EFC100™

Field-proven, permanent leak protection
– from a single application

in 7 easy lessons

1. HISTORY
2. CHEMISTRY
3. ANATOMY
4. PHYSIOLOGY
5. ECONOMICS
6. STRATEGY
7. MATHEMATICS

Leak-proof, stress-resistant,
advanced polyurethane sealant
for integral metal and composite aircraft fuel tanks
and their joints, rivets and fasteners

MEGGiTT
smart engineering for
extreme environments

IMAGINE

Meggitt Polymers & Composites' applied research and technology has used its imagination so you don't have to use yours.

For essential LESSONS IN EFC100™ read on and hear us out.

Meggitt Applied Research & Technology

IMAGINE an integral fuel tank sealant that you apply once only and then you're done – for the life of your aircraft.

No more patching at yearly intervals and, for some aircraft, total stripping and resealing every five years with conventional sealants.

IMAGINE a sealant that offers long-term leak protection and yet weighs a third of conventional treatments.

That's fuel savings for some – and greater range or more payload for others.

IMAGINE a sealant so strong and yet so flexible that it can seal highly-stressed aircraft lap joints – and stay sealed.

We're already keeping essential veteran military tankers in service and are poised to extend the lives of the oldest workhorses in commercial aviation.

IMAGINE an economically-viable solution to the higher cost of sealing flexible composite wings on next generation aircraft?

It may be the only practical functional solution, too.

LESSON #1

EFC100™ HISTORY

First a little history

EFC100™, Meggitt's long-life, leak-proof, stress-resistant, advanced polyurethane sealant, is no overnight sensation.

Nearly 50 years back, we launched our lightweight fuel bladders based on the same *polyurethane* technology.

Our bladders are maintenance-free, with inner liners that don't dry out and become brittle when empty for extended periods. They are flexible, withstanding the stresses and strains of repeated take-offs, landings and high g maneuvers.

To date, we have supplied over 200,000 fuel bladders for a wide range of military and civil aircraft and many of the first installations are still in service.

We remain the *only* manufacturer to have perfected this technology, setting a standard of longevity in the late 1970s that has never been beaten.

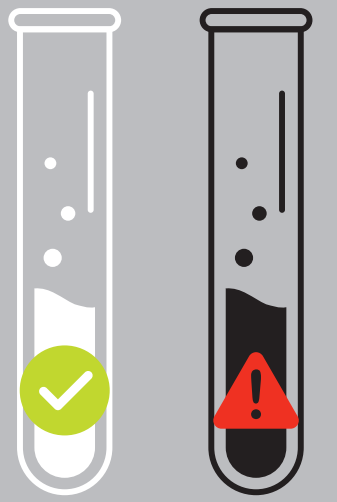
It's hardly surprising that virtually every US helicopter, fighter, bomber, tanker and transport you'd care to name uses these bladders.

EFC100™ is based on the same polyurethane technology, available as a spray or brush sealant, utilized by military customers for the last 20 years to keep mission-critical tankers, transports and special-purpose aircraft flying.

Now we're ready to spread EFC100™'s wings into commercial aviation.

LESSON #2

EFC100™ CHEMISTRY



[POLYURETHANE] [POLYSULFIDE]

★One-time application
★Life long leak resistance
★No patching
★No stripping
★No re-sealing
★Translucent

And now for a little chemistry

(Stay with us now.)

EFC100™ is a polyurethane-based sealant, rich in features that traditional coatings just can't match.

EFC100™ is a saturated polymer with *no* sulfur-sulfur bonds. These bonds, present in traditional coatings, are subject to ozone attack, typically resulting in cracking and splitting.

When fuel is removed for an extended period, EFC100™ is completely unaffected, retaining its flexibility.
Traditional sealants dry out and crack.

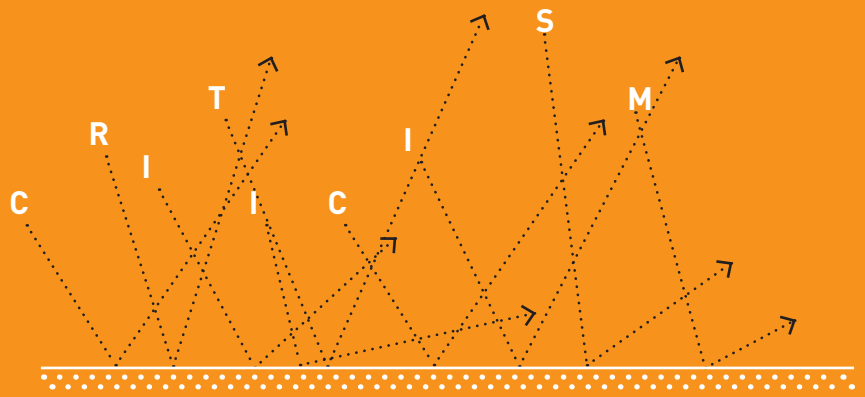
EFC100™ is unaffected by the extreme stresses suffered during take-offs, landings and high g maneuvers, retaining its leak-proof properties.
Traditional sealants yield.

EFC100™ demonstrates superior adhesion to common substrates, so prevents fuel contamination.
Traditional sealants can contaminate fuel by shedding matter as they age.

EFC's **once-and-done** application lasts for the life of aircraft – no maintenance needed.
Traditional sealants require periodic maintenance and may need to be completely stripped and reapplied to some aircraft as often as five-years from application.

LESSON #3

EFC100™ ANATOMY



Chromate-free

Impervious to criticism

Where traditional sealants breathe, allowing oxygen to rise to their surfaces, EFC100™ is non-porous and does not allow oxygen or water to reach the substrate. This means the likelihood of corrosion is almost entirely eliminated.

No passenger or crew is likely to be subjected to fuel vapors from an EFC100™ coated integral fuel tank.

EFC100™ is resistant to fungus, humidity, ultra-violet light and ozone.

Above all, there's no danger of EFC100™ degrading and contaminating fuel or being compromised by fuel additives.

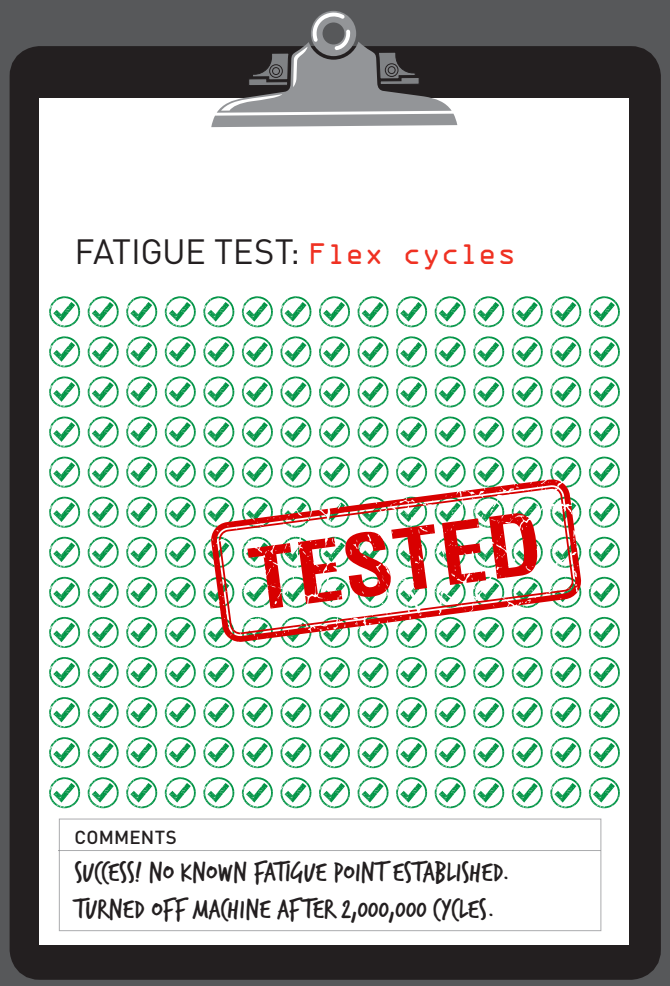
And always transparent

EFC100™ is self-levelling and remains effective even when applied more thinly than traditional coatings. These characteristics create a key feature: a level of translucency that allows for accurate non-destructive testing (NDT) and visual detection of cracks in the aircraft structure.

Traditional sealants are opaque at any thickness, making NDT and visual inspection impossible.

LESSON #4

EFC100™ PHYSIOLOGY



Fatigue resistance is *the* critical success factor

Traditional sealants have low flexibility and limited life.

When EFC100™'s is fatigue-tested, it just doesn't fail – despite *millions* of flex cycles at high amplitudes. To date, EFC100™ has withstood *at least* two million flex cycles at a coating thickness of 0.010 inches.

Competing sealants fail easily. Even if they are applied *four times* thicker than EFC100™, they fail at around 8,000 cycles. Traditional sealants require *25 times* that thickness to achieve even 200,000.

That's why EFC100™ has been successful in addressing leaks arising from the high-stress points of integral fuel tanks in aircraft – where wing meets fuselage, for example.

And why EFC100™ will be the only sealant to provide a functional as well as cost-effective solution to sealing composite wings which flex more by far than any metal structure. Without EFC100™, airlines can expect even higher maintenance costs than they have experienced to date with conventional coatings.

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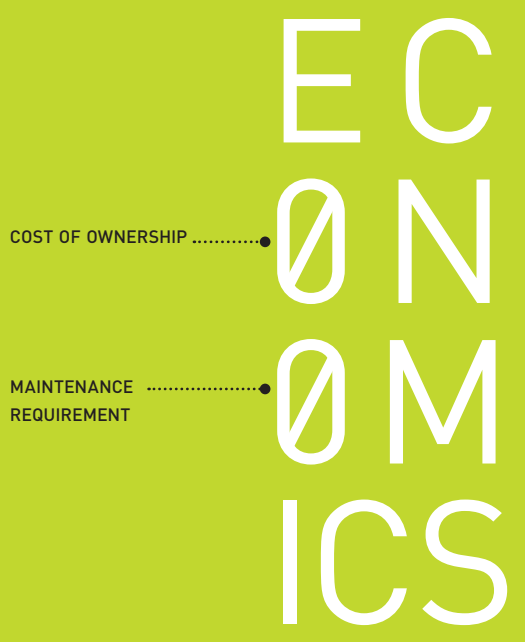
STRONG PERFORMANCE

Reported by Air Force Research Laboratory to have "excellent tensile strength and elongation ... lighter weight and cures rapidly."

LESSON #5

EFC100™ ECONOMICS



How the economics stack up

Cost of ownership? *Nil.*

30% weight savings? *Will you spend them on greater range and payload or reduce your bottom line?*

Military customers have reaped the rewards of EFC100™'s zero maintenance requirement.

For a military tanker, the cost of complete stripping and resealing with conventional sealant every five years, plus stripping and changing the topcoat every three, was eliminated.

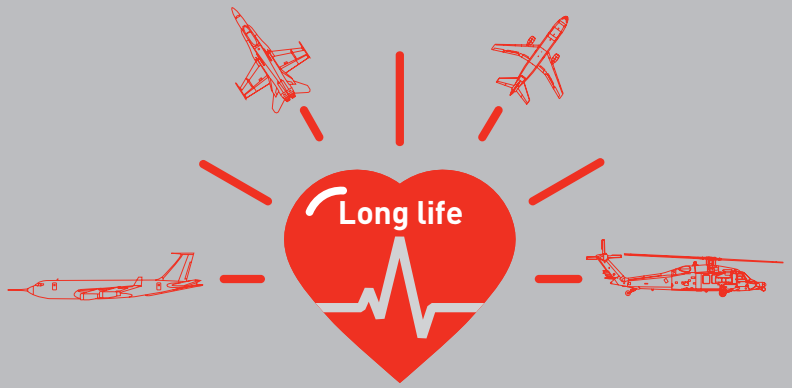
This tanker no longer wasted fuel at 25 pounds per hour for every 500 extra pounds of weight incurred using a conventional sealant. As EFC100™ is 2,500 pounds lighter; the annual saving was nearly $55,000.

We haven't mentioned the cost of unscheduled repairs, maintenance labor and facilities – or the cost of an aircraft that isn't flying.

It doesn't take much to imagine the boost that will be given by EFC100™ to the operating economics of ordinary civil aircraft, even if they only have to be ready for passenger flights, rather than supporting combat aircraft.

LESSON #6

EFC100™ STRATEGY



Extending the service life of vital military aircraft

Since the 1990s, it has been our privilege to focus R&D on United States' mission-critical military applications. Several military aircraft have benefited from and EFC100™ installation. Over more than 25 years, there have been no reported leaks due to material failure.

We have extended the service lives of essential special-purpose aircraft and aging super tankers as EFC100™ has sealed the seams and gaps arising from high-stress zones.

EFC100™ keeps them flying

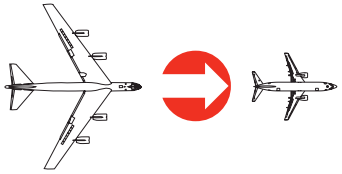
C-9✈C-130✈DC-8✈DC-9✈E-8C✈BAe Jetstream 41✈BAe 146✈B52✈ KC-10✈KC-135✈P-3✈RC-135✈S-76✈UH-60✈WB-57

Acquisition

Engineered Fabrics Corporation, where this remarkable product originated, was absorbed into Meggitt Polymers & Composites in 2007. EFC100™ continued to play a key role in keeping classic military aircraft flying.

Strategic review

In 2015, the Meggitt division expanded significantly through acquisition and has been the subject of a major strategy review under new management and significant ongoing investment.



Renewed investment and the new commercial focus

We are now able to turn our attention to realizing the immense potential of EFC100™ in commercial aircraft to reduce airline maintenance costs.

We have started work with OEM partners who have seen the competitive advantage EFC100™ brings to military applications.

EFC100™ has been tried and tested over decades on military aircraft using manual spray and brush applications.

Now we're on a timetable to deliver new mixing and dispensing methods including robotic delivery for commercial assembly lines.

LESSON #7

EFC100™ MATHEMATICS

Why our claims add up
compared to conventional sealants

Millions flex cycles at high amplitude

10x stronger

30% lighter

x2 elongation

15 years' total leak resistance (and counting)

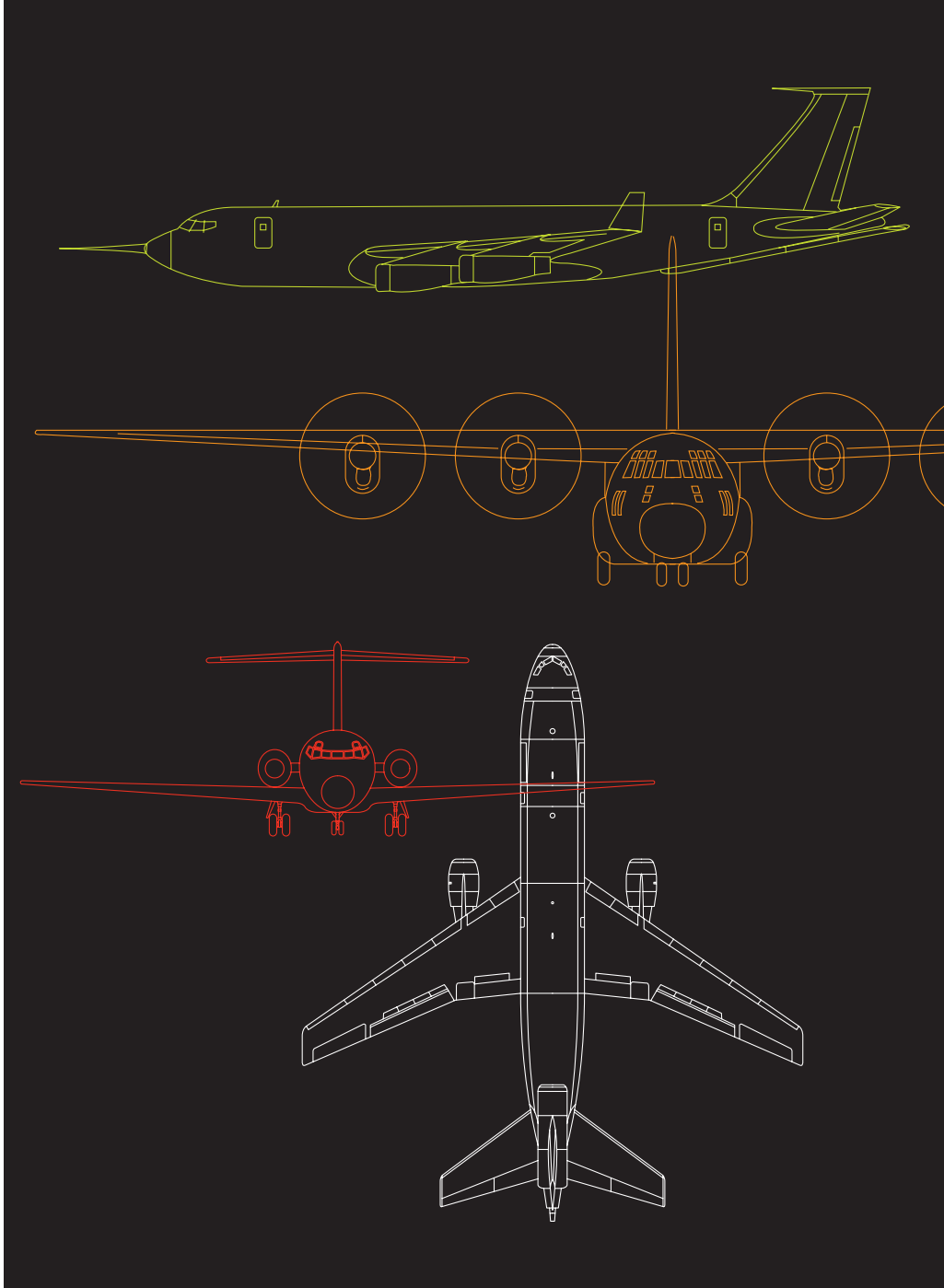
0 maintenance

Facts that stick

EFC100™ features		EFC100™ benefits
Outstanding tensile strength (10x as strong as conventional sealants)	=	Long-life
Extremely flexible (No known fatigue point after millions of cycles at high amplitude)	=	Long-life
Double the elongation of conventional sealants	=	Resists failure due to wing flex
Low specific gravity (30% lighter than traditional sealants)	=	Fuel conservation and range and payload extension
Translucence	=	Non-destructive testing and visual inspection for structural damage
Fuel resistant, from common fuels and gases to biofuels and fatty acid methyl esters	=	Long-life. Clean fuel.
Ozone-resistant	=	No cracking and degradation
Non-nutrient	=	Fungus-resistance prevents degradation
Abrasion resistant	=	Nil wear and tear
Resistant to air, water and fuel intrusion	=	No leaks, no corrosion and no vapor escape
Hydrolytically-stable	=	Long-life despite high humidity

Awards

- USAF E-8C Joint STARS
  Fuel Containment Improvement
- USN C-9
  Program Commendation
- KC-10
  Certified leak-free
- USN C-130
  Commended for weight savings
  Certified leak-free
- KC-135
  Reserve tanks
  Certified leak-free



EFC100™

Field-proven, permanent leak protection – from a single application

The EFC100™ product line is a mature one consisting of a family of brushable and sprayable variants, sag-resistant fillets for high-stress zones, topcoats, quick-cure options and adhesion promoters.

Ask your Meggitt representative for details and how to apply EFC100™ with our Gold level partner and distributor.

Contact:

Meggitt Fuel Containment & Systems

John Mlincsek
(Vice President, Sales)
john.mlincsek@meggitt.com
Tel: (770) 684 7855 Ext 4485

Randy Fotinakes
(Vice President, Business Development & Government Affairs)
randy.fotinakes@meggitt.com
Tel: (770) 684 7855 Ext 4463

Design by **HybridCreative** www.hybridthinking.co.uk

Meggitt Polymers & Composites
669 Goodyear Street
Rockmart, GA 30153
USA
www.meggitt.com

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