

1” (25.4 mm), JCSS recommends auger replacement. As the O.D. of the augers decreases, the efficiency decreases at an accelerating rate.

WIDTH WEAR

The other type of auger wear is a decrease in the wing width. The thickness of the auger wings allows them to resist the forward force of the pressing material, in order to compress the material. When the auger wing wears thin, the integrity of the wing becomes compromised, and the wing may fracture and break off, causing die damage.

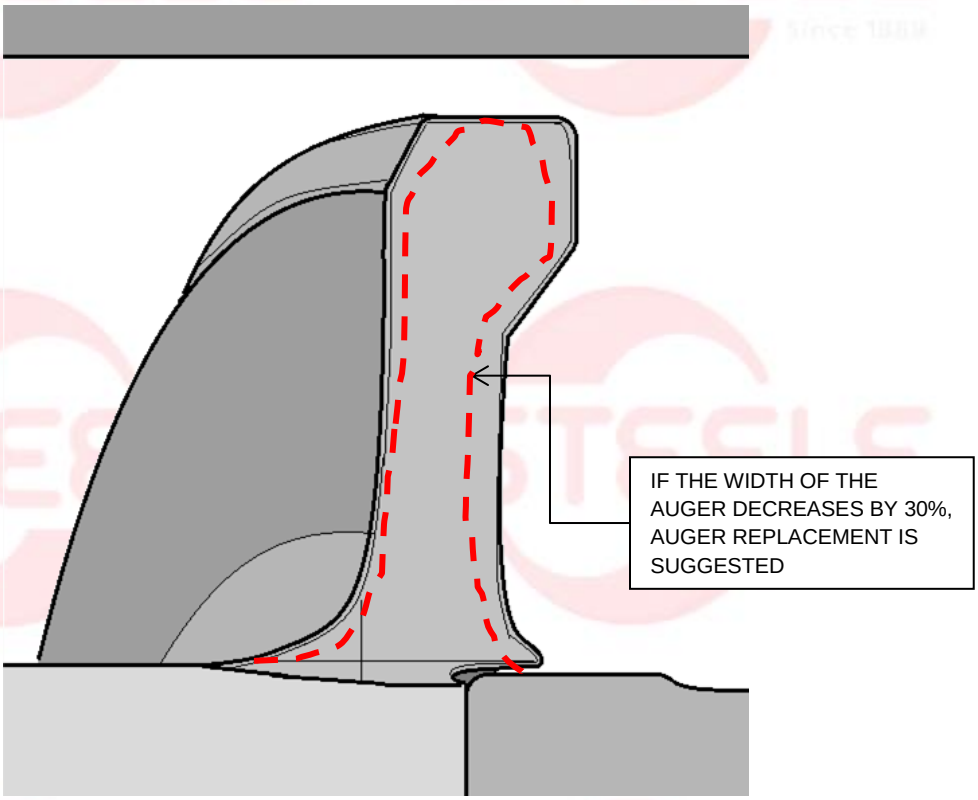

FIG 4: Typical auger wing width wear

Generally, when the thickness of the auger wing decreases to 60% of its original width, the auger should be replaced. Any more wear risks more expensive damage. The extrusion efficiency decreases (approximately) linearly as a function of auger wing width.

AUGER LINERS

The effect of liner wear is highly dependent on material. Liner wear has a lesser effect when using high-cement additives. Like auger O.D. wear, liner wear can increase backflow, decreasing extrusion efficiency. Liner wear has little effect on the wear of other machine components, so replacement is mostly dependent on efficiency requirements. Typical liner wear is shown in Figure 4. The information supplied in this section can also be applied to sealing auger liners.

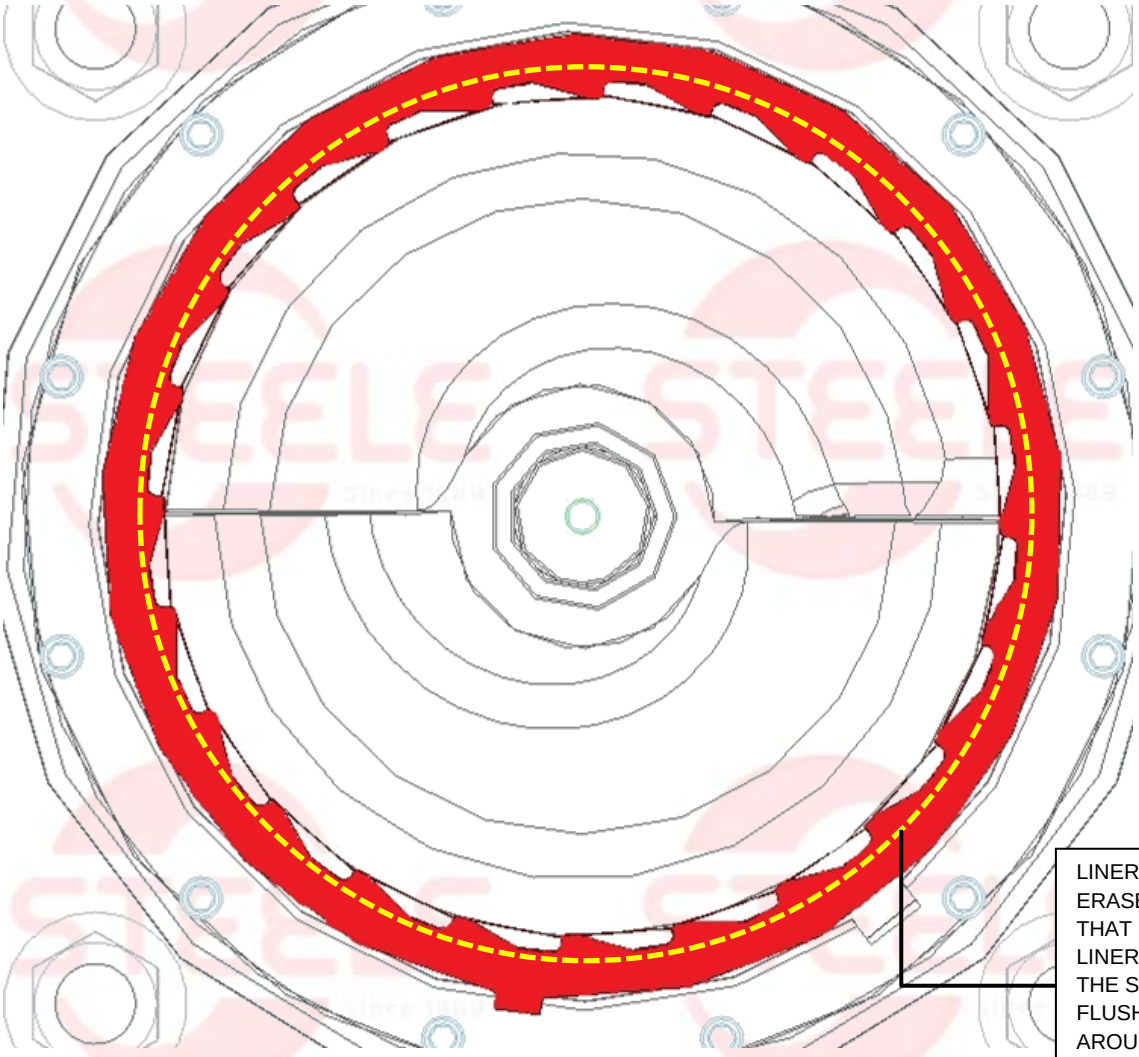

FIG 5: Typical auger liner wear

FEED ROLLER SWIPES AND SHOES

Outer diameter wear of the feed roller shoes can lead to hardcaking, similar to the effects of O.D. wear in augers (see the auger O.D. wear section of this document). The feed roller swipes at the ends of the feed roller are especially susceptible to wear, so the ends of the feed roller are extremely sensitive to hardcaking. As such, the front and rear feed roll swipes will need to be replaced more frequently. If the distance between the swipe and the top of the shoe wears to ¼" (6mm), you may want to consider replacing the shoe (see Figure 5). The feed roller swipes should be replaced when they are no longer able to hold the shoes.

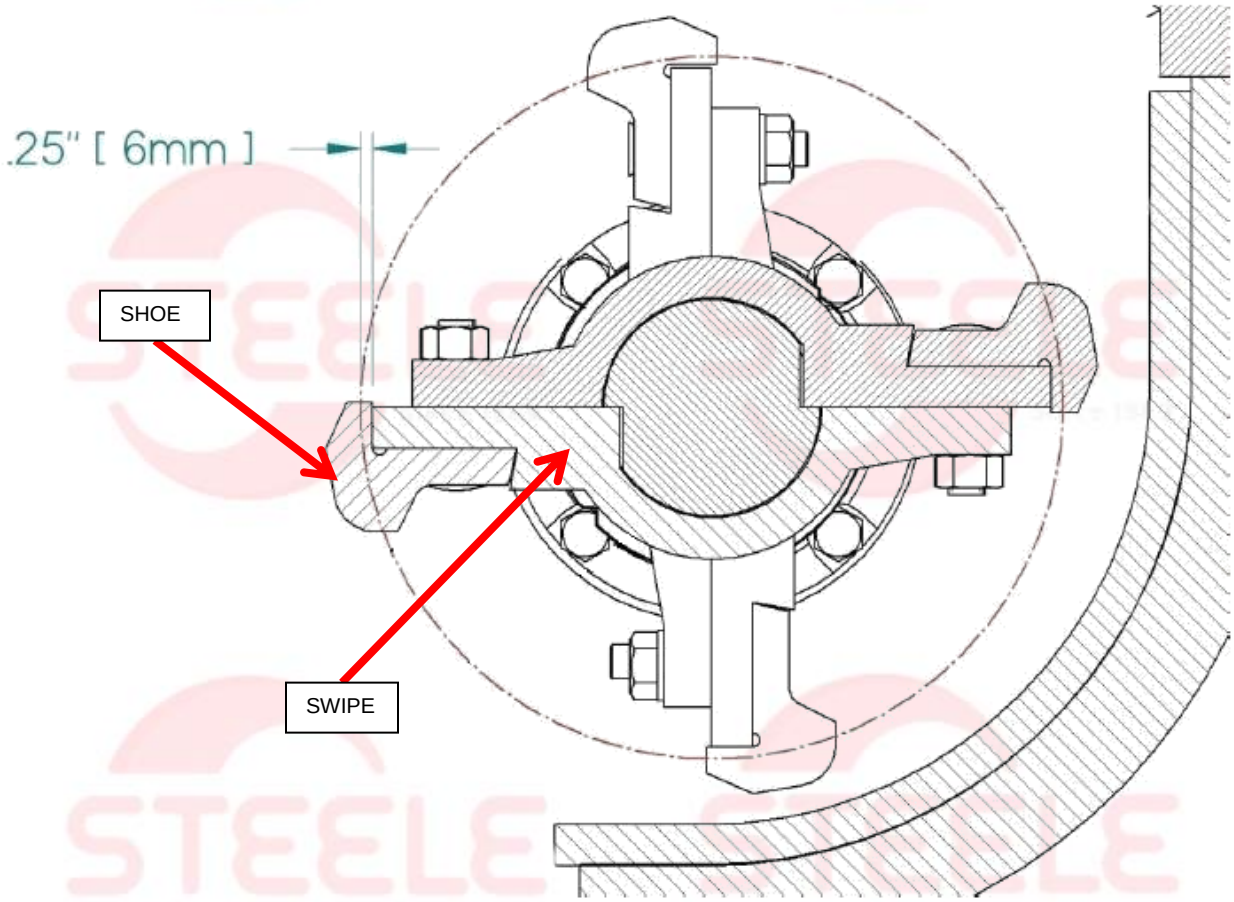

FIG 6: Feed roller shoe wear limit

PUG KNIVES

There are two types of pug knife wear: wear in the O.D. of the pug knife and wear in the width. The danger with width wear is exposing the shank to wear. The thickness of the pug knives protects the pug shank from fatigue failure and surfaces of the shaft from abrasion. The shank could potentially fracture and break off, damaging many components of the machine. If the overall thickness of the pug knife is less than ¼" greater than the outer diameter of the pug shank, JCSS recommends replacing the pug knife (see Figure 6).

O.D. wear of the pug knife has similar effects to auger O.D. wear. Pug knife wear can lead to hardcaking (the effects of hardcaking are described in the auger O.D. wear section of this document). If the O.D. decreases 1" (see Figure 6), JCSS recommends replacing the pug knife.

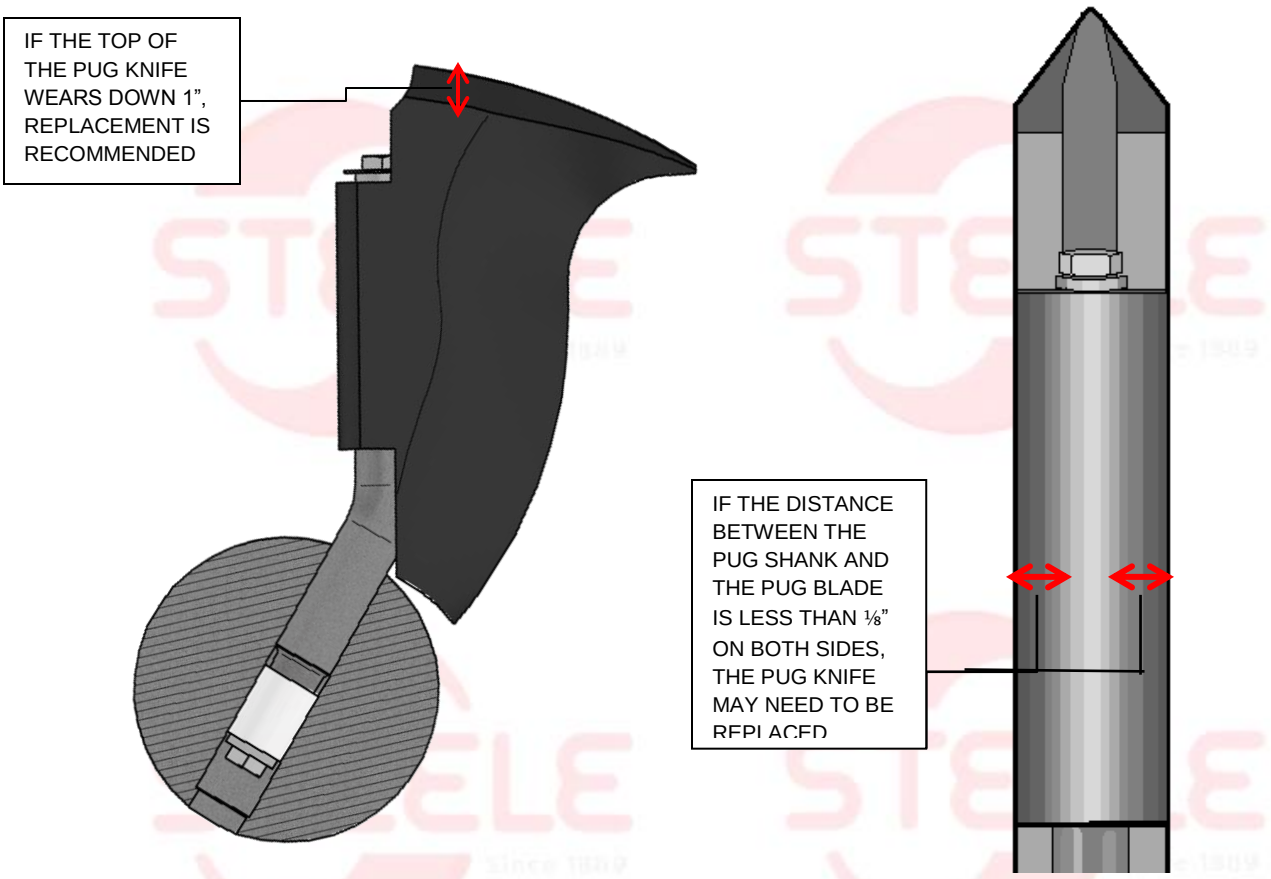

FIG 7: Typical pug knife wear