

# FCC EXPANDER FLOW PATH EROSION - EXPANDER EROSION

By Dave Linden

Despite the use of various separation technologies, all FCC expanders ingest a significant amount of catalyst throughout their operating period. The quantity as well as the size of the particles determines both the erosion and deposition characteristics that are experienced in the expander. The following Figures #1 & 2 show two different expander installations.

Figure #1 shows a rotor blade that operated with above normal catalyst loadings. The noted wear occurred in less than two years of operation. In contrast, the blade shown in Figure #2 operated in excess of five years of service and has experienced virtually no erosive wear.



Figure 1: 2 Year Rotor Blade Run



Figure 2: 5 Year Rotor Blade Run

## Catalyst Quantity

Field testing and operational experience has shown that expander blades will experience erosive wear when the particle loadings exceed 150 ppm by weight. Rapid and excessive wear occurs when the loadings are above 300 ppm.

The new separation technologies of today are far more efficient than the early third stage separators. Expander catalyst loadings of less than 50 ppm have been achieved and 5+ year expander rotor runs with blading being removed in the condition of Figure #2 have become common.

## Particle Distribution

As previously discussed, the particle size distribution is just as important from an erosion standpoint as is the quantity of catalyst. Larger catalyst particles (> 20 microns) are far more erosive than the fine particles. At one time, a rule of thumb was that if the separator could remove all of the 10-micron and larger particles, the expander could operate with minimal erosion over a four year operating campaign. Experience has shown, that even the small catalyst particles (1 to 10 micron) can be erosive if there are sufficient quantities. The erosion patterns caused by large catalyst particles, differs greatly from that caused by small catalyst particles.

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