

APPENDIX II

Operations Cost Build Up

All costs are in 2022 USD.

Cost Item	KC-135R	A330	KC-46	KC-10	A340F	SAIL-43K Units	SAIL & KC-135 Calculation Basis	A330/KC-46/KC-10 Change	A340 Change vs A330
Capital costs									
Aircraft capital cost	845,009	1,370,985	1,592,794	1,247,443	1,697,110	1,119,198 per aircraft per month	Total aircraft cost of per AC Cost Sheet; 1.0% monthly lease factor	Diff AC cost; same lease factor	
Initial spares purchase	4,000,000	8,000,000	8,000,000	8,000,000	12,000,000	4,000,000 per aircraft	SAIL-01 number * 2 for two bases; balance sheet item only	SAIL * 2 given yet larger EW	Same as A330 for KC-46/KC-10; SAIL * 3 for A340
Spares carrying cost %	20%	20%	20%	20%	20%	20% % per year	Typical industry cost; both depreciation and replacement costs	No change required	
Inventory carrying cost	800,000	1,600,000	1,600,000	1,600,000	2,400,000	800,000 per aircraft per year	Annual Income Statement impact for spares		
Flight operations									
Crew	1,000	1,250	1,250	1,250	1,250	1,000 per block hour	9 crews/aircraft; narrowbody pay scale; crew util of 275 block hours/month; Includes travel and remote accommodation; Deleted payload operator	Times 125% for widebody scale	No change required
Initial crew training	800,000	800,000	800,000	800,000	800,000	800,000 per aircraft	Typical industry cost; upfront cost per aircraft; amortized over 10 years; recurring training cost in crew cost numbers	No change required	No change required
Navigation charges	400	400	400	400	400	400 per block hour	Typical industry cost	No change required	No change required
Maintenance									
Airframe (heavy)	42,986	69,444	55,556	69,444	78,125	42,986 per aircraft per month	3-year, 8-year, 10-year and 12-year checks for SAIL & KC 135	2 & 6 yr checks for 767; grossed up by 1.25% for others	777 numbers for A340
Engines	4,267	3,867	3,867	5,800	4,267	4,267 per aircraft cycle	Full restoration costs 4.0M; Mean time btw removals 6000 cycles; 4 engines; Plus \$400 per cycle for life limited parts	\$8M restoration costs; 6000 cycles btw removals; \$600 for LLPs; 2 or 3 engines	4 engines, but NB costs for restorations & LLPs
Landing gears	3,000	10,000	5,000	5,000	12,000	3,000 per aircraft per month	Typical narrowbody industry cost; 10-year overhaul interval	Widebody cost	Jumbo cost
Aux Power Unit	35	70	50	70	90	35 per block hour	Typical industry cost	Grossed up for size	Further increased
Line maintenance	300	450	450	450	450	300 per block hour	Average industry cost for narrowbody plus a premium for unique parts; modelled hourly despite some cyclic drivers	Grossed up for size	Further increased
Specialized Equipment	250	250	250	250	250	250 per block hour	Maintenance of specialized aerosol storage, combustion, and dispersal equipment	No change required	No change required
Ground Operations									
Landing fees	2,926	4,664	3,766	5,354	7,623	2,717 per cycle	\$0.01 per kg of MTOW** (typical industry cost) x 2 for specialized facilities	Same basis; larger plane	Same basis; larger plane
Ground handling	2,000	3,000	2,500	3,000	4,000	2,000 per cycle	Tow, pushback, etc.; premium atop typical narrowbody costs to reflect low utilization airports	Grossed up for size	Further increased
Cargo handling	0.05	0.05	0.05	0.05	0.05	0.05 per kg	Typical industry loading cost; applied to departures only (no offload on landing)	Same basis; larger plane	Same basis; larger plane
Insurance	35,209	57,124	66,366	51,977	70,713	46,633 per aircraft per month	0.5% of acquisition cost (typically 0.25%, added 0.25% for non-typical operation)	Same basis; larger plane	Same basis; larger plane
Fuel usage Arctic	18,607	31,464	21,500	33,157	29,600	32,076 lbs per sortie	Manual performance calculation		
Fuel usage Antarctic	18,607	31,464	21,500	33,157	29,600	32,076 lbs per sortie	Manual performance calculation		
Fuel usage ferry	108,397	122,659	79,869	154,458	104,361	82,450 lbs per sortie	Manual performance calculation		
Lbs per gallon	7	7	7	7	7	7			
Fuel price	2.50	2.50	2.50	2.50	2.50	2.50 per gallon	Projected long-term cost per gallon		
Overhead	250,000	250,000	250,000	250,000	250,000	250,000 per aircraft per month	Dispatch, crew scheduling, flight planning, Flight Ops and Tech Ops administration, other G&A		
Payload cost	0.35	0.35	0.35	0.35	0.35	0.35 per kg	Sourced from de Vries et al. 2020		

*OEW: Operating empty weight

** MTOW: Maximum take off weight

USGS: US Geological Survey