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16 SEP 1976

S-4265/DT-2B/Mr. Boyd/48287/lda/13Sep76

MEMORANDUM FOR THE CIVILIAN ASSISTANT TO THE DEPUTY SECRETARY OF DEFENSE

SUBJECT: Age of Soviet Aircraft (U)

Reference: OSD Memorandum, 25 August 1976, subject as above.

1. (C) Scientific and technical intelligence analyses of Soviet aircraft have not revealed any specific correlation between age and onset of service-life problems. Soviet approaches that contribute to long aircraft service life and limit the incidence of catastrophic failure in flight include: conservative selection of materials, use of high load design factors, service-life testing and restrictive usage patterns. Each of these factors is discussed in the following paragraphs.

2. (C) Soviet aircraft becoming operational during the 1950 through 1970 period exhibited the conservative use of materials with only thoroughly-proven, well-tested, long-life materials being selected. Soviet designers preferred the lower-strength but tougher and more fatigue-resistant 2024 aluminum alloy over the 7075 alloy. Fatigue problems associated with the 7075 aluminum alloy resulted in major wing modifications on the United States B-52, KC-135, and C-5 aircraft. A further indication of Soviet willingness to accept weight and performance penalties to gain structural reliability has been revealed by the generous use of steel in the airframes of their fighter aircraft. The steel chosen has been a chromium-manganese-silicon steel possessing good strength, outstanding toughness and fatigue resistance. However, more recent aircraft, as exemplified by the MIG-25 FOXBAT, are assessed as using large amounts of titanium in the airframe, indicating a less conservative application of materials.

3. (C) The Soviets generally apply about the same overload and safety factors as employed by U.S. designers. Ultimate (design) loads are specified as 1.5 times limit (operational) loads. Soviet limit load factors (G's) are 7 to 9 for fighters and 2 to 3.5 for bombers and transports. On older, but still operational large civil aircraft, the limit load factors have been reduced to 2.3. Fighters, such as the MIG-17, -19, and -21, employ limit load factors of 8 G's while similar U.S. fighters employ a factor of 7.3 G's. A further indication of conservative Soviet design practices is the use of lower unit area wing loadings to carry the operational loads.

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4. (C) The Soviets establish guaranteed minimum fatigue life values when an aircraft becomes operational. After lead production aircraft reach about 70 percent of the guaranteed value, a full scale cyclic test is conducted to determine residual life and potentially critical failure points. Service life extensions are made based on test results. Using this practice, several aircraft have their service lives extended from 10,000 and 15,000 hours to 18,000 and 30,000 hours, respectively. Newer Soviet aircraft, such as the TU-154, the YAK-40 and the TU-144, are being assigned 30,000 hour service lives.

5. (S) The average Soviet combat aircraft is subjected to a conservative or low annual peacetime flying program. Most aircraft are maintained in a high state of readiness with only a small percentage of the fleet subjected to training. Furthermore, average Soviet combat crews are believed to fly only about 7 to 17 hours per month under extremely controlled conditions. The relatively low rate of peacetime flying is a planned rate and is not the result of logistics or maintenance inadequacies.

6. (C) The cause of the BEAR accident off Canada is unknown and any comment on probable cause would be highly speculative. Third world country problems with the SU-7 are being examined in the context of your question and any evidence of accelerated aging through design defects or fatigue will be promptly reported.

SIGNED

FOR THE DIRECTOR:

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