

New Scraper Issues
By Mark Jaski
January 20, 2005

One requirement for the new horizontal scraper will need it cycle once ever 2 minutes. One scenario could be a scraper that operates 1,000,000 cycles (1 cycle every 2 minutes for 5000 hours per year for 6 years) or longer. This would require a bellows to last more than 1,000,000 cycles. Typical bellows cycles are reported in Standard Bellows Company (SBC) catalogue to be 5,000 to 10,000 cycles. For higher cycles contact SBC's engineering department. SBC claims that a life of 1,000,000 cycles could be quoted, as a design goal only, using AM-350 Stainless Steel. If the quantities would be significant they could perform cycle testing.

Another issue with the scraper is RF fingers will be needed to cover the gaps and interstices. These fingers will need to last 1,000,000 cycles or more. Wear may be a problem with RF fingers.

A cycle test is needed to determiner the integrity of the bellows and RF fingers. This test could be done using an air cylinder actuating several bellows under vacuum. At the same time RF fingers could be set up inside the bellows to test the wear resistance of different RF finger materials. This test would require bellows, RF fingers, RF finger mating material, air cylinder, linear bearings, a vacuum system, counter, test base, vacuum monitor, etc. It is estimated that this test would cost \$30,000.

Another issue with the scraper is the braze joint of the scraper blade made out of tungsten and Glidcop (see figure 1). Preliminary analysis shows high stresses at the braze joint for the horizontal scraper. The vertical scraper does not achieve these high stresses. More analyses needs to be done to verify this configuration will work. A different Glidcop/tungsten configuration may be needed or a test may be required. Analysis has not yet been done for 1mm thick tungsten.

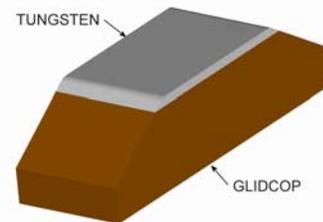


Figure 1: scraper blade

The vertical scraper requires some type of RF liner to hide the region between the chamber and the blade. This liner configuration has yet to be determined.