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AVIATION INSIGHTS · FREIGHTER MARKET SPECIAL REPORT

Why the Best New Freighter Is a Used One

A twenty-year-old passenger 777, converted to carry freight, costs $75 million to $110 million by the time it is ready to fly, however cheaply the aircraft was bought, and it carries more cargo than a brand-new 777 freighter. Boeing's 767 freighter line closes next year, only thirty-five more new 777 freighters may be built after 2027, the replacement aircraft are late, and the engines decide the price.

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ABOUT THIS REPORT · PREVIEW EDITION

Freighter production is ending early, so the industry is converting passenger aircraft

The ICAO aeroplane CO2 standard in Annex 16, Volume III, closes the Boeing 767 freighter line at the end of 2027 and was to close the 777F line with it. On 15 September 2026 the FAA allowed Boeing thirty-five more. The replacement aircraft are late, the passenger aircraft best suited to conversion are being kept in service, and for most buyers a new widebody freighter before 2029 still means a converted one. This report looks at what that does to prices, which aircraft work, who pays and who carries the risk. It ends with Boston Warwick's view on each of the fourteen assets it covers.

Built from manufacturer airport planning documents, operator specifications, appraiser publications, Federal Register filings, company disclosure and Boston Warwick's own fleet and conversion datasets, which are maintained for clients. It is separate from the $159 Barrel series on jet fuel, though it draws on that work.

$75–110m
WHAT A CONVERTED 777 COSTS, READY TO FLY, HOWEVER THE AIRCRAFT WAS ACQUIRED

+29%
MORE CARGO A CONVERTED 777 CARRIES THAN A NEW-BUILD 777 FREIGHTER, ON TYPICAL EXPRESS CARGO

12
CONVERTED BOEING 777-300ERS FLYING IN THE ENTIRE WORLD

42%
OF THE A321 CONVERTED FREIGHTER FLEET SITTING IN STORAGE

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HOW TO READ THIS

Four claims, and where each one is evidenced

This report makes four claims that are not yet in general circulation. A reader short of time can check all four in the sections named below and skip the rest.

First, that the converted aircraft is the better freighter for the light, bulky cargo that makes up most air freight. The report's central finding follows from published payload and volume figures. Section 11, Figures 11 and 12. The measurement basis is set out in Section 24 because many published errors in this field start there.

Second, that the widebody and narrowbody freighter markets are moving in opposite directions for the same reason. Sections 12 to 14, Figure 13. Per-departure costs do not scale with payload, so a small freighter has to carry unusually valuable cargo or serve an unusually captive route.

Third, that the entire market runs through one regulator, and that the one decision it has now taken shortens the window without closing it. Sections 04 and 06. The FAA granted Boeing's 777F exemption on 15 September 2026, after the research for this report had closed. We have revised the analysis for it, and Section 04 sets out what the grant changes and what it does not.

Fourth, that cheap feedstock does not make a cheap freighter, because the engines and the conversion account for most of the cost and the airframe for very little of it. Sections 09 and 10, Figures 6 to 8. Five passenger 777-300ERs sold this year for $12.5 million to $33 million each, and the aircraft they become will cost what every other converted 777 costs.

The report says where it is uncertain. Section 20 is written against our own argument and Section 23 sets out the one question still open and the data that would close it. Every judgement in Section 02 carries a confidence rating and, in Section 20, a test that would change our view, and Section 22 states a view on every asset in the report.

EXHIBITS

The twenty-three figures, and what each one settles

Every exhibit in this report answers a specific question. A reader who wants one answer can find it here without reading the whole report.

INDEX OF EXHIBITS

Figure	What it shows	The question it settles
1	Production end against replacement dates	How long the gap actually is
2	777-300ER fleets and operator positions	Where the feedstock is, and why it is staying there
3	Base value moves by type	Whether freighter values doubled, or one aircraft did
4	Base value against market lease	Why the two published numbers disagree, and which to believe
5	Passenger aircraft to converted freighter, on appraised values	What the published figures imply for the conversion cost
6	**Three routes to a converted 777**	**Whether cheap feedstock makes a cheap freighter. It does not**
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9	Converted against new, with ranges	What the alternatives cost, where they exist
10	**GE90-115B values against the airframe**	**Why two engines are worth more than the airframe, and what each earns**
11	**Payload carried by cargo density**	**Whether the conversion carries more than the new-build freighter. It does**
12	Density capability by variant	Which aircraft are built for weight and which for volume
13	**Output per departure**	**Why size decides the economics, and by how much**
14	Fuel per tonne-kilometre by type	Which aircraft earns more than it burns, on typical air cargo
15	Conversions by year and body type	How far the narrowbody market fell, and when
16	A321 value, lease and storage	What a failed conversion programme looks like
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18	Conversion programmes and capital	Who can actually perform a conversion, and who funds them
19	Orders against aircraft	How far the order book runs ahead of the hangars
20	What is on order, and when it can arrive	Which supply line can deliver in 2027, and which cannot
21	Where the lease factor lands	Whether the lessor is being paid for the engines
22	747-400 engines and industrial twins	Who else is bidding for freighter engines
23	Composite share against conversion status	Whether the next generation can be converted at all

Figures 11 and 13 carry the report's two original findings. The rest put published material into a form that can be compared.

SECTION 02

Executive summary

The ICAO aeroplane CO2 standard in Annex 16, Volume III, adopted in US law at 14 CFR 38.1 and 40 CFR 1030.1, is closing Boeing's freighter lines, the aircraft that would replace them are late, and a regulator has reopened one line for thirty-five aircraft. The price of large air freight capacity for the rest of this decade is being set in what remains of the gap, and the largest component of that price is the engines.

Findings

1. The cause is on the supply side. Air cargo tonne kilometres grew 11.4 per cent in 2024, 3.4 per cent in 2025, and the 2026 tonnage forecast is plus 0.2 per cent. The summer ran ahead of that, with August demand up 4.4 per cent, but on a fleet that did not grow: capacity fell 0.1 per cent in the same month and load factors rose two points. Revenue is up because aircraft are fuller and yields rose; the fleet is unchanged. Values rose anyway, because manufacturing slots are being withdrawn. The ICAO aeroplane CO2 standard in Annex 16, Volume III, prohibits the issue of an original certificate of airworthiness from 1 January 2028 for aircraft that do not meet its limits, and both the 767 freighter and the 777F fail it. The 767 line closes. The 777F has been given a thirty-five-aircraft reprieve, which Finding Six and Section 04 cover.

2. On typical air cargo, the converted aircraft carries more than the new-build one. A new-build Boeing 777F and a converted 777-300ER can lift almost the same weight, 102.0 and 100.7 tonnes. The converted aircraft has twenty-nine per cent more space, because the 777F is built on the shorter 777-200LR airframe and the 777-300ER fuselage is 10.13 metres longer. Most air cargo is light and bulky, so the hold fills before the weight limit is reached: at the density of typical express cargo the new-build freighter is full at 76 tonnes while the conversion carries 98. That finding rests on published figures.

3. Only twelve converted Boeing 777-300ERs are flying in the entire world, on the figure IAI gave Aviation Week on 8 October; its last published count, on 22 July, was eleven. All are from IAI, whose programme is the only certified 777-300ER conversion. Mammoth, certified for the smaller 777-200LR in April 2026, delivered its first aircraft in August. Mammoth's 777-300ER prototype had its main deck door cut on 4 September 2024 and is still not certified two years later. Kansas Modification Center has never flown one. The industry's capacity to convert is far smaller than is generally assumed.

4. Narrowbody freighter conversion has collapsed, and the reason is cost per departure. Conversions fell from over 120 in 2023 to over 70 in 2024 to fewer than 20 in 2025. In 2026 widebody conversions overtook narrowbody for the first time since 2009. Forty-two per cent of the A321 converted freighter fleet is in storage and its lease rate has fallen thirty-five per cent since 2020. A single widebody departure produces roughly eight times the tonne kilometres of a narrowbody one, against per-departure costs that do not scale anything like as fast.

5. The engine is now worth more than the aeroplane it came off. Two CFM56-7B engines lease for $80,000 to $100,000 a month each. The whole converted 737-800 freighter they were bolted to leased for $140,000 to $160,000 in 2024. Lessors have begun parking converted narrowbodies and leasing out the engines. At least one converted 737-800 was retired after two years of service and another was

reportedly scrapped before it ever entered service, because the engines were worth more to passenger operators than the aircraft was worth as a freighter.

6. Everything runs through one regulator, and its one decision so far shortens the period of scarcity without ending it. The 777-9 certification that decides when passenger 777s are released for conversion, and two uncertified conversion programmes, still sit with the Federal Aviation Administration. On 15 September 2026 the agency granted Boeing's petition: up to 35 more 777Fs may receive first certificates of airworthiness between 1 January 2028 and 1 January 2031. At Boeing's current rate that is about sixteen months of production spread over three years. The firm 777F backlog is 37 aircraft on Cirium's count and 38 unfilled orders in Boeing's own data at 30 September 2026. On either count it is already spoken for through 2027, the 35 are additional aircraft that have to be sold, and Cirium's estimate is that fifteen or sixteen of them will be; the one-aircraft difference between the two counts changes none of this.

7. Cheap feedstock does not make a cheap freighter. Challenge Group bought five long-grounded 777-300ERs this year for $12.5 million to $33 million each. The first did not leave India until 3 August, six months after it was bought, and has still to be converted. By the time one is ready to fly as a freighter it will have cost what a conversion of a $47.6 million mid-life aircraft costs, because the conversion is about $35 million whatever the airframe, and the engines are $10 million to $15 million each to overhaul. Three routes to a converted 777 all end at $75 million to $110 million. The airframe is the smallest of the three costs.

8. The engine supports the value of the widebody and has destroyed the value of the narrowbody. A full-life GE90-115B is worth more than $35 million and leases at $250,000 to $300,000 a month. Two of them earn two thirds of what the whole converted aircraft earns. On the 737-800 two engines came to earn more than the aircraft, and the aircraft were parked for their engines. On the 777 that has not happened, and the margin between the aircraft lease and two engine leases is the single figure that decides whether it does.

Judgements

Converted 777s stay expensive through 2027 and get cheaper from 2028 HIGH CONFIDENCE	Until the exemption aircraft begin delivering in 2028 there is no new large widebody freighter available to a buyer ordering now; the 777F backlog to 2027 is already sold. From 2028 a buyer with a slot has a choice, and the premium on a converted 777-300ER should compress from the roughly $90 million now being quoted towards the $75 million to $80 million the appraisers publish. It does not collapse, because the density comparison in Section 11 gives the conversion more cargo at under half the new-build price.
Aircraft to convert stay scarce until the early 2030s HIGH CONFIDENCE	Eleven of seventeen large 777-300ER operators have announced cabin retrofit or life-extension programmes. Emirates alone is refitting 109 of its Boeing 777s, and it had 118 passenger 777-300ERs in service on 1 April 2026. The appraiser community expects availability to improve into the early 2030s, conditional on 777X deliveries beginning.
Narrowbody freighter conversion does not recover before 2028 MEDIUM-HIGH CONFIDENCE	The oversupply is real and the storage rates are published. Demand for the engines is structural. Recovery requires either a collapse in CFM56 values or a step change in short-haul air freight yields. Neither is visible.

SECTION 10

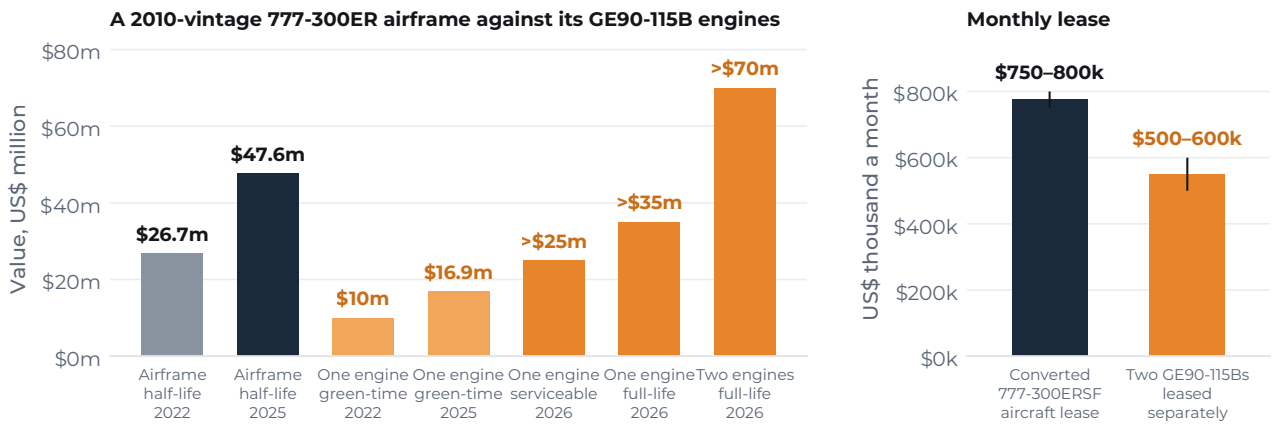
The engines set the value

The two engines on a converted 777-300ER, leased separately, would earn two thirds of what the whole aircraft earns. On the 737-800 the same comparison went the other way and the aircraft were parked. On the 777 the engines are what support the value of the aircraft, and the gap between the two lease rates is the figure to watch.

The GE90-115B is the only engine on the 777-300ER, the 777-200LR and the 777F, and no new one is built except for the 777Fs still coming off the line. The passenger fleet that carries most of them is being kept in service, so the supply of spare engines is not growing. The effect is visible in the appraisers' engine updates. In 2022 a green-time GE90-115B was worth about $10 million. In 2025 it was $16.9 million. In March 2026 appraised full-life values were above $32 million; by September they exceeded **$35 million**, and a serviceable engine with 3,000 cycles remaining was expected to trade above **$25 million**. Cirium's half-life opinion in June was about $19.9 million. Long-term lease extensions, which were $170,000 to $185,000 a month in the spring, were being observed at **$250,000 to $300,000** a month by September. A performance restoration shop visit is commonly cited at $6 million to $9 million; the Jet Airways engineer's range for an engine out of long storage is $10 million to $15 million; one appraiser's account of a full overhaul excluding life-limited parts was around $22 million. The cost depends on what the inspection finds, and an engine that has been parked for years yields more findings.

The engines are worth more than the airframe they power

GE90-115B values against the 777-300ER airframe, US$ million, and what each earns on lease a month. Bars at the stated range midpoint

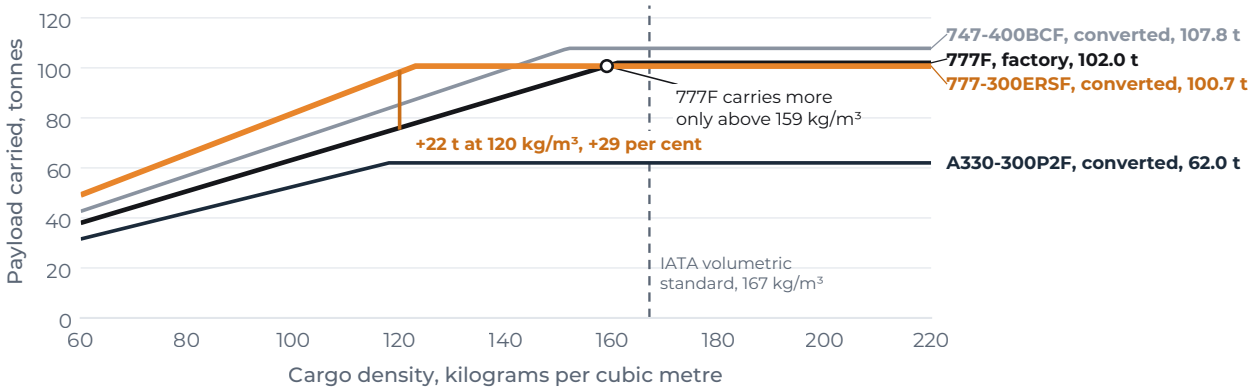


Airframe values include two engines at half-life. Lease bars are drawn at the midpoint of the published range, with the range shown.
Sources: appraiser data, November 2025 and 11 September 2026, as listed in the references; converted aircraft lease as reported for AerCap placements. Checked 18 October 2026.

Figure 10. GE90-115B values and lease rates against the airframe. GE90-115B values by condition against the half-life value of a 2010-vintage 777-300ER, which itself includes two engines at half-life, and the monthly lease of a converted aircraft against two engines leased separately. Sources: appraiser data, November 2025 and H2 2026 engine and lease rate update; converted aircraft lease as reported for AerCap placements.

On typical air cargo the converted 777 carries more than a new 777F

Tonnes loaded before weight or space runs out, by cargo density; unit load device volume basis



Sources: Atlas Air and Cargojet revenue payloads; Boeing 777 Airplane Characteristics for Airport Planning, Rev. G, and Cargojet volumes; compiled 4 September 2026. Boston Warwick calculation. Checked 18 October 2026.

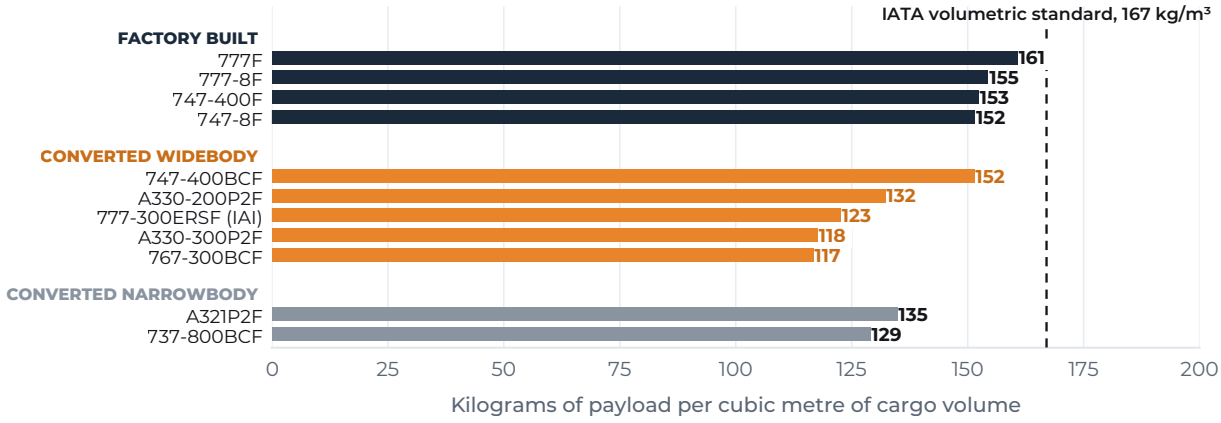
Figure 11. On typical air cargo, the conversion carries more than the new-build freighter. Tonnes loaded before the aircraft runs out of weight or space, by cargo density. Consistent unit load device basis throughout. On a gross-compartment basis applied to both aircraft the gap narrows to 17.5 per cent and the crossover moves to 141 kg/m³; the direction is unchanged. Sources as for Table 5; Boston Warwick calculation.

- The **777F cubes out at 76 tonnes**, leaving 26 tonnes of certified payload capability unused
- The **777-300ERSF carries 98 tonnes**, within two tonnes of its structural limit
- The converted aircraft carries **twenty-nine per cent more**
- The new-build freighter carries more only above **159 kg/m³**, and very little moves by air at that density

For that reason AerCap, which could have ordered any of the three new-build freighters, holds twenty firm and ten options on the 777-300ERSF instead. The converted aircraft is a better match to the cargo.

Every freighter in the fleet fills its space before it reaches its weight limit

Maximum payload divided by total cargo volume, by variant; none reaches the IATA standard



Volume basis varies by source; only the 777F and 777-300ERSF pair is verified to a common basis (Section 24).
Sources: Boeing, Airbus, EFW, Atlas Air, Cargolux and Cargojet specifications, compiled 4 Sep 2026 (document dates not recorded). Checked 18 Oct 2026.

Figure 12. Every freighter in the fleet cubes out before it weighs out. Maximum payload divided by total cargo volume, by variant. Not one type reaches the density at which the industry charges for space, and the 777F comes closest. Sources: Boeing and Airbus airport planning documents, EFW brochures and operator specifications; see the methodology note on measurement basis.

SECTION 22

The investment gauge

Boston Warwick's view on each asset this report has examined: the direction we expect its value to take over the next twelve months, what supports that view, what would change it, and how confident we are. The note below the gauge applies to every line.

Three words are used and they mean specific things. **Favourable** means that on the evidence in this report the asset is more likely to hold or gain value over twelve months than to lose it, and that the reasons are structural. **Neutral** means the supporting and opposing factors are balanced, or the price already reflects what this report has found. **Unfavourable** means the evidence points to lower value, or to a risk that the price does not reflect. Confidence is high where the view rests on published transactions and dated events, medium where it rests on an appraiser's opinion or on our own calculations, and low where it rests on a forecast.

TABLE 15. THE GAUGE, OCTOBER 2026

Converted 777-300ERSF, ready to fly, half-life FAVOURABLE TO 2027, NEUTRAL FROM 2028 · HIGH CONFIDENCE	**Twelve months:** Flat to slightly lower from $83.5 million over twelve months. **What drives it:** The only large freighter deliverable in 2027; 29 per cent more cargo than a 777F on typical express cargo; engine values. **What breaks it:** Thirty-five exemption 777Fs placed quickly; GE90-115B values falling; a lessee declining to renew in 2028.
GE90-115B engine FAVOURABLE · HIGH CONFIDENCE	**Twelve months:** Higher. **What drives it:** No production outside the exemption 777Fs; the passenger fleet retained; full-life above $35 million and rising; $250,000 to $300,000 a month on lease. **What breaks it:** 777-9 deliveries releasing passenger aircraft and their engines; an engine lease rate above about $375,000 a month, at which point the engines earn more off the aircraft than on it.
Passenger 777-300ER feedstock, mid-life NEUTRAL · MEDIUM-HIGH CONFIDENCE	**Twelve months:** Firm, at $47.6 million and above. The price already reflects the scarcity. **What drives it:** 777-9 delay; retrofit programmes; converters and passenger carriers bidding for the same aircraft. **What breaks it:** 777-9 certification on Boeing's own schedule, which would release aircraft in 2027 instead of the 2030s.

Full gauge for all fourteen assets in the report

The remaining eleven verdicts, each with its twelve-month view, what drives it, what breaks it and the confidence behind it, are in Section 22 of the full report.

Views are Boston Warwick's, formed on the published evidence cited in this report as at 20 October 2026, and will be revised when the events in Section 21 occur.

SECTION 23

The question that decides the next decade

One question lies beyond the published record, and it is the one a fleet planner most wants answered. This section explains why it is still open and what would answer it.

We have shown that a converted 777-300ER carries more typical air cargo than the new-build 777F, and that a widebody departure produces roughly eight times the output of a narrowbody one against costs that do not scale with it. Both can be calculated from published figures, and we have shown the calculations.

Cost per available tonne kilometre in operation is the next step, and it needs data held by operators. It requires block fuel by stage length, crew and maintenance cost per block hour, and landing and handling fees by station. None of it is published to a standard a paid report can cite. Where a manufacturer publishes a fuel figure it is a marketing comparison, and where an operator publishes one it is not comparable across types. Section 12 goes as far as the public record allows, which is fuel per tonne and per cubic metre on ICAO's consistent basis, and stops there.

It matters most for the comparison this report deliberately leaves open. After 2029, when the A350F is delivering and the 777-8F is arriving, the converted 777-300ER will compete against new aircraft for the first time. By then it no longer matters which aircraft carries more of a given cargo, because the new aircraft will carry more than either. What then counts is whether an $85 million converted aircraft with older engines costs less per tonne-kilometre over a twenty-year holding period than a new one at twice the price.

Nobody has published the answer, and the report's central claim is limited in time for that reason. The conversion has the market largely to itself until 2028, and shares it only with the thirty-five exemption 777Fs until 2029. After that the comparison is open, and the report says so.

Two smaller gaps are worth stating. First, the world convertible widebody census, by type, operator, age and announced life extension, is not published by anyone and is outside the scope of this report; the operator counts in Section 07 are at different dates, listed under Table 3, and should be refreshed against a paid fleet dataset before transactional use. Second, IAI publishes no numeric specification for the 777-300ERSF at all, so the payload and volume figures in Section 11 come from an operator. We have said so where they appear.

> **WHERE THE EVIDENCE FOR THE OPEN QUESTION SITS**
>
> Block fuel by stage length exists inside every operator's flight planning system and inside the manufacturers' performance databases. Maintenance cost per block hour exists inside the engine and airframe support agreements. Station costs exist inside handling contracts. None of it is public, all of it is knowable to a party with access, and assembling it for a specific network is the analysis that would answer the question. Boston Warwick is engaged to do that work.

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The full report

Why the Best New Freighter Is a Used One, October 2026, runs to 79 pages in 24 sections with 23 figures. It contains:

- what a converted 777 costs by the time it is ready to fly, by route, and the cost of waiting;
- why the GE90-115B engines set the value of the aircraft;
- converted and new-build freighters compared at the cargo densities the market actually flies;
- who can convert a 777, the slots, feedstock and order book, and who pays for and holds the residual;
- an outlook with dated events to watch, and recommendations;
- the investment gauge: Boston Warwick's view on all fourteen assets, with drivers, risks and confidence;
- a glossary, the methodology and the full bibliography.

Two editions are available: a single-user edition and a firm licence for one organisation.

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Aviation M&A and fleet strategy

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Figures as at 20 October 2026.