



F-HELIX

ELECTRIC
HELICOPTER

1/6 SEATS

2 BLADES

MTOW 1900 lb

CRUISE SPEED 86 Mph

TOTAL POWER 140 kw

from Pennstate University paper (Forum 75 Philadelphia - may 2019):

V CONCLUSION n. 8 :

"With the current state of the art of liquid batteries, mission performance is in line with, if not superior to, NASA's concept vehicles for VTOL air taxi operations ..."

THE REVOLUTIONARY ELECTRIC HELICOPTER 1 / 6 SEATS - 2 BLADES



Mr Vinati bought the SILVERCRAFT aeronautical factory in 1990 and resumed producing the helicopter SH4 Silvercraft a light helicopter 3 places and 2 blades with 1900 lb of Maximum Take Off Weight (type certificate by FAA -USA and RAI-ITA) : F-Helix is the natural evolution of Silvercraft SH4.

We signed a research agreement with the Penn State Vertical Lift Research Center of Excellence (www.vlrcoe.psu.edu) to validate the F-Helix concept and optimize the performance.

We address ourselves to those who already know helicopters.
We do not expect, therefore, that you will be surprised to learn that a helicopter can land in autorotation, that is unsurpassed for an infinity of tasks, and so on.
You already know these things better than we do.

But, you also know full well the problems for a helicopter:

- high initial cost
- poor controllability and
- excessive maintenance.

Vinati s.r.l. came up with the F-Helix concept with 6 main objectives in mind:

- 1) to create eVTOL that can autorotate
- 2) to abate the initial cost by simplifying assembly and number of parts
- 3) to improve the flight characteristics
- 4) to reduce maintenance cost
- 5) to reduce noise using blue edge-like blades
- 6) to create a green flight

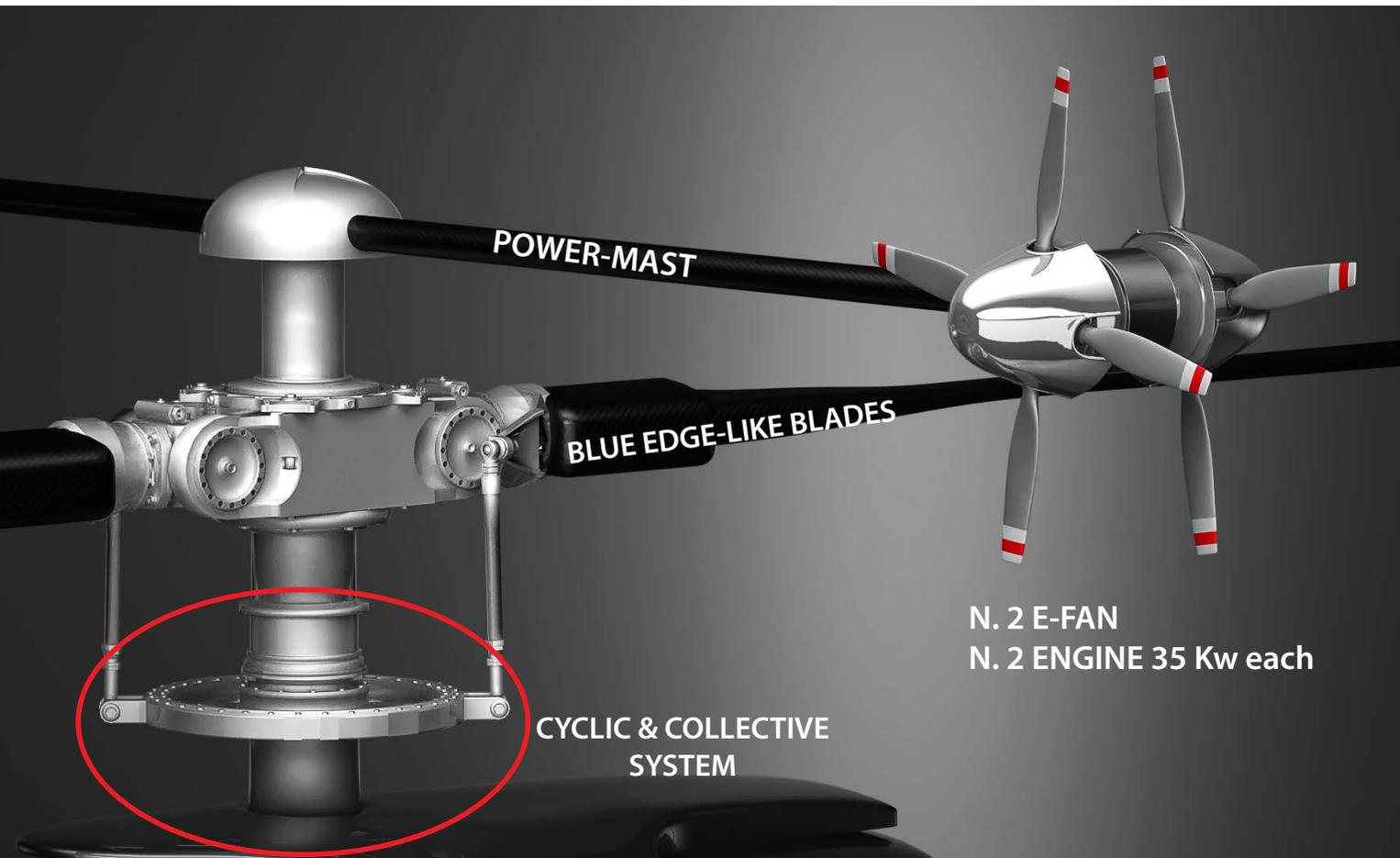
THE RESULT?

F-Helix a 1-6 seat two-bladed Fly-by-Wire electric helicopter with a maximum take-off weight of 1900 lbs with far fewer moving parts.



POWER MAST

THE REVOLUTIONARY POWER MAST WITH 2 SETS OF CO-AXIAL COUNTER-ROTATING PROPELLERS (4 eFANS)



Mounting the electric propellers directly on the main rotor leads to no torque exchange between main rotor and fuselage.

The Powermast makes useless:

- Fuel Engine
- Main rotor
- Tail rotor
- Tank
- Fuel
- Free wheel
- Tail beam
- Oil pump
- Oil tank
- Lubrication system
- Engine shroud

The Result:

- Green Flight
- Low Cost
- Low Noise
- Easy to pilot (Autopilot ready)

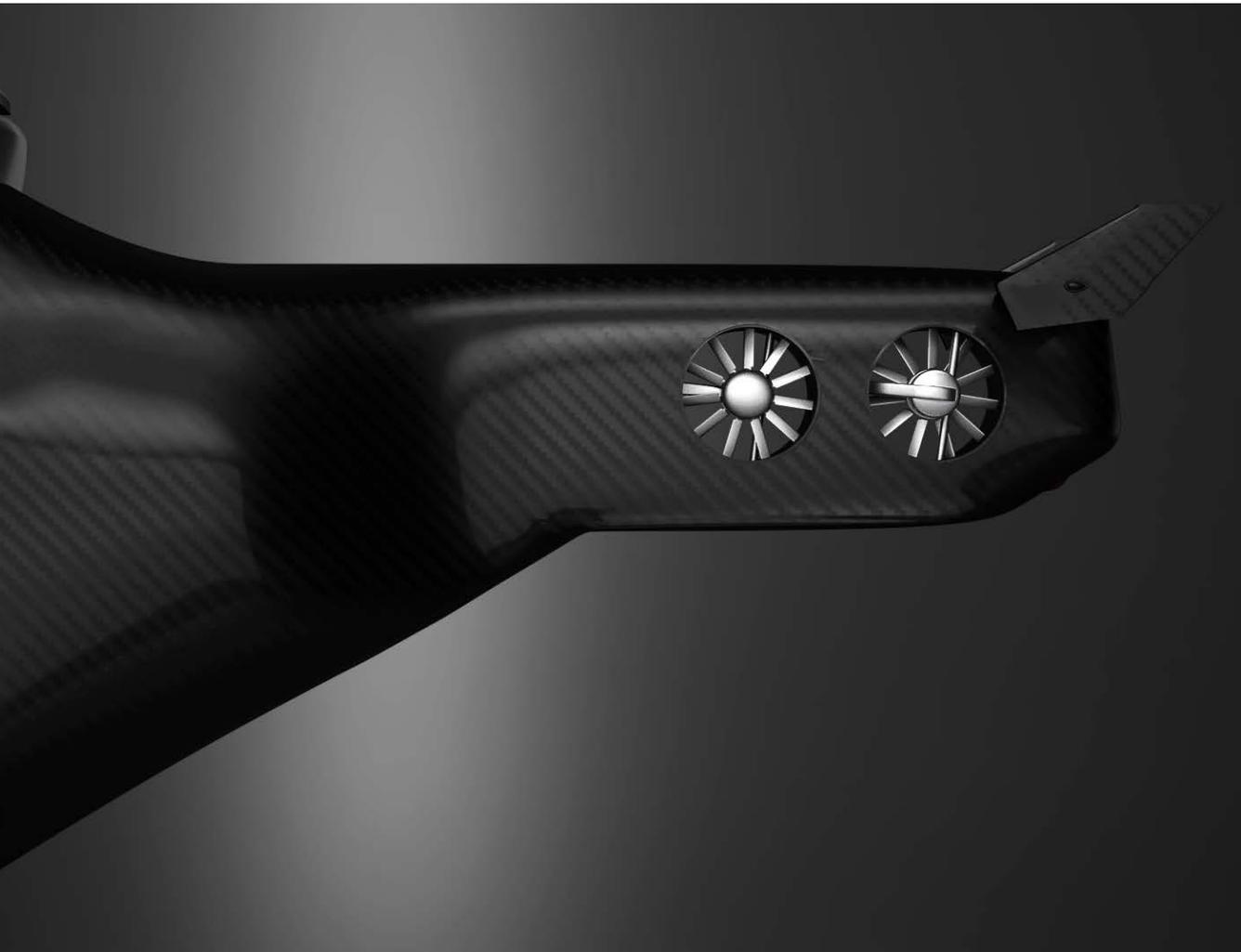
This allows us to save around 1000 lb that are allocated to the battery pack or to the payload.

This means more load capacity and longer flight duration in the near future



F-HELIX IS BASED ON AN EXISTING PLATFORM : THE SILVERCRAFT SH4 CERTIFIED by F.A.A (N° H2EU) in U.S.A. (N° IM 54) in FRANCE and R.A.I (N° A 145) in ITALY

THE 2 YAW eFANS



No torque exchanged between the main rotor and fuselage.

The two small electric ducted fans are used to provide control and directional stability around the yaw axis.

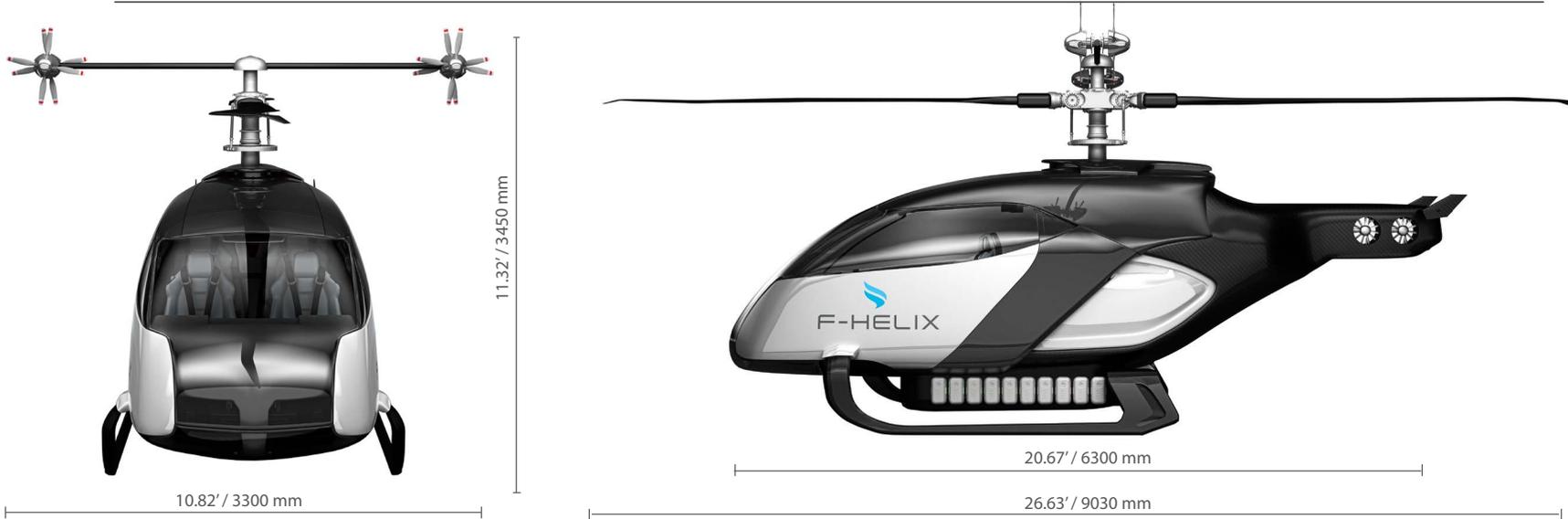


PennState

Vertical Lift Research Center of Excellence
<http://www.vlrcoc.psu.edu>

Download the Paper : <https://www.f-helix.com/forum>
Advanced Vertical Flight II
Technical Session C: Wed. May 15, 2019
Performance and Design Optimization
of the F-Helix eVTOL Concept (Paper 57)
Umberto Saetti,* Jacob Enciu, Joe Horn
Pennsylvania State University

TECHNICAL SPECIFICATION



Dimensions

Length	26,63 ft. / 9030 mm
Width	8,62 ft. / 3300 mm
Height	11,32 ft. / 3450 mm
Rotor Diameter	29.63' / 9.03 Mt
Rotor Disc Area	689 Sq.ft. / 64 Mq
Max Disc Loading	2.76 Lb/sq.ft. / 1.25kg/mq

Weight

Empty	550 lb / 249 Kg
Max Gross Weight	1900 lb / 862 Kg

Engine

Engine	N. 4 E-fan
Total Power E-fan	140 Kw
Max Thrust	1000 N / 212 Lbf
Yaw Fan (Directional Fan)	N. 2 Kw. 0,5+0,5

Performance

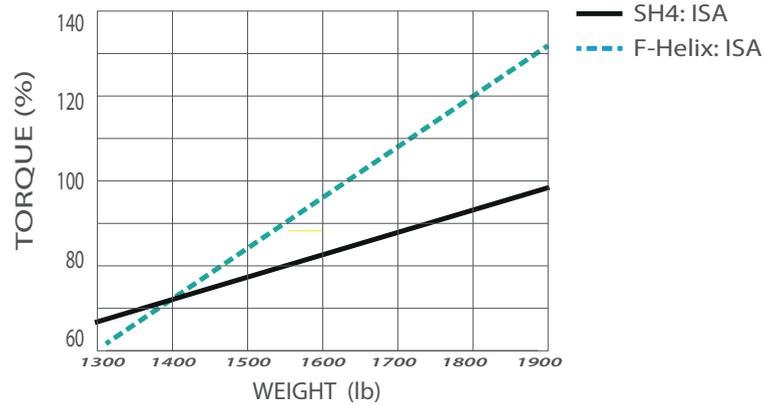
Max Speed At Sea Level	106 Mph / 170 Kmh
Cruising Speed	87 Mph / 140 Kmh
Economic Cruising Speed	80 Mph / 128 Kmh
Max Rate Of Climb At Sea Level	1.140 Fpm
service Ceiling	13115 Ft. / 4.000 Mt
Hovering Ceiling In Ground Effect	7850 Ft. / 2.392 Mt
Hovering Ceiling Out Of In Ground Effect	5550 Ft. / 1.691 Mt

Battery Pack Lithium Battery	1100 lb / 499 Kg
PAYLOAD with Lithium Battery	250 lb / 113 Kg
MAX ENDURANCE Lithium Battery	1 h 14 min
MAX RANGE Lithium Battery	107,3 Mi / 173 Km

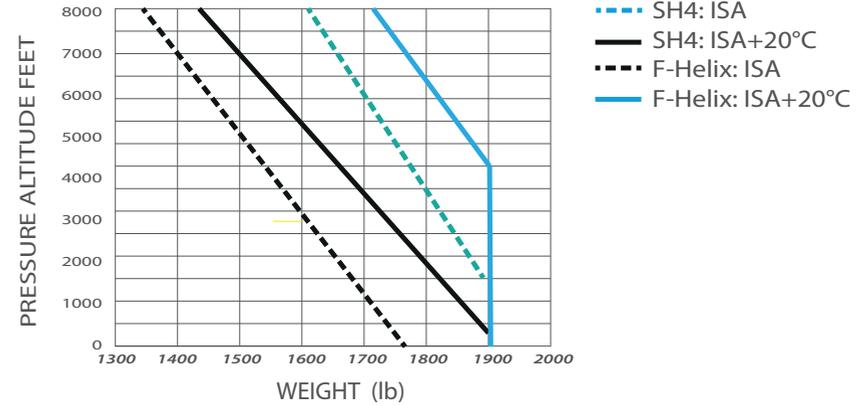
Battery Pack Solid State Battery	560 lb / 254 Kg
PAYLOAD with Solid State Battery	690lb / 313 Kg
MAX ENDURANCE Solid State Battery	1 h 36 min
MAX RANGE Solid State Battery	139,2 Mi / 224 Km

F-HELIX PERFORMANCES (download PennState University Paper : www.f-helix.com/forum)

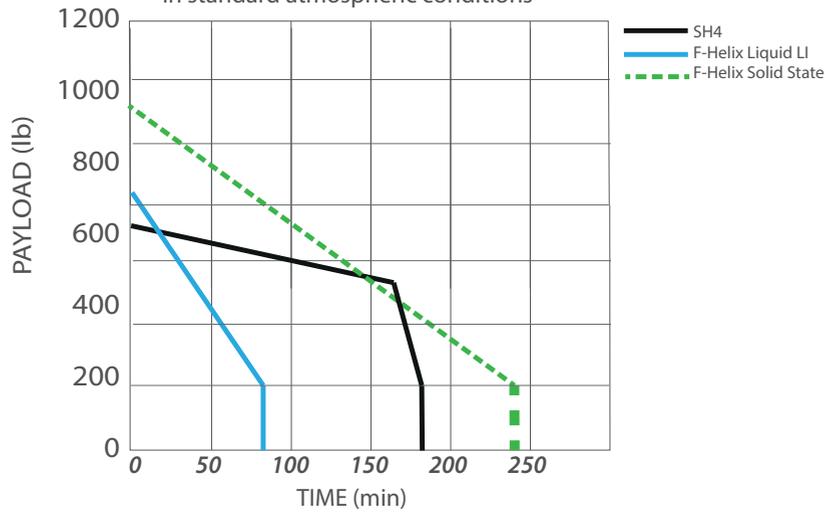
Torque required for hover OGE in standard atmospheric conditions



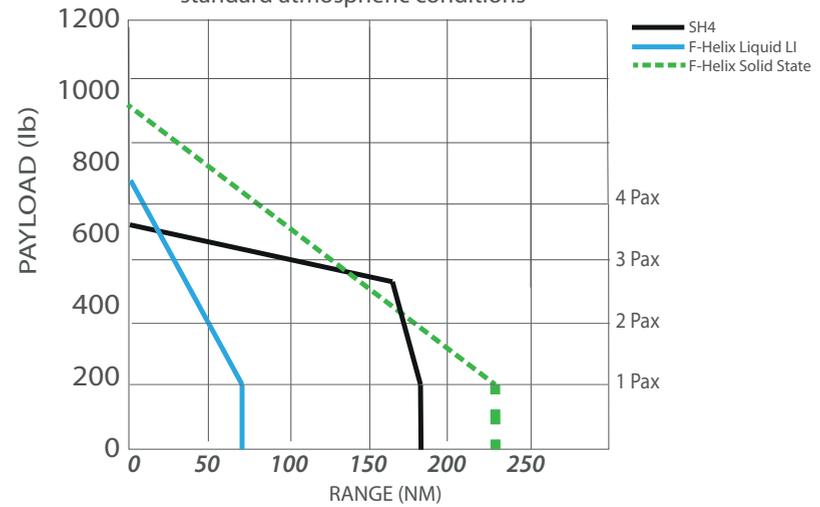
Maximum hover weight OGE for standard day and hot day atmospheric conditions



PAYLOAD/MISSION-TIME results for the typical mission in standard atmospheric conditions



PAYLOAD/RANGE analysis for the typical mission in standard atmospheric conditions



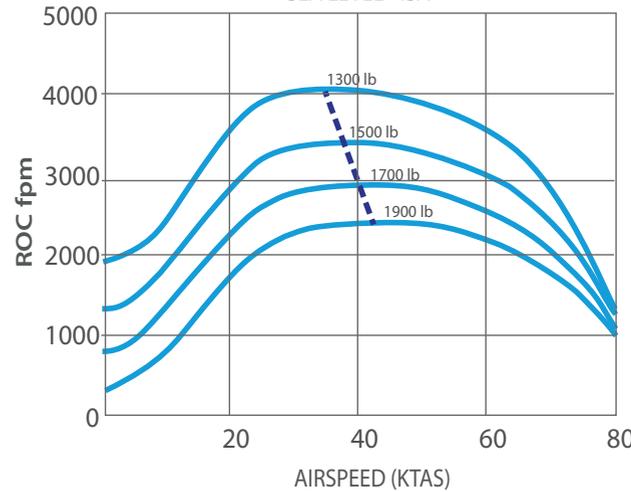
F-HELIX PERFORMANCES

F-Helix performance in hover

Parameter	Description	Value
P_{eFan}	eFan power required	80 shp
P_{req}	total power required	160 shp
T_{eFan}	eFan thrust	106 lb _f
η	eFan propulsive efficiency	83 %

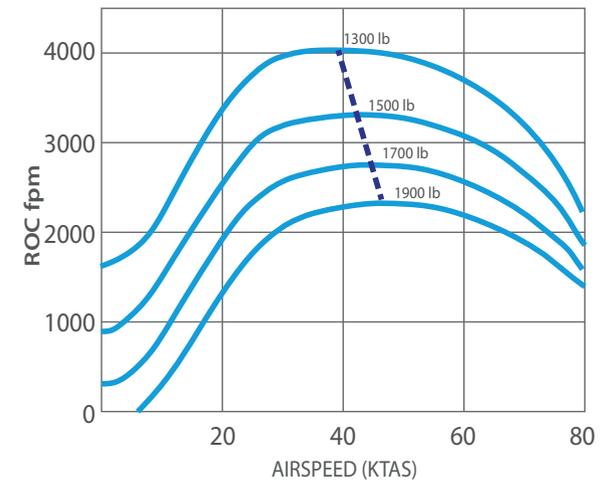
RATE OF CLIMB

SEA LEVEL - ISA

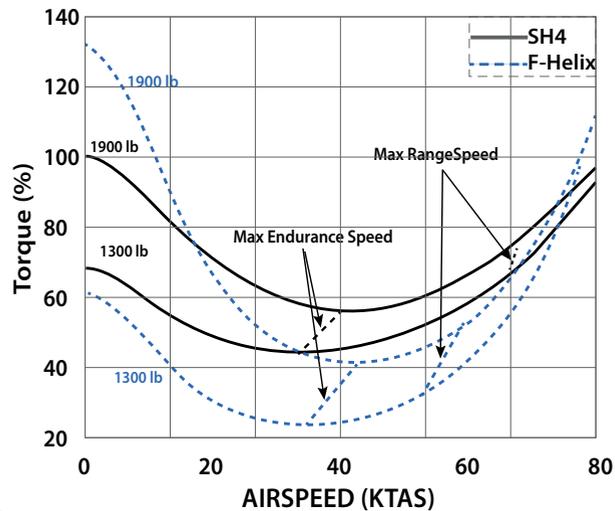


RATE OF CLIMB

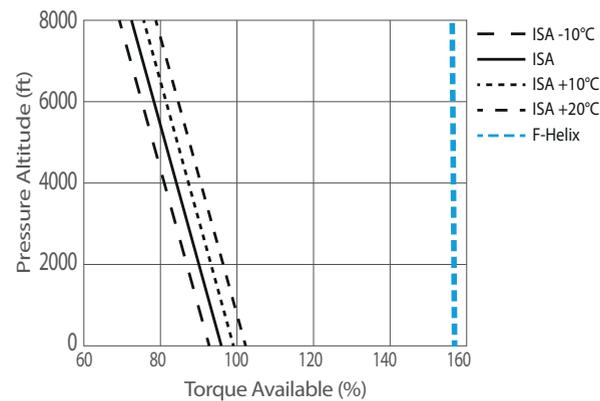
8000' - ISA



Torque available for various atmospheric conditions

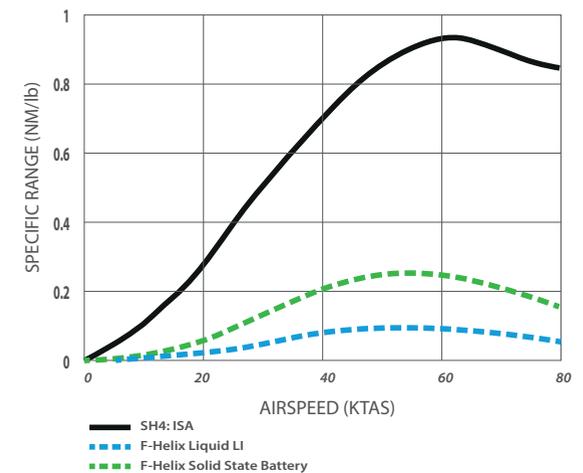


Torque available for various atmospheric conditions



Specific Range

in standard atmospheric conditions 1900 lbs



TYPICAL MISSION

(for Mission segments see Pennstate University paper p. 12) - * energy reserve 20 min.



Utility (no passengers) Lithium Solid State

Battery Pack max weight	1070 lb	1070 lb
Battery Kwh	121	315
Operative empty weight	650 lb	650 lb
Gross weight	1900 lb	1900 lb
Payload	180 lb	180 lb
Endurance min.	81	242
Range NM / Km	67 / 124	225 / 416

Utility (three passengers) Lithium Solid State

Battery Pack max weight	560 lb	560 lb
Battery Kwh	121	315
Operative empty weight	650 lb	650 lb
Gross weight	1900 lb	1900 lb
Payload	690 lb	690 lb
Endurance min.	42	110
Range NM / Km	35 / 65	91 / 168



Utility (one passenger) Lithium Solid State

Battery Pack max weight	900 lb	900 lb
Battery Kwh	102	265
Operative empty weight	650 lb	650 lb
Gross weight	1900 lb	1900 lb
Payload	350 lb	350 lb
Endurance min.	68	177
Range NM / Km	56 / 104	225 / 327

AMBULANCE Lithium Solid State

Battery Pack max weight	1003 lb	1003 lb
Litter installation	77 lb	77 lb
Patient (one)	170 lb	170 lb
Operative empty weight	650 lb	650 lb
Gross weight	1900 lb	1900 lb
Endurance min.	76	226
Range NM / Km	63 / 117	64 / 119



Utility (two passengers) Lithium Solid State

Battery Pack max weight	720 lb	720 lb
Battery Kwh	81	212
Operative empty weight	650 lb	650 lb
Gross weight	1900 lb	1900 lb
Payload	530 lb	530 lb
Endurance min.	54	142
Range NM / Km	45 / 83	117 / 217

EXTERNAL CARGO Lithium Solid State

Battery Pack max weight	540 lb	540 lb
Battery Kwh	61	159
Operative empty weight	650 lb	650 lb
Underslung load or spraying eq.		530 lb
Gross weight	1900 lb	1900 lb
Endurance min.	41	106
Range NM / Km	34 / 63	88 / 163



F-HELIX





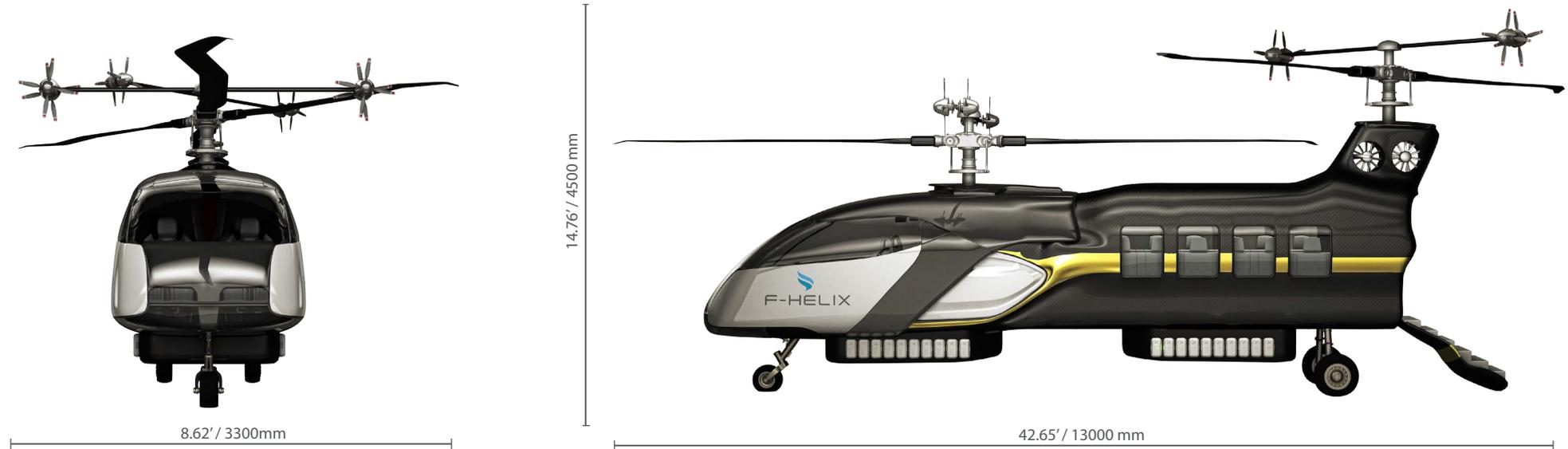








TECHNICAL SPECIFICATION - F-HELIX BUS



Dimensions

Length	42.65 ft. / 13000 mm
Width	8.62 ft. / 3300 mm
Height	14.76 ft. / 4500 mm
Rotor Diameter n. 2	29.63' / 9.03 Mt
Rotor Disc Area	1378 Sq.ft. / 128 Mq
Max Disc Loading	2.76 Lb/sq.ft. / 1.25kg/mq

Weight

Empty	1100 lb / 249 Kg
Max Gross Weight	1900 lb / 862 Kg

Engine

Engine	N. 8 E-fan
Total Power E-fan	300 Kw
Max Thrust	2000 N / 414 Lbf
Yaw Fan (Directional Fan)	N. 2 Kw. 1+1

Performance

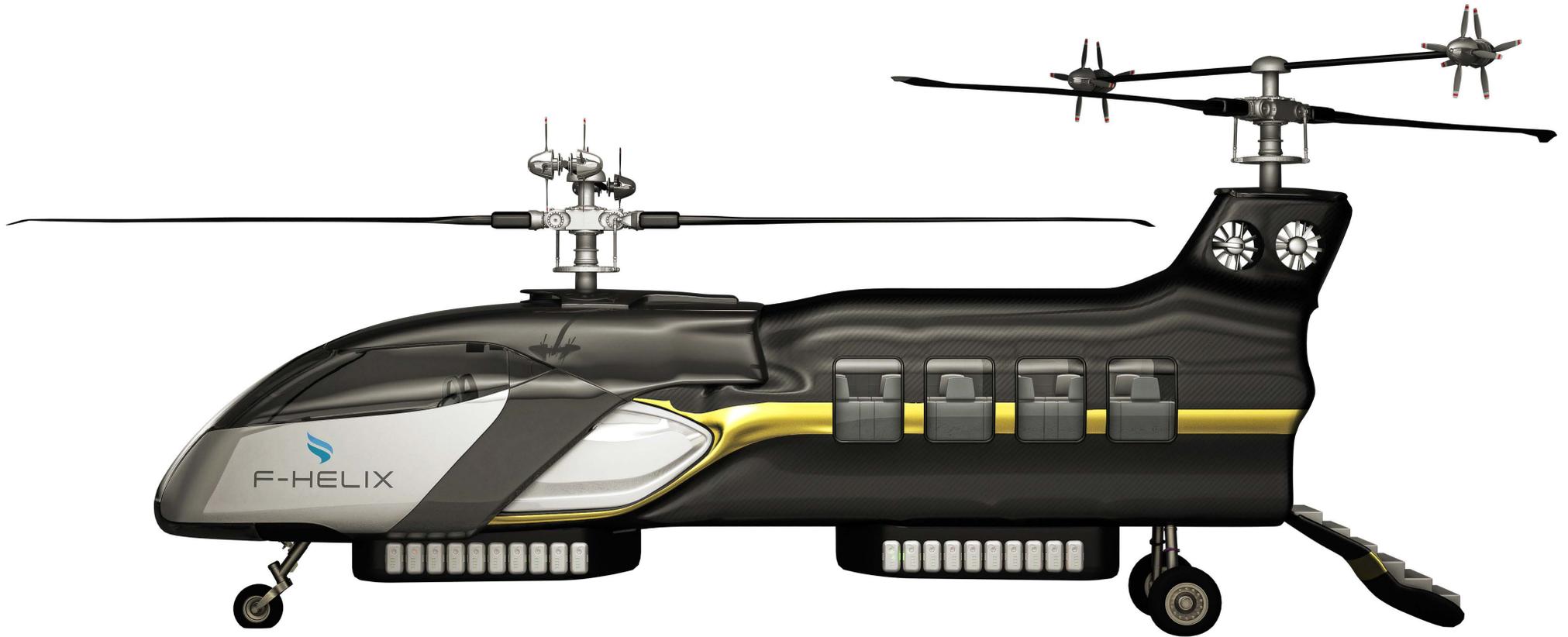
Max Speed At Sea Level	106 Mph / 170 Kmh
Cruising Speed	87 Mph / 140 Kmh
Economic Cruising Speed	80 Mph / 128 Kmh
Max Rate Of Climb At Sea Level	1.140 Fpm
Service Ceiling	13115 Ft. / 4.000 Mt
Hovering Ceiling In Ground Effect	7850 Ft. / 2.392 Mt
Hovering Ceiling Out Of In Ground Effect	5550 Ft. / 1.691 Mt

Battery Pack Lithium Battery	2200 lb / 1000Kg
PAYLOAD with Lithium Battery	500 lb / 226 Kg
MAX ENDURANCE Lithium Battery	1 h 14 min
MAX RANGE Lithium Battery	107,3 Mi / 173 Km

Battery Pack Solid State Battery	1120 lb / 508 Kg
PAYLOAD with Solid State Battery	1380 lb / 626 Kg
MAX ENDURANCE Solid State Battery	1 h 36 min
MAX RANGE Solid State Battery	139,2 Mi / 224 Km

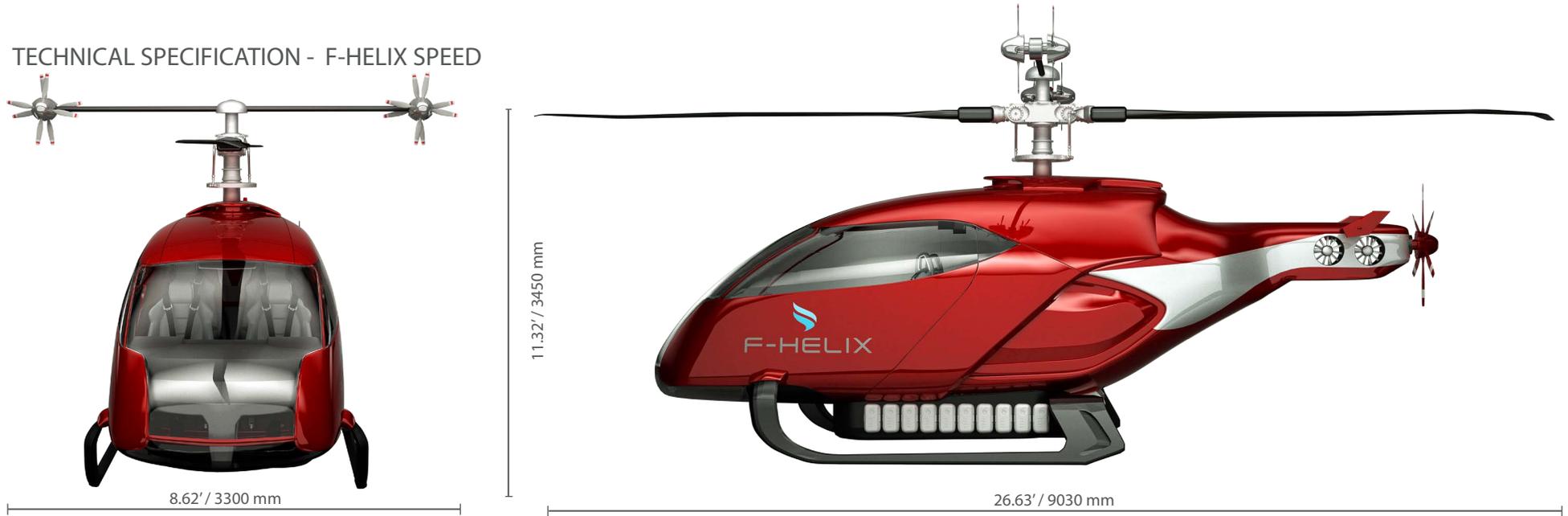
F-HELIX BUS







TECHNICAL SPECIFICATION - F-HELIX SPEED



Dimensions

Length	26,63 ft. / 9030 mm
Width	8,62 ft. / 3300 mm
Height	11,32 ft. / 3450 mm
Rotor Diameter	29.63' / 9.03 Mt
Rotor Disc Area	689 Sq.ft. / 64 Mq
Max Disc Loading	2.76 Lb/sq.ft. / 1.25kg/mq

Weight

Empty	700lb / 320Kg
Max Gross Weight	1.900 lb / 862 Kg

Engine

Engine	N. 4 E-fan+N.1 E-Fan
Total Power E-fan and Tail E-Fan	210 Kw
Max Thrust PowerMast	1000 N / 212 Lbf
Yaw Fan (Directional Fan)	N. 2 Kw. 0,5+0,5

Performance

Max Speed At Sea Level	160 Mph / 257 Kmh
Cruising Speed	140 Mph / 225 Kmh
Economic Cruising Speed	110 Mph / 177 Kmh
Max Rate Of Climb At Sea Level	1.140 Fpm
Service Ceiling	13.115 Ft. / 4.000 Mt
Hovering Ceiling In Ground Effect	7.850 Ft. / 2.392 Mt
Hovering Ceiling Out Of In Ground Effect	5.550 Ft. / 1.691 Mt

Battery Pack Lithium Battery	900 lb / 407 Kg
PAYLOAD with Lithium Battery	300 lb / 135 Kg
MAX ENDURANCE Lithium Battery	1 h 14 min
MAX RANGE Lithium Battery	107,3 Mi / 173 Km

Battery Pack Solid State Battery	800 lb / 362 Kg
PAYLOAD with Solid State Battery	400 lb / 180 Kg
MAX ENDURANCE Solid State Battery	2 h 51 min
MAX RANGE Solid State Battery	399 Mi / 642 Km

F-HELIX SPEED - 2 SEATS
















F-HELIX







F-HELIX



 **VINATI**
NAVE (BS) - ITALY

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