

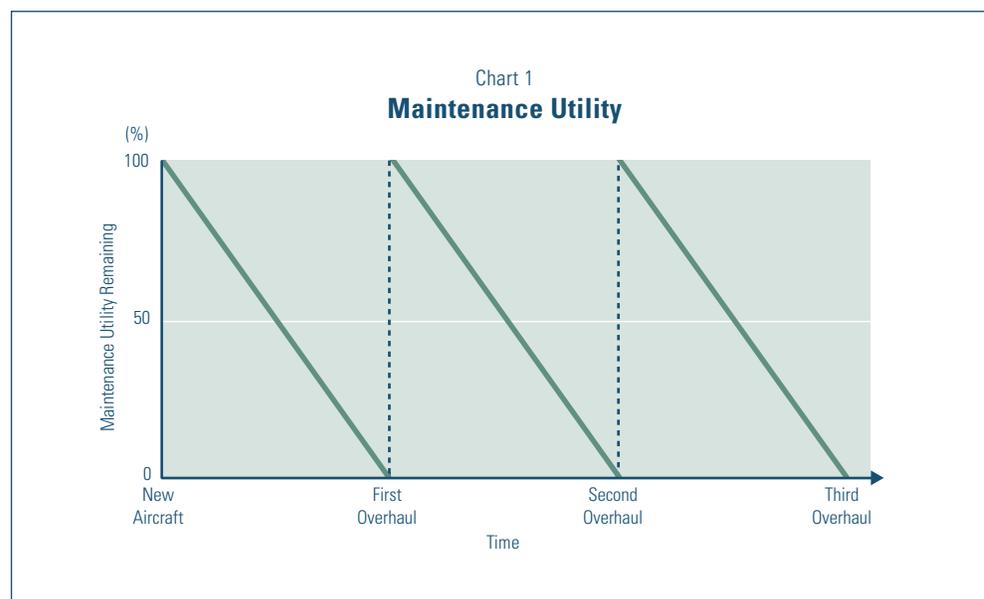
---

# Maintenance and Related Issues

## Maintenance

Due to the nature of the airline business, especially passenger air travel, regular maintenance of aircraft is essential to safety, and regulators play a prominent role in overseeing maintenance practices. The condition and the maintenance of aircraft are regulated by the aviation authorities of the jurisdiction in which the aircraft is registered. Such requirements establish standards for repair, periodic overhauls, and alteration by requiring that the owner or operator establish an airworthiness maintenance and inspection program to be carried out by certified individuals qualified to issue an airworthiness certificate. No aircraft may be operated without a current certificate issued by the authority with which the aircraft is registered.

Most operating leases provide that the lessee is liable for all maintenance costs which may arise. In the event that an aircraft is forcibly repossessed following for example a rental payment default by the airline, the aircraft may require some



---

outstanding maintenance work before it is in a condition to be re-leased or sold to another airline.

A lessor's primary risk in relation to maintenance is therefore the credit risk of the lessee's failure to pay in whole or in part for the maintenance utility they consume (hours flown). An aircraft that has just been overhauled—airframe and engines—has 100% maintenance utility remaining (*see chart 1*).

There are considerable ongoing costs related to maintaining an aircraft to the required standard. For example, airframe overhauls occur every six to ten years and cost between \$1 million and \$5 million depending on the aircraft's utilization pattern. Engine overhauls occur more frequently, every two to four years, and the cost ranges from \$500,000 to \$3 million, depending on utilization. In general, the rule is the older the component for both engine and airframe, the higher the overhaul costs.

Due to such significant costs, the risk is that if the lessee is unable to make the necessary payments, the value of the aircraft could depreciate much faster than if it were properly maintained. The issuer of the rated notes may find itself having to pay from its own cash flows the costs of an unperformed maintenance. Or the lessor may be willing to lease or sell the aircraft at a discount. Such occurrences could potentially expose a securitization to a shortfall in expected revenue.

There are two principal ways that lessees pay lessors for maintenance utility:

*Cash Maintenance Reserve Payments.* These are usually payments made on a regular, usually monthly, basis by the lessee to the lessor, and are generally based upon the age and expected utilization of the aircraft in question. Therefore, at the time a plane is taken out of service for maintenance, the lessor should already have funds to cover the cost of the overhaul. Should a lessee default who has been making cash maintenance reserve payments, the assumption is that the lessor would generally not incur any reimbursed costs.

*End of Lease Adjustments.* This option would expose a lessor to a greater risk of incurring maintenance costs and is thus usually only offered to better quality credits or airlines that have demonstrated a good track record of payment. If the aircraft is returned at the end of a lease in a worse than stipulated condition, the lessee must make an end of lease payment to the lessor. Conversely, if the aircraft is returned in a better than stipulated state, the lessor is obliged to pay the lessee. In the instance where the lessee is expected to pay the lessor, and fails to do so, the lessor is exposed to credit risk since it will have to apply its own funds to maintain the aircraft before re-leasing it.

## Eurocontrol Liens

Eurocontrol fees are payable to air traffic control authorities in all European countries “infringed” by an aircraft’s flight path. The magnitude of the costs depends on the aircraft weight, distance traveled, and country involved. Eurocontrol charges attach to individual aircraft so that if a lessee returned an aircraft on which a charge is outstanding, the lessor would have to discharge the fee before that aircraft could be allowed to fly.

## Airworthiness Directives

From time to time, the aviation authorities that regulate the operation of aircraft may issue airworthiness directives (ADs) to aircraft operators. These directives usually follow the detection of a major defect that could affect passenger safety.

## Stress Tests

The analysis of the degree of exposure of a transaction to maintenance, Eurocontrol, and ADs takes into account two concerns. First, assuming that a lessee has defaulted, the issuer could be exposed to the costs of maintaining the aircraft before it is re-leased. By making assumptions regarding the lessee default rates, cost of maintenance per airframe and engine, and exposures to Eurocontrol and AD’s upon repossession, analysts will calculate the aggregate costs that could be incurred by the issuer throughout the transaction.

Standard & Poor’s does not believe that the above costs are adequately covered in the repossession costs per plane. The figure of \$500,000 to \$750,000 reflects the average costs incurred by a lessor, and while these amounts could have occurred during an economic downturn, they may be understated if the portfolio is subjected to the recessions of the severity suggested by the ratings. For these reasons, additional reserves should be available to cover for maintenance and associated costs.

Second, assuming that no lessees default, the portfolio would still be exposed to liquidity requirements. This liquidity stress is due to the differences in timing between cash inflows from lessees and monies having to be paid out. Drawings on the cash maintenance reserve contributions previously made by lessees and reimbursement to lessees who have overpaid on their end-of-lease adjustments both utilize liquidity. On the other hand, lessees making regular maintenance payments and those which owe end-of-lease payment to the lessor represent sources of liquidity.

Standard & Poor’s will review separate cash flows which should model the sources and uses of maintenance expenditures. These scenarios should model two scenarios: one in which lessees default and another in which all lessee payments are made. An assumption will need to be made as to the percentage of the lessees which

---

are making reserve payments. Clearly, a larger percentage would reduce cash flow requirements since it is assumed that related maintenance would be fully provided.

It will be necessary for a substantial portion of the leases to be subject to end-of-lease payments. This assumption does not imply that the credit quality of the pool is improving; rather, it is meant to reflect a scenario in a recession where a lessor has reduced bargaining power and is forced to write leases with maintenance requirements which are more in the lessee's favor. Another assumption will be made regarding the costs of various maintenance checks. While schedules are provided by the major manufacturers which take into account the age and usage of the aircraft, analysts will review these costs to determine if any adjustments are required.

The form of the maintenance reserves will be transaction specific. Whether this reserve is merely in the form of a liquidity cushion or a true cash reserve will depend on the requirements of the cash flows.