Aircraft hangars, by necessity, are large, open buildings. But what if a hangar could keep its functionality while reducing operational costs? The latest hangar designs aim to do just that.

Advances in building technology allow airport operators to optimize the required capital investment in the building, specify the latest fixed equipment to make the workplace more efficient, and deploy the latest in portable equipment for speedier access to the aircraft. These hangar technology advances yield efficiencies in the work tasks that translate directly into reduced labor costs and shorter turn times for maintenance checks. Workplace efficiency improves each maintenance check visit, and shorter turn times mean capacity for more total check visits in the hangar throughout its life.

Advanced Building Materials
Hangar building volumes are growing with the introduction of larger aircraft, such as the Airbus A380 and the Boeing B747-8 — and those two aircraft manufacturers have even larger derivatives on the drawing board. These huge aircraft bring to the hangar more, larger parts, higher and wider clearance requirements, and more spare parts, meaning larger building areas and volumes are required to maintain those aircraft. Fortunately, the corresponding increase in building cost can be countered with building technologies.

Selecting the right building shell materials can improve insulative value in any extreme climate, with resulting energy savings realized for the life of the building. In cold climates, insulation keeps generated heat in the building longer. In hot climates, insulation preserves air conditioning. In each case, the heating...
and air conditioning equipment sizes can be reduced because the overall heating and cooling loads are reduced, and the new, smaller equipment is more energy efficient.

Given a hangar’s volume, planning for stratified heating and air conditioning can further reduce mechanical equipment and operating costs. After all, there’s no need to heat and cool the upper regions of the hangar to the same comfort levels required at the workstations below. Reduced heating and cooling of these unoccupied spaces reduces energy cost forever and saves even more money because of the ability to use smaller, less expensive equipment at first cost. When certain duties, such as vertical stabilizer and rudder work, must be completed at higher areas, portable or small supplemental heating and cooling units can be used.

In fact, there may be no reason to build those unused upper regions in a hangar at all. Any building area not covering the tail section of the aircraft can be reduced in clear height. Nose-in only hangars can be designed with lower roof areas from the leading edge toe of the vertical stabilizer forward to the hangar wall.

**Accessing Natural Resources**

Daylighting is free if heat gain and loss can be controlled. Today’s advanced glass with high-tech filter coatings, new technologies in insulated skylights and translucent insulating plastic panels as window substitutes can all be installed to preserve energy efficiency through controlled heat and cooling loss, and reduced lighting loads in the hangar bay.

Fire protection systems in hangars are highly specialized combinations of detection equipment, fire sprinklers, specialty foam, high-speed pumps, and a large water supply. Then add the cost of environmental controls to capture the effluent if a system activates: huge floor drain systems and underground tanks or outdoor basins for foam/water effluent storage. Add up all those system components and their redundant backups, and the first cost is enormous. Is there a better way? The newest systems rely on foam-generating equipment that uses less water to make foam. These newer high-expansion foam systems require less water storage and no effluent retention.

Hangar doors make an entire wall of the building a huge energy-robbing opening. Even when closed, the conventional overlapping door panels are notoriously leaky at the edges. Doors must be opened, but those openings can be minimized to reduce energy loss. Conventional rolling panel hangar door systems can be configured to open only portions of the hangar needed for specific aircraft to enter or exit. Vertical rise fabric doors can further reduce the opening because doors not at the tail section of the aircraft can be lowered to reduce the opening height over the wings. Despite the light weight of these doors, they are most prominent in two extreme climates: the arctic and the desert. The combination of providing a reduced opening and making a tight edge seal makes these doors a solid option.

**Fixed and Portable Equipment**

The types and number of fixed equipment in hangars vary with the type of maintenance work performed in each hangar. Line maintenance equipment must emphasize speed because aircraft arrive for unscheduled maintenance to correct specific problems and need to be quickly dispatched. The maximum dwell time is usually overnight. At the same time, hangars must accommodate...
heavier maintenance checks that can last for weeks and require nearly constant access to every part of the aircraft.

How do you safely implement the speed needed for line repairs? Flexibility to park aircraft in any configuration for quick maintenance is paramount in line maintenance operations. Shelter for inclement weather protection also creates an unpredictable aircraft parking pattern. The need for fast access and lack of predetermined parking layouts impede the use of many fixed work stands, which take up precious floor space and can’t be moved between densely parked aircraft.

In any hangar, general power for tools, equipment, compressed air, water and communications lines, as well as 400 hertz of aircraft power, must be available at locations convenient to the aircraft service points and workstations. Long cable and hose runs to distant wall-mounted connections create clutter and safety hazards across the hangar floor. New designs in utility pits offer multiple utility connections in floor pits that “pop up” to provide those connections at the aircraft service points. Proper layout of these pits eliminates clutter and improves safety. These latest designs offer ease of use and reliability for the constant usage they must serve.

Power lift platforms, bucket trucks and wheeled work stands have been the traditional fixed equipment for line maintenance. But there has always been a tradeoff: increased hangar floor area required to position that equipment. Teleplatforms are the magic carpets of the aircraft hangar. Mounted on an overhead bridge crane system, these platforms can swiftly travel to any point around any aircraft type for fast and safe maintenance access. Designed to minimize the floor area requirement for maneuvering, the newest generation of power lift platforms can turn 360 degrees within their own footprints. New mini units, as small as 1 square meter, can deliver a mechanic and his tools up into a wheel well, lower cargo hold, and other tight areas with ease.

Paint Hangars Require Special Consideration
Paint hangars are a special breed. Painting the equivalent of a large house and then adding elaborate graphics is a unique and expensive operation. Successful application requires airflow across the aircraft, at 75-100 feet per minute, to ensure a smooth finish. The air moving through the hangar must also be treated — in the desert, outside air must be cooled and in cold climates it must be heated. In many locations, air humidity must be adjusted. All that equipment to treat and move air, plus the energy to power it, makes the air treatment process expensive.

How can you reduce that high cost? Don’t waste that expensive air in exhaust. New filter systems offer dry media that remove paint particles from that airstream to allow as much as 60-75 percent of it to be recirculated instead. Reduced outside air volume means less new air to treat, smaller equipment, and lower operating costs throughout the life of the building.

Improvements on the Outside
New technologies are coming outside the hangar as well as inside. Engine run-ups are a standard requirement for maintenance, repair and overhaul (MRO) operations. A jet blast deflector wall/fence designed for high power run-ups, installed near maintenance hangars, eliminates the requirement to tow the aircraft over great distances to perform run-ups and provides excellent protection to the surrounding area from dangerous jet blast.

When both jet blast hazards and run-up noise are issues, a jet blast deflector can be combined with an acoustically treated run-up facility known as a ground run-up enclosure (GRE). A GRE reduces the acoustic impact of run-ups on airports and surrounding communities, allowing MRO operators to run-up at night when high-power operations are typically restricted. New modular GRE designs are available for smaller MROs, which allow the facility to be built in stages. Operations could begin with just a jet blast deflector to create a safe environment around the ramp and, later, add one, two or three acoustically vented side walls to minimize the acoustic impact of engine run-ups.