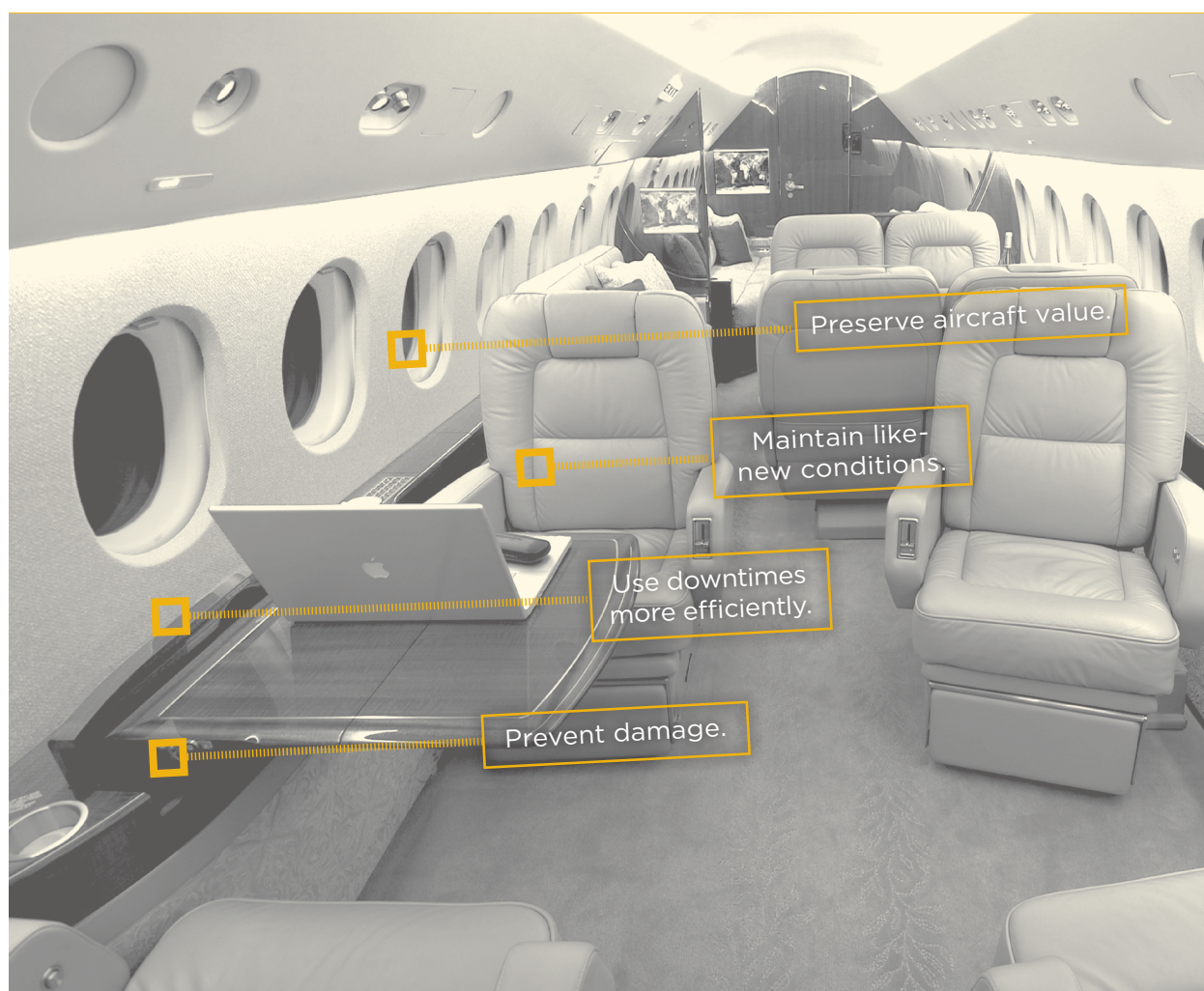


HOW TO EXTEND THE LIFE OF AN AIRCRAFT INTERIOR:

A DOM'S GUIDE TO PHASED INTERIOR MAINTENANCE

By Nate Darlington



www.DuncanAviation.aero/interior

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Parts of an interior will wear out long before the next complete refurbishment is due. Some essential maintenance is frequently overlooked, causing unnecessary damage and frustrations for passengers. A simple method keeps interiors looking new, helps them last longer and reduces long-term costs.

You can tell a lot about the condition of an aircraft by looking at the cabin, or at least

that is what people tend to think. A clean, well-cared-for interior inspires confidence in how well the rest of the aircraft has been maintained.

However, costs are prohibitive for complete interior refurbishments, and normal wear and tear ages interior components

long before the next refurbishment is due.

What if there was a way to minimize refurbishment expenses and reduce the effects of wear and tear?

Scheduling partial interior work with regularly scheduled maintenance events can reduce one-time refurbishment costs and extend the “like-new” quality of an interior through to the end of its functional lifespan.

Regular maintenance can also extend the life of an aircraft interior, protect

finishes, prevent damage and increase aircraft availability.

Scheduling partial interior refurbishments and performing regular interior maintenance is the basis of what Duncan Aviation calls “Phased Interior Maintenance,” a concept which is intriguing both owners and operators in the field.

MARKET DRIVERS

It’s commonly known that a worn or abused interior negatively impacts a passenger’s experience and tends to create an unfavorable impression with a prospective buyer.¹ However, interior refurbishments tend to weigh heavily on the balance sheets.

As such, “interiors are usually something people only worry about once every six years,” says Matthew Schepers, interior modification sales rep with Duncan Aviation’

The components of an interior also have different life spans, many of which will break or fail

¹ McCammon, Bob. “How Interior Aesthetics Affect Business Aircraft Resale Values.” Duncan Download Blog. September 2, 2014. <http://blog.duncanaviation.aero/index/bid/35419/How-Interior-Aesthetics-Affect-Business-Aircraft-Resale-Values>

between interior refurbishments. Poor operation of seats, cabinetry, and cabin equipment tend to frustrate passengers.² The entire maintenance operation tends to be judged by the aircraft’s appearance, inside and out.

Recent trends show interior work has been moving away from complete refurbishments

and toward partial interior

work. “For the most part, aircraft owners are just trying to fix what they need to fix to get their interiors looking nice again and not have them look worn,” says Schepers.

Delaying interior repairs can lead to unnecessary damages to the most costly portions of an interior.

THE INTERIOR REFINISHMENT PROBLEM

Directors of Maintenance (DOMs) are challenged with keeping their aircraft properly maintained, both functionally and aesthetically, while on a tight flight schedule and with limited resources.

In many cases, this balancing act causes interior repairs to be overlooked or postponed until the next major refurbishment. This can lead to unnecessary damage to the most costly portions of an interior, require unanticipated repairs and cause operators to exceed their maintenance budgets.

² Darlington, Nate. “Economizing Interior Refurbishments.” Duncan Aviation. September 23, 2011. <http://www.duncanaviation.aero/videos/pim/part2.php>

“The ideal way to schedule ongoing maintenance to an interior is to coordinate it with maintenance events of similar downtimes,” says Nate Darlington, interior modification sales rep with Duncan Aviation.

Unfortunately, interior items typically aren’t anticipated far enough in advance for scheduling or budgeting considerations.

DOMs know when their aircraft’s next maintenance event is coming due. However, estimating downtimes and determining what interior services can, or should, be scheduled with which events gets complicated quickly.

“It’s easy to get overwhelmed, but careful, strategic planning is important,” says Darlington.

THE RELATIVE VALUE OF INTERIOR AESTHETICS

Interior aesthetics tend to be dismissed as an unnecessary expense. However, according to Bob McCammon, aircraft sales rep for Duncan Aviation, an aircraft’s worn or abused interior leads prospective buyers to question how the rest of the airplane has been maintained.¹

“First impressions make a big difference in the sale,” says McCammon. “A well-maintained interior will help an aircraft sell faster at a better price. The broker or selling agent won’t have to make excuses for it.”

Ideally, an interior’s condition and appearance should depend on how an aircraft is used and the mission of the operator and/or principal of the aircraft, says Darlington.

THE “PHASED” INTERIOR MAINTENANCE SOLUTION

Many operators are unaware that interior repairs can be paired with regularly scheduled events to maintain the condition of a refurbishment. Additionally, a complete interior refurbishment can be effectively phased over several years of maintenance events (*see Standard vs. Phased Cost Projections*).

Darlington describes it as “Phased Interior Maintenance,” or running interior events in conjunction with annual airframe events.

By phasing in interior maintenance, operators can also off-set the cost of a complete refurbishment by amortizing it over the aircraft life and maintenance cycle.

This helps reduce long-term costs, avoids extra downtime and keeps the interior in pristine condition.

Most cost savings are realized by pairing inspections that require removal and reinstallation of interior items with maintenance for those same items.

For example, inspections that require the removal of seats and floorboards are a prime opportunity to replace carpet and recover seats without extending the service schedule.

Planning for regular interior maintenance—like routine maintenance to the airframe,

engines, and other systems—maintains an aircraft’s value and prevents damage.

If the plan is followed, it also helps soften the blow on the balance sheets by spreading the burden of cost over several years.

With this in mind, treating interior repairs as an extension of regular aircraft maintenance becomes a smart business decision.

EFFICIENT SERVICE SCHEDULES

Phased Interior Maintenance schedules give operators an efficient budgeting tool that allows them to plan and control long-term costs. The schedules help operators perform annual evaluations by making note of functionality and appearance, planning interior services and budgeting more effectively.

Most importantly, having a detailed plan allows services to be scheduled months in advance, which maximizes a service center’s available manpower and results in more aggressive downtimes.³ It also reduces the anxiety of tight decision deadlines.

These schedules allow DOMs to anticipate what interior items need to be worked three to four months in advance, and have time to prepare for them, says Schepers. As a general rule, larger aircraft need about six to eight weeks lead time for

³ Darlington, Nate. “Planning an Aircraft Interior Refurbishment.” Duncan Intelligence Newsletter. July 2011. <http://www.duncanaviation.aero/intelligence/201107/planning-aircraft-interior.php>

interior work. Smaller aircraft can be done with less lead time, about four to six weeks.

“This allows all the materials to come in so when the plane arrives everything’s ready,” he says. “We’re not figuring things out along the way.”

Schepers estimates that 10 to 12 weeks of downtime can be saved for a larger aircraft over the course of three or four years. Smaller aircraft would save about five to six weeks of downtime over the same period.

Phased Interior Maintenance schedules allow DOMs to anticipate interior repairs three to four months in advance.

IMPROVED MATERIAL LEAD TIMES

Understanding the time and effort it takes for designers, engineers and support staff to provide a package that meets an operator’s expectations is critical to the success of an interior refurbishment.³

“Accounting for material lead times is often underestimated,” says Darlington.³

It’s best to have all materials on hand prior to the scheduled start date of an interior completion. This allows service providers to properly inspect materials for flaws and imperfections.

Darlington explains that the driving factor behind most interior refurbishment schedules is carpet.⁴ Machine-made carpet lead times range from four to eight weeks and handmade carpets range from eight to 12 weeks. By taking carpet

into consideration ahead of time, service providers can respond to any potential material issues without impacting the downtime or schedule of the maintenance event.

Additionally, Kirby Harrison of Business Jet Traveler, notes that it is worth a person’s time and consideration to select materials that wear well and are easy to maintain.⁴

Leather is more durable than fabric for seats, and can be treated to resist stains and inks; wool-blend carpets are more durable than silk or silk blends; and scratch and stain-resistant countertops are worth the investment.⁴

DAMAGE PREVENTION

A well-maintained interior goes deeper than clean carpets and seats. Functional items also need ongoing service to make sure that they work properly.

If cabinetry door and drawer operations are left neglected, damage to surrounding areas can occur.

Consider door and drawer adjustments, for example. “It takes 30 minutes to adjust the latches so the door strikes won’t poke through the cabinet veneer,” says Schepers. “Otherwise it takes 20 hours to repair and refinish the damaged veneer.”

Other functional interior items, like cabinets and seats, can break

⁴ Harrison, Kirby J. “Inside the Cabin: Thinking of Others Can Pay Off.” Business Jet Traveler. August 1, 2011. <http://www.bjtonline.com/flying/inside-the-cabin/s/article/thinking-of-others-can-pay-off-2932.html>

or damage surrounding materials if they aren't maintained.

If they function correctly, they won't cause damage. "Ongoing maintenance of big ticket items extends their lifespan," he says. "It makes your interior investment last longer."

CONSIDERATIONS FOR INTERIOR MAINTENANCE SCHEDULES

When considering phasing-in an interior refurbishment, it is essential to accurately identify maintenance events that have sufficient downtimes and allow for combined interior work.⁵

Anticipating when interior items will need service and what maintenance they will require—such as adjustments, touch-ups or replacement—is also necessary to create an effective interior maintenance schedule. This is not an easy task.

"Every aircraft has its own life and maintenance cycles," says

Schepers. "The goal is to come up with a plan that the operator can take with them, and will cover the full scope of both cycles."

Having an experienced maintenance, repair and overhaul

⁵ Darlington, Nate; Schepers, Matthew. "How to Create an Interior Maintenance Plan for your Business Aircraft." Duncan Download Blog. August 30, 2011. <http://blog.duncanaviation.aero/index/bid/41906/How-to-Create-an-Interior-Maintenance-Plan-for-your-Business-Aircraft>

(MRO) service provider assist with the planning process is essential. They should be familiar with what interior services can be paired with each maintenance event, how an interior will wear over time and the operational requirements of each aircraft.

Refurbishing a business jet is a complex project that requires specialized skills and artistic talent.⁶ It's best to involve a professional designer when creating a plan to phase a complete interior refurbishment over several years. They can help identify the materials that will be needed at each phase to create a cohesive design.

Choosing one MRO to plan for and perform combined maintenance events will help increase familiarity with the aircraft and help improve work efficiency. However, operators should be able to take interior maintenance plans and quote work outside of the service center, without any scheduling obligations.

DUNCAN AVIATION'S PHASED INTERIOR MAINTENANCE PROGRAM

Duncan Aviation's Phased Interior Maintenance program is available for all aircraft makes and models of business aircraft. Maintenance schedules are individually created on request, and are based on a detailed aircraft assessment. Each schedule

⁶ Harrison, Kirby J. "Buyers' Guide Articles: Outfitting Your Aircraft's Cabin." Business Jet Traveler. March 26, 2012. <http://www.bjtonline.com/business-jet-news/outfitting-your-aircraft%E2%80%99s-cabin>

pairs interior maintenance with annual aircraft inspections that require the removal and reinstallation of interior items.

To create a maintenance schedule, an interior refurbishment professional works directly with a DOM to evaluate how an aircraft is used and its interior requirements. The life spans of interior items are estimated, required maintenance events are identified

and interior items are paired with inspections that require similar downtimes.

Duncan Aviation's award-winning, professional design team can also advise operators interested in phasing an interior refurbishment over several years.

"We sit down and really get to know the operator, the aircraft and the needs of the principal," says Matthew. "The relationship with the operator is what's important to us."

Phased Interior Maintenance schedules are an operator's to keep without cost or obligation. In addition, Duncan Aviation will train operators on ways they can

perform annual evaluations of their interior condition, how to make note of functionality and appearance and ways to perform ongoing maintenance to prevent small items from causing damage.

BUSINESS AIRCRAFT INTERIOR MODIFICATION SERVICES

Duncan Aviation is a family-owned, full-service business aircraft MRO, offering refurbishment, modifications, upgrades, parts and support capabilities. Our interior design teams are award winners, and our technicians are among the most experienced in the industry.

We are known for our meticulous attention to detail, and our aircraft inspections and interior completions work have earned the trust, admiration and respect of operators and organizations around the world.

Interior modifications and refurbishments can be accomplished at any of Duncan Aviation's facilities in Battle Creek, Michigan, Lincoln, Nebraska, and Provo, Utah, and include a three-year, 1500-hour warranty on interior workmanship

Contact some of the most experienced people in the industry and request a Phased Interior Maintenance schedule.

Call an Interior Modifications Sales Rep today!

Battle Creek: 800.525.2376

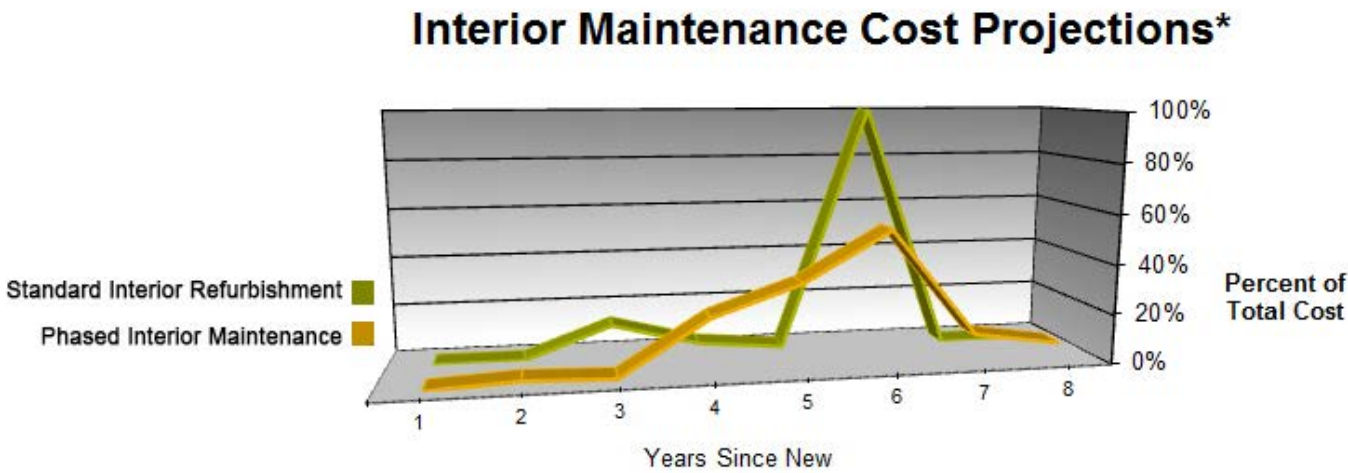
Duncan Aviation takes the time to get to know a DOM, their aircraft and the needs of the principal.

Maintenance plans are a DOM's to keep without cost or obligation.

STANDARD VS. PHASED COST PROJECTIONS

Phased Interior Maintenance can be used to spread the cost of an interior refurbishment over the life and maintenance cycle of an aircraft. This helps maintain a like-new condition for the interior, and reduces long-term costs and aircraft downtime.

Call a Duncan Aviation interior modifications sales rep today!
Battle Creek: 800.525.2376
Lincoln: 800.228.4277
Provo: 877.771.2788



* The above information is for general reference and illustration only, and is subject to change at any time.

STANDARD VS. PHASED INTERIOR MAINTENANCE SCHEDULES

Phased Interior Maintenance schedules pair interior refurbishment events with annual airframe inspections of similar downtimes. This sample schedule for Falcon 2000 aircraft reduces total interior costs by about four percent over an eight-year period. It also offsets the one-time cost of an interior refurbishment by about 70 percent on the sixth year.

Call a Duncan Aviation interior modifications sales rep today!
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Aircraft Age	Inspection	Downtime*	Phased Interior Maintenance		Standard Interior Maintenance	
			Items*	Est. Costs*	Items*	Est. Costs*
3 yrs	3A	7 days	Entry step treads. Finish touchups. Cabinet adjustments. Cabin window liners/shades. Seat touchups. Crew seat covers. Entry door shrouds. Misc. cockpit items.	\$35k	SWAT work. Carpet. Crew seat covers.	\$50k
4 yrs	4A	10 days	Cabin lower sidewalls, PSU panel replacement. Cabin carpet. Finish touchups. Lav divider covers.	\$65k	SWAT work. Replace worn items. Seat touchups.	\$15k
5 yrs	A	5 days	Baggage carpet. Seat touchups. SWAT work.	\$22k	SWAT work.	\$5k
6 yrs	C check (R&R)	6 weeks	Cabin headliner. Finish sand, top coat. Baggage. Recover seats. Entry steps. Curtains. Cabin window lenses. Cockpit window panels. Entry headliner.	\$285k	Complete interior refurbishment. Finish sand and topcoat.	\$400k
7 yrs	2A	6 days	SWAT work.	\$5k	-	-
8 yrs	3A	7 days	Cabin, entry, cockpit carpet. Cabin window liners.	\$60k	-	-
Total Est. Phased Interior Maintenance Costs*				\$452k	Total Est. Standard Interior Costs*	\$470k

* The above information is for general reference and illustration only, and is subject to change at any time.