TFD GROUP
TOOLS FOR DECISION

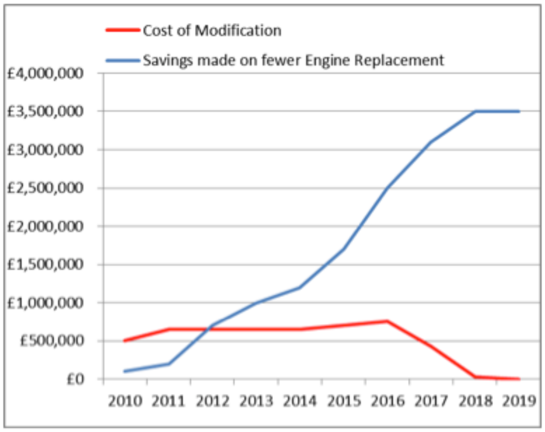
SIM™

"SIM and its parent tool MAAP are the only true resources-to-readiness tools available today."

The support of aero engines is highly complex and the cause-effect relationships of support decision options can only be rigorously evaluated through a robust model. Any organization that bears support risk associated with delivering engine, module or parts availability, or the business risks of providing the capacity for repair and overhaul, needs to be able to balance investment decisions that trade cost with delivery performance. Aero-engine original equipment manufacturers (OEMs), user fleet authorities, maintenance repair and overhaul (MRO) organizations need to be able to foresee the impact of strategic and tactical fleet support decisions on equipment availability and through-life support costs.

SIM™ is a total ownership cost and logistic planning modeling platform. Although originally designed for aero engines, it has wider application to any systems made up, at least in part, of life limited parts subject to serial tracking. At its heart lies TFD's MAAP® whole life logistic analysis platform, considerably enhanced to deal with life limited parts.

TFD was selected for the development of SIM on the basis that our existing tool set most closely provided the functionality that was required. The additional requirements peculiar to aero engines were the ability to handle serialized parts, analysis of FOD, non-constant hazard functions, secondary and subsidiary damage, tear-down matrices and embodiment of modifications and upgrades (both major and minor). In addition, new advanced data interfaces were needed to manage the large quantities of data required to model serial-tracked components and the complex support environment where airworthiness depends on the correct handling of configuration, alternative and substitute parts.



SIM was developed directly from TFD's whole life cost modeling analytical platform tool MAAP®. Because of their size and complexity, platforms like vehicles, ships and aircraft, and their major subsystems, inevitably have significant configuration differences even though they are members of the same fleets or even the same blocks. To cater for this, MAAP was built as a multi-system model allowing analysis of multiple system types in a single run while accounting for any commonality between them. This capability also allows multi-system or "system of systems" analytical excursions, mixing both system types and technologies in a single analytical excursion.

MAAP and SIM are activity-based or process models. Cost estimates are generated by aggregating predicted resource requirements of all the events involved in deploying, operating and maintaining systems over the life cycle. This focus on identifiable cost-

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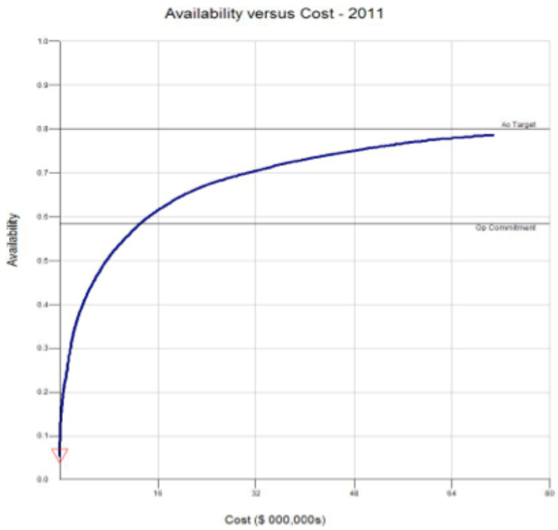
> “SIM is the ideal tool to help crystalize business cases and pricing proposals for modifications identifying spend profiles and likely rates of return on investment.”



creating mechanisms and their effects distinguishes process models from parametric models which rely on historically derived cost-estimating relationships to produce broad cost estimates of uncertain validity and dubious relevance.

SIM is unquestionably the most sophisticated and complex decision support tool available for advanced mechanical systems extant. It has four principal functional capabilities:

- Predict future fleet conditions and performance
- Predict future maintenance demands by time and location and component
- Calculate optimal resource requirements to achieve a given operational availability (Ao)
- Support ‘what if’ analysis of operational or support options

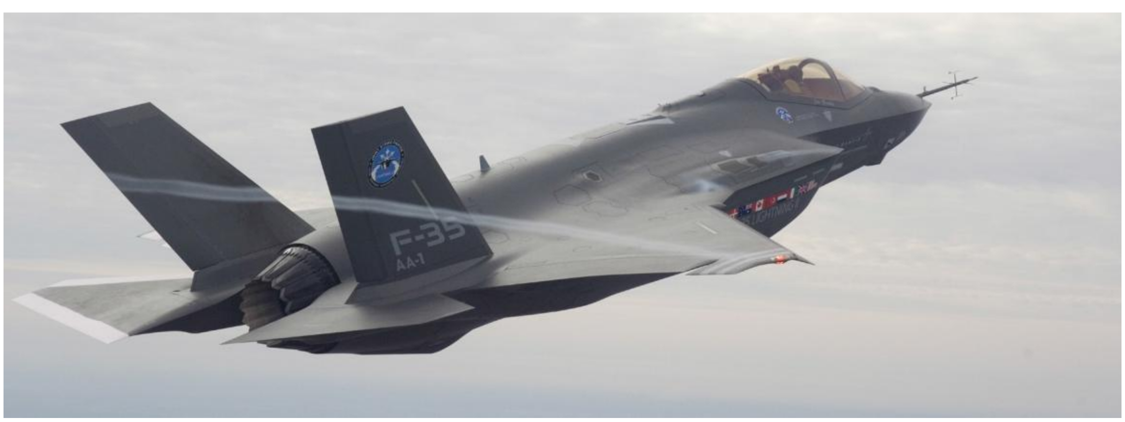
SIM models support scenarios which enable users to optimize:

- Operational Planning – Operating fleet profile
- Maintenance Planning – Scheduled & unscheduled, hard life & MISSL
- Repair Process – Part failure (MTBF), FOD, secondary & subsidiary damage
- Modifications – Calendar-based, operating-hour based and opportunistic
- Optimized Logistic Support Analysis (LSA) resource requirements determination by location and time period, including spares, support equipment and manpower

SIM produces a “future history” of support activity in a detailed user-defined operating environment. By notionally operating each member of the fleet at each operating site according to operational plans, the model adds time and stress to every component of every system, according to individual duty cycles. These accumulated times lead to the need for both scheduled and unscheduled maintenance actions at specific locations on specific systems, involving serial-tracked individual parts.

Note that any time-bound changes in operation or support can be modeled with fidelity. This includes foreseen changes in configuration, deployment, fleet size, operating program and fleet, build-up and run-down. Sub-fleets can be included in the computations, as can modification campaigns. Once the resources required for a given modeling case are derived, SIM can optimize for operational availability and support investments enabling balance of investment decisions to be made trading between cost, time and fleet availability.

As a generic modeling platform, SIM is designed for use with aero-engines or other systems that require individually serialized parts with declared finite installed lives. SIM’s chief advantages over other maintenance planning approaches derives from its use of individual part histories, rather than having to assume that all members of a part number population have the same (mean) age. Accordingly, it is best used in combination with a continuous source of serial-tracked data and interface development is a crucial aspect of model implementation.



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