

**ATKINS**

# **SAM** **Systems Availability** **Model**

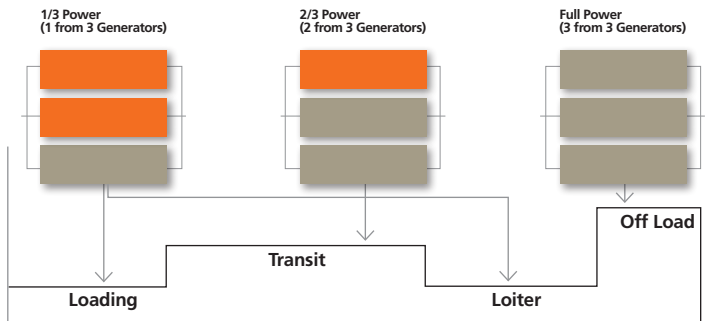
Fact Sheet



**Plan Design Enable**

The Systems Availability Model is a suite of programs designed to assess the AR&M characteristics of multiple systems used over operating scenarios that place varying demands upon those systems, such as that encountered in complex military or industrial installations.

### Modelling Multiple Power Requirements in SAM



It is the ability of SAM to overlay system dependencies onto complex mission profiles that makes it a powerful and flexible Availability, Reliability and Maintainability (AR&M) modelling tool. A mission profile may be built up of a variety of activities each demanding use of different combinations of equipments, rather than a fixed time at risk approach adopted by many simpler modelling tools.

The flexibility provided by SAM makes it eminently suitable for the comparison and assessment of availability and support resources at the concept stage, through design development and on to modifications in service. This can be achieved by building individual models at the different stages or by developing a concept phase model in parallel with the design.

Typical tasks of the model are:

- Comparing the availability, reliability, maintenance and support characteristics of a design with the specified targets and requirements.
- Assessing various design options and their relative merits.
- Examining the effects of equipment failure on availability and operational (mission) success.
- Assessing the availability, reliability and support requirements resulting from a specified operating profile.
- Forecasting logistic and support requirements.
- Assessing the effects of differing repair policies.
- Assessing the effects of starting a mission with Equipment not operational

### **Functionality**

SAM operates by assembling the system Equipment and Component data into convenient lists where each item and its function are uniquely identified. Using simple dependency logic, each Equipment Function is combined with others, allowing for redundancy where appropriate, to form Major Functions of a System. This allows the Equipment's use in alternative configurations and substitution in other roles to be assessed.

The complex dependencies of the interdependent systems are represented graphically on charts with the failure and repair data in tabular form.

Input is by direct access terminal which also provides a model initiating, editing and running facility.

After initial data input, a model is assembled, amended and run, with selected outputs being demanded. Successive versions of the model can be retained which is particularly useful when system designs are being developed

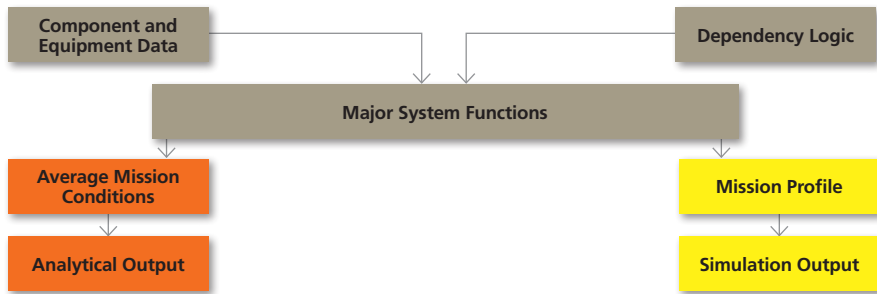
### **Modes of Operation**

SAM can be operated in two modes which provide a comprehensive range of user selectable Availability, Reliability and Maintainability (ARM) outputs based upon a wide scope of operating, failure and repair data:

#### **Simulation Mode**

In the Simulation Mode Equipments are operated in conformance with defined Operating (Mission) Profiles. Major Functions are combined to form activities, a sequence of which constitutes a mission. Monte Carlo procedures are used to sample the failure and repair distributions of Equipment thereby creating an artificial history of the system operation in terms of Equipment states.

Measurements of time and state taken from this history yield a variety of Availability parameters e.g. Mean Availability and Reliability (both with confidence intervals) Mean Repair Hours and Number of Non-Repairable Failures. As this method depends on sampling, the values of the output parameters are not precise but are best estimates of mean values, the confidence in which increases with the number of simulations. If required the same basic model can be used to evaluate numerous different Mission Profiles.



### Analytical Mode

In the Analytical Mode the results are based on defined operating (mission) periods and Equipment usage. The functional dependencies depicted by the logic are analysed to establish which combinations of Equipment are sufficient to provide the required system function. From the Equipment failure and repair data the Availability/Reliability of each Equipment and each combination of Equipments are calculated. These are then combined to yield the Availability/Reliability parameters of the Major Functions of the system. Different Operating (Mission) Profiles can be assessed by simple changes in mission length and Equipment usage.

### Recent Applications

SAM has been successfully utilised to support R&M programs on a number of recent and ongoing MOD procurement projects.

These include:

- Type 45 Destroyer
- Carrier Vessel (Future) (CVF)
- Landing Ship Dock (Auxiliary) (LSDA)
- Sonar 2087
- Joint Tactical Information and Data System (JTIDS)
- Future Wheeled Tanker
- Military Afloat Reach and Sustainability (MARS)

### Platforms Supported

SAM runs on the following platforms:

- Microsoft Windows 2000
- Microsoft Windows XP Professional

### SAM Customer Support Help Desk

Atkins provides a Help Desk facility available to any MOD staff or MOD contractors using SAM for work on defence projects. The Help Desk can be contacted by Email to gain help with using the product, request technical information, report faults, and submit requests for enhancement and modifications.

### Training

Atkins provides training courses in the use of SAM for AR&M modelling and analysis. Courses can be tailored to suit all levels of reliability analysis experience.

**For more information or for technical support please contact:**

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