

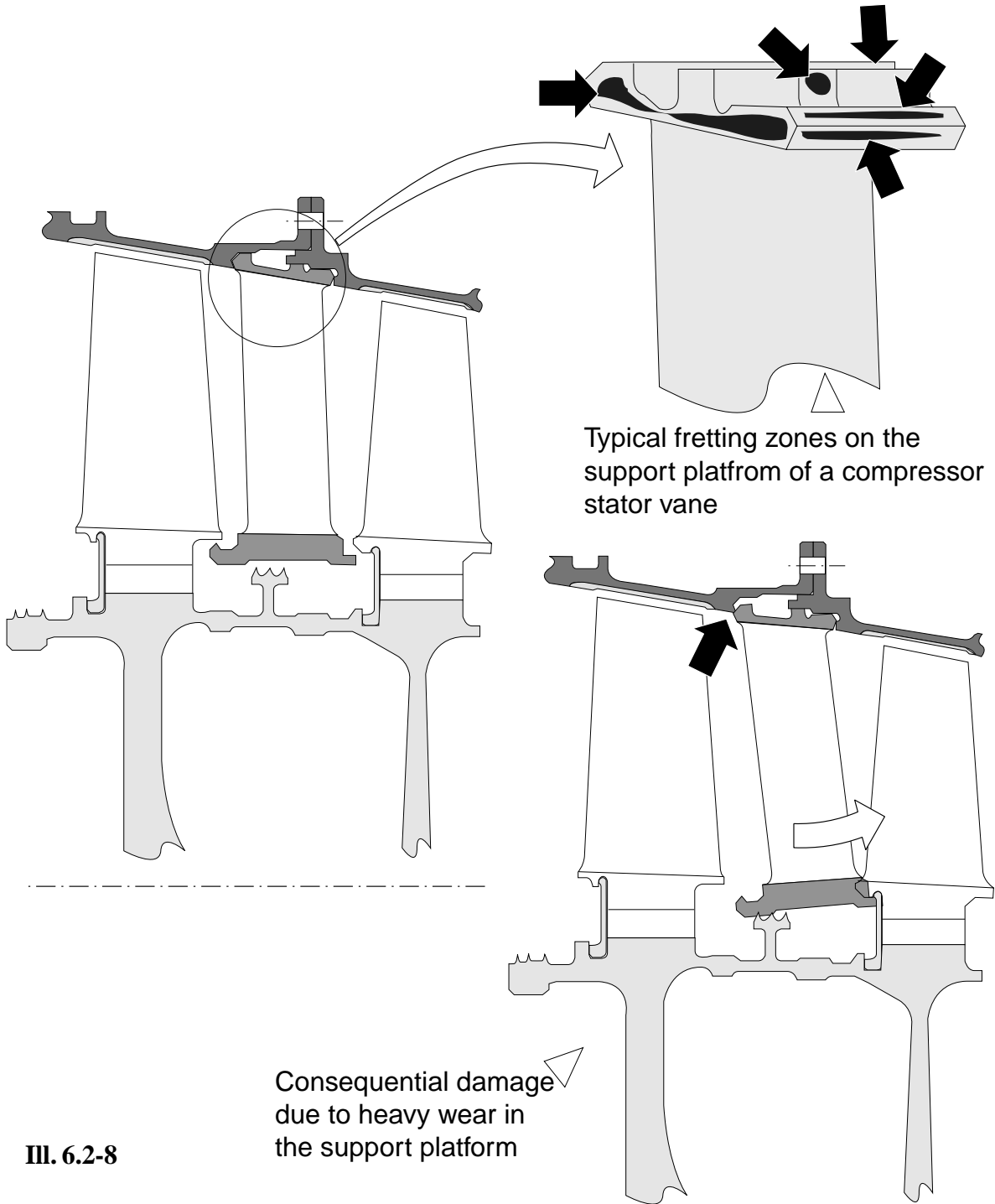
Example 6.2-3 (Ref. 6.2-5): "...An example of a persistent fretting problem is the leading edge **wear at contact surfaces of compressor stator vane bases** in the last few stages, and particularly in the outlet guide vanes. These stator vane bases are supported from T-shaped grooves in the casings (similar to Ill. 6.2-8)...The forward ledge is 0.088 in. (approx. 2.2 mm) with no wear evident. The aft ledge has worn until the remaining ledge thickness is 0.024 in (approx. 0.6 mm). **High-frequency vibration** has been demonstrated by strain gages applied to outlet guide vanes. Dynamic pressure gages located in the compressor discharge diffuser reveal **high-frequency fluctuations of the flow** and static pressure.

Comment: This excerpt from 1967 concerns a still-recurring problem with **guide vanes** fastened individually or in segments to the inside of casings (compare Ill. 6.2-8). The affected parts are the **T-connections** of individual blades and blade segments. The fretting stress high enough that even steel blades are affected, as in this case. This shows the importance of searching for fretting traces as early as the engine trial stages, so that suitable remedies can be applied if necessary (e.g. coatings, see chapter 6.3)

Illustration 6.2-8: *The connection between **guide vanes** and the **casing** or supporting intermediate structures are typical fretting zones. Not only the unavoidable blade oscillations must be observed, but also **differences of thermal expansion** between casings and blades. Different thermal expansion and/or temperature differences cause the connection to loosen, if only for a short time, allowing glide wear and impact wear to occur. These influences must be considered when testing a tribo-system and can affect the selection of possible coating materials. Although dynamic cracks are less likely in the roots of guide vanes than in rotor blade roots, they can still occur, and the geometric wear can offset the blade. If this happens, the blade may come into contact with the rotor. In extreme cases the **blade or blade segment may fall out.***

For this reason, even new parts made of titanium alloys in fretting-susceptible zones should be armored with an anti-wear coating (e.g. tungsten carbide).

Typical wear zones and consequential damag-
-es due to fretting in compressor stator vanes.



III. 6.2-8