Before taking delivery of a new airplane model, an airline operator should select and procure the ground-support equipment and tooling required for airplane maintenance and operation. Procurement can be expensive, so it is very important that the operator select only the required tools. The procurement process should include bidding to obtain the lowest tool prices and allow adequate lead time for the manufacture and delivery of the tooling. The airline should begin tool selection and procurement 9 to 12 months before initial airplane delivery to ensure tools are available before the new airplane arrives.
Proper GSE and tool selection involves many factors, including the type and level of maintenance to be performed, the number of line stations to be supported, the number of ramp operations, and the extent of component overhaul to be performed by the operator. All these factors must be compared to the level of work that is contracted by the airline to other GSE and maintenance support service providers, such as maintenance repair organizations, other airlines, and local airport service providers for fueling, cleaning, baggage loading, and catering.

For example, at a line station, an airline often will contract its required maintenance to another airline. The other airline may be the predominant air carrier at the airport, and therefore already may have all the needed GSE and tools for performing airplane turnarounds and maintenance.

The tools also are used to remove and install airplane assemblies, engines, and other components such as landing gear, flight control surfaces, and auxiliary power units. Some tools are used to test various airplane systems, such as the electrical, avionics, oxygen, and fire-suppression systems. Still other tools are used for employee safety and protection of the airplane or its systems during maintenance.

Component maintenance tools are used to perform maintenance on airplane components already removed from the airplane. The components typically undergo maintenance in one of the overhaul shops at the airline, such as the avionics shop, electrical shop, hydraulic shop, or wheel-tire-brake shop.

Airplane manufacturers.

The airplane manufacturer designs most of the tools that are used for on-airplane maintenance and many of the tools used for component maintenance. These tools are considered specialized because they are designed only by the airplane manufacturer for its particular airplane models.

It is important to know that the airplane manufacturer does not manufacture the specialized tools that it designs. Instead, it contracts the manufacturing to other companies, called GSE licensees (see the following section). An airline may purchase the specialized tools either from a GSE licensee or from the airplane manufacturer through the normal spares purchasing process.
The licensees are required to build the tools according to the airplane manufac-turer’s standards and specifications. The GSE licensees are given real-time access to all the airplane manufacturer’s tool drawings, ensuring that they have the most up-to-date information. The airplane manufacturer periodically reviews the manufacturing processes the GSE licensees. The GSE licensees are not limited to manufacturing and selling just the spe-cialized tools designed by the airplane manufacturer. Many GSE licensees also design, manufacture, and market their own GSE and maintenance tools.

Commercial tool vendors. Commercial tool vendors provide many of the general-purpose maintenance tools used for on-airplane and compo-nent maintenance. These commercially available tools are designed, built, and marketed by more than one company and perform the same maintenance tasks.

Specific component tool vendors. Some component maintenance tools are designed and built only by the designer of the airplane component or assembly. Some examples of component mainte-nance for which there may only be one tool vendor are the overhaul of valves, pumps, and line replaceable units.

GSE manufacturers. GSE manufacturers design, manufacture, and market the large pieces of GSE used for servicing airplanes. GSE manu-facturers are typically separate from the GSE licensees, although several GSE manufacturers are also GSE licensees. GSE primarily is used to support airplane servicing, airplane ramp opera-tions, airplane turnaround, and line maintenance operations. The equipment is sold to a lesser degree to support


equipment is offered with a variety of options that must be considered before actual purchase. These options may include different types of engines (e.g., gasoline, diesel, propane), equipment for cold weather operations, various power inputs and outputs, and arrangements for spare parts.

Aircraft airline manufacturers. When an airplane acquires a new airplane, it also receives all the tool drawings for the airplane. The tools that the airplane manufacturer has is required to build some or all of their maintenance to other maintenance companies. As a result, the airline saves money by not having to purchase new GSE and tooling. The amount of con-tracting depends on a business analysis that studies the cost and benefits of contract maintenance. Ramp operations requirements. The GSE required for ramp operations is typically large and expensive. One piece of GSE, however, can often be used for more than one airplane model. For example, a tow tractor that is used for a larger airplane can also be used for a smaller model. However, if an airplane buys a new airplane model that is larger than any of its existing models, then the airline may need to acquire a substantial amount of new GSE.

The type and level of on-airplane maintenance to be performed on the new airplane directly affects the type and quantity of tools selected. Higher levels of maintenance require more tools. For example, an airline that performs only airplane turnarounds will require fewer tools than an airline that performs letter checks, such as C-checks, or heavy maintenance. If an operator plans to have the capa-bility to perform unscheduled maintenance (e.g., unscheduled change of engines, removal of damaged control surfaces, removal of landing gear), then additional equipment, such as mainte-nance work platforms, will be required to access all the different areas around the airplane.

If an operator desires to perform component maintenance overhaul, even more tools will be required. The number and types of tools depend on the extent of the overhaul work and how many overhaul shops the airline operates or intends to operate. Some airlines do not perform any overhaul maintenance, while other airlines perform partial or even full maintenance overhaul. If an operator performs small component maintenance overhaul of avionics equipment, the operator may be required to purchase automatic test equipment, which adds significant expense.

Contracting maintenance to outside companies. Small airlines, tour operators, and even large airlines contract some or all of their maintenance to other maintenance providers. As a result, the airline saves money by not having to purchase new GSE and tooling. The amount of con-tracting depends on a business analysis that studies the cost and benefits of contract maintenance.

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Procurering the Selected Equipment and Tools

After selecting the required GSE and tooling, the operator needs to determine the best method of procurement. GSE and tooling can be procured from a variety of sources: the airplane manufacturer, GSE licensees, commercial tool vendors, specific component tool vendors, or GSE manufacturers.

Operator experience over the years has shown the following guidelines to be prudent and effective in acquiring GSE and tooling in an economical way. After selection of the required GSE and tooling, the operator should request price quotes for each piece of GSE and tooling that it intends to purchase. Requests for quotes should be sent to a minimum of three companies that market GSE and tools. This method will result in a variety of price quotes and will allow the operator to choose the company that best meets its needs.

Past experience indicates that prices can fluctuate greatly among GSE and tool manufacturers. The amount of price fluctuation depends on several factors, such as demand for the tool, whether or not the tool is currently in stock, the quantity of tools ordered, and the requested lead time. The airline may receive a price reduction if it plans to purchase all or most of its GSE and tools from one company.

Lead time includes not only the time needed to manufacture the tool but also the time needed for shipment, travel through customs, delivery, and inspection. The airline should allow for as much lead time as possible. Longer lead times typically result in lower prices, while shorter lead times tend to increase tool prices. Larger quantities of the same tool also can result in a lower unit price.

As an option, the airline can purchase GSE and tools from the airplane manufacturer by sending a purchase order directly to the manufacturer. The airline manufacturer will review the order to check that the correct GSE and tools have been selected. The airline manufacturer will then purchase the requested tools from different GSE and tool manufacturers. When the tools are delivered to the airplane manufacturer, they will undergo a quality control inspection. The inspection ensures that the airline will receive the correct tools and that they will be completely functional. After inspection, the tools will be shipped from the airplane manufacturer to the airline.

Line-station requirements.
The amount of line-station maintenance performed by an operator at any given location usually depends on the number of aircraft flights to the location. Operators often contract their line-station maintenance work because the amount of work at a given line station does not justify the investment in equipment and personnel. However, if an airline plans to provide its own maintenance at a line-station location, it will need to select the appropriate type and quantity of GSE and tooling.

Facility requirements.
When an airline introduces a new airplane model into its fleet, the airplane manufacturer can work with the airline to determine whether the airline’s maintenance facilities are adequate to handle the increased maintenance activity. For example, the airline’s component maintenance shops may not be large enough to handle the larger pieces of equipment and increased flow of items through the shop. The airplane manufacturer can consult with the airline and recommend improvements to an existing shop or plan a new shop layout. The airplane manufacturer can then help select the proper tools and equipment for the shop.

The airplane manufacturer can also work with the airline to determine whether or not the airline’s airplane hangar can physically accommodate the dimensions of the new airplane model. If needed, the airplane manufacturer can provide recommendations for modifying the existing hangar or developing a new hangar.

Summary
Before the introduction of a new airplane model into its fleet, an operator needs to work with the airplane manufacturer to understand the different types of GSE and tools that will be required for airplane maintenance and operation. Based on the airline’s particular maintenance needs and operation, the operator should be able to properly select the GSE and tools that will be needed. The selection process should begin 9 to 12 months before initial airplane delivery. To procure the GSE and tooling in as cost-efficient and timely manner as possible, the operator should request a bid from three or more companies for each piece of equipment the operator intends to buy. Prices will vary depending on the demand for the tool, whether the tool is in stock, the order quantity, and the production lead time. By following these steps, the operator should be able to properly select the required GSE and tools, procure them at the lowest price, and have them available at the time of airplane delivery.