Heat Exchanger Management: A Better Model for Commercial Operators

By Paul Maness, General Manager, TAT Technologies

As fleets age and MRO demand reaches record levels, thermal component availability is becoming a strategic planning discipline — not a procurement afterthought. Here is a practical framework for getting ahead of it.

The global commercial fleet is aging. According to Oliver Wyman's 2025 Global Fleet and MRO Market Forecast, the average age of commercial aircraft in service has risen to 13.4 years — the highest it has been in decades — driven by production shortfalls at both major airframe manufacturers and sustained passenger demand that is keeping older aircraft flying longer than originally planned.

Within that environment, heat exchangers occupy a specific and frequently underestimated position. They are among the most frequently removed components in commercial line and base maintenance. They are platform-specific — the unit that services a 737 does not transfer to an A320 or a Q-400. They require a level of manufacturing expertise that most component shops cannot perform in-house. And when a serviceable unit is not available at the moment it is needed, the operational consequences arrive quickly and compound through the maintenance schedule.

For operators managing thermal components reactively — sourcing units as demand arises — the current environment is creating pressure that a transactional approach was not designed to absorb. For operators managing them proactively — with rotable pools and supplier relationships — the complexity of maintaining that model is growing. In both cases, the question worth asking is the same: is the current approach optimized for what the next five years of maintenance demand is going to require?

Before arriving at a strategy, it is worth identifying which operational situation actually applies. Not every operator faces the same heat exchanger challenge, and a solution that addresses the wrong problem delivers no value.

The first question applies to operators with planned heavy maintenance events: when your aircraft enter scheduled base maintenance, do you have serviceable heat exchanger units staged and ready to install? The time between when units are removed and when they return from overhaul is a predictable gap. Operators who have not pre-positioned exchange units against their maintenance schedule absorb that gap as schedule risk every cycle.

A closely related but distinct question applies to what happens during that same maintenance event. An aircraft enters the hangar on a planned schedule. Inspection reveals heat exchanger units that are not serviceable — a finding that is not uncommon on aging airframes. If that happens, does your operation have the inventory to keep the aircraft on its return-to-service schedule, or does it wait? The cost of an aircraft sitting on the hangar floor past its planned release date does not appear on a parts invoice. It appears in utilization data and schedule performance at the end of the

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For operators who do maintain rotable pools, the questions shift in character: Are the units in your pool in serviceable condition when you need them? Are they positioned where your maintenance events actually occur? And is the overhead of managing that pool — tracking serviceable status, managing core returns, coordinating overhaul cycles across multiple platforms — consuming resources your team would rather direct elsewhere?

These questions do not carry a right or wrong answer. They are a diagnostic framework. The operators who have worked through them honestly are the ones who have moved from reactive heat exchanger management to a planned program — and who consistently find that the shift changed their maintenance cost structure in ways that were not visible when they were managing transactions one unit at a time.

Why Heat Exchangers Deserve a Dedicated Strategy

Heat exchangers are not a uniform commodity. Each platform uses specific configurations that are not interchangeable across types. The core of a heat exchanger — the internal structure that transfers thermal energy between fluid streams — must be manufactured to precise tolerances and assembled through a process, vacuum brazing, that requires specialized capital equipment and process certification. A shop that does not manufacture its own cores is dependent on external supply for the most lead-time-sensitive element of the repair cycle.

This manufacturing dependency is the reason heat exchanger turnaround times vary so significantly across the market. Shops that control their own core production can move a unit from induction to test without waiting on a supplier network. Shops that do not control it cannot. For operators, that difference — measured in days, not hours — compounds across every removal event in a maintenance year and has a direct effect on how much rotable inventory is required to achieve a given level of availability.

For operators, the supply chain architecture becomes relevant when there are handoff points between the initial repair shop and the recore capability. A heat exchanger that requires recoring but enters a shop without that capability must move to a second facility for that work before it can return to service. That handoff — receiving, inspection, manufacturing, and return logistics between two facilities — adds time to the overall cycle that is not inherent to the repair itself but is inherent to the structure of the relationship. Operators who contract directly with vertically integrated manufacturers eliminate that handoff. Operators who contract with intermediate shops accept it as part of the supply chain model. Neither approach is categorically right or wrong — but the lead time implications are structurally different, and operators managing tight maintenance schedules benefit from understanding which model they are working within.

The implication is that the choice of heat exchanger MRO partner is not primarily a price decision. It is a supply chain architecture decision. The right partner reduces both the inventory requirement and the schedule risk simultaneously. The wrong partner, regardless of unit price, increases both.

A Better Model: Direct Partnerships with Manufacturing Capability

The operational situations described above share a common requirement: availability when it matters. The question is not whether an MRO provider can repair the unit — most credible shops can. The question is whether they can deliver the unit, in serviceable condition, at the moment the operator's maintenance schedule demands it.

That capability is not primarily a function of inventory depth. It is a function of manufacturing agility. An MRO partner that manufactures its own cores in-house can build and stage units ahead of scheduled maintenance events when agreements are structured that way. For operators with planned heavy maintenance, this means serviceable units can be pre-positioned before the aircraft enters the hangar — the planned return-to-service date is not dependent on a repair cycle that begins the day the aircraft arrives.

For unscheduled events — when inspection reveals units that are not serviceable — the same manufacturing capability enables faster response. A vertically integrated shop can prioritize that repair without waiting on a supplier for the core, which means turnaround measured in days rather than weeks. For operators, that difference is the margin between a maintenance event that stays on schedule and one that does not.

The distinction worth understanding is this: transactional MRO relationships are structured around units already in the system — cores already received, repairs already in process. Direct partnerships with manufacturing capability are structured around availability planning — units built ahead of demand, turnaround

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optimized for the operator's schedule, and exchange arrangements negotiated as part of the agreement rather than activated as an emergency accommodation.

What TAT Technologies Brings to the Partnership

TAT Technologies brings more than 75 years of thermal management heritage to the aerospace industry. That history is not incidental — it is the foundation of the engineering depth and manufacturing capability that makes flexible exchange arrangements operationally credible rather than commercially aspirational.

The foundation of that capability is in-house manufacturing. TAT Technologies designs and produces its own heat exchanger cores — fin forming, certified welding, precision machining — within our facility. That vertical integration insulates TAT from the material shortages and supplier backlogs currently extending industry-wide lead times. While shops dependent on external core suppliers wait for production capacity or material availability, TAT controls its own manufacturing process from start to finish. That supply chain control is the operational foundation of turnaround reliability — not just capability, but certainty. It is the reason TAT can structure agreements with exchange provisions, build units ahead of scheduled maintenance, and respond to unscheduled demand when other shops are waiting on their supply networks.

TAT Technologies currently has exchange capability on select platforms and is actively investing to expand that coverage across the Boeing 737 family and 777, De Havilland Q-400, and Airbus A320 family — platforms that represent the core of mid-size and larger commercial operator fleets. The expansion is intentional and customer-driven, built around actual removal frequencies and maintenance schedules rather than around what is convenient to stock.

TAT Technologies holds FAA, EASA, and CAAC certification — meaning that regardless of an operator's regulatory environment or the international routes their fleet flies, the documentation that accompanies every unit from our facility meets the applicable airworthiness standard and provides complete chain-of-custody traceability from repair through return to service.

The agreements we structure with operators are direct partnerships — availability planning built into the contract before removal events occur, not reactive sourcing after they happen. Operators who have structured relationships this way report that the most significant change is not in cost or turnaround time individually, but in the predictability of both across a full maintenance year. Planning against known capability changes the heat exchanger conversation at the program level, not just the transaction level.

Planning for What the Next Decade Requires

The dynamics driving current MRO demand are not short-cycle phenomena. Oliver Wyman projects the MRO market to grow steadily through 2035, with component maintenance representing a meaningful and expanding share of total industry spend. Heat exchangers, as a high-frequency removal category tied directly to platform age and utilization, will track that growth or exceed it.

The operators best positioned to manage that environment are those who have already moved heat exchanger availability from a transactional function to a planned program — with direct relationships to manufacturing partners who can build ahead of demand, stage units for scheduled maintenance, and respond to unscheduled events without dependency on external supplier networks.

The shift from reactive to planned is not a large operational change. It begins with the questions outlined here. It continues with a direct conversation about what an operator's platform profile, maintenance schedule, and availability requirements actually look like — and what a partnership structured around manufacturing capability and exchange flexibility would mean for their maintenance cost structure and schedule performance.

That conversation is one TAT Technologies is built to have.

ABOUT THE AUTHOR

Paul Maness is the General Manager of TAT Technologies, a global leader in thermal management solutions for the aerospace and defense industries with more than 75 years of operational heritage. TAT Technologies operates one of the largest heat exchanger MRO facilities in America, with in-house core manufacturing, FAA, EASA, and CAAC certification, and growing exchange capability across Boeing, De Havilland, and Airbus platforms. He can be reached at paulm@tat-technologies.com or visited at Booth 5114 during MRO Americas, April 21–23, 2026, in Orlando, Florida.

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