



A short Company & Technology Overview

***The Future of Rotary Wings Workshop
Centro Alti Studi della Difesa (CASD)
Rome, November 22nd, 2012***

An introduction to K4A

- K4A was founded in 2005 by Engineers and Businessmen with the ambitious goal of playing a significant role in the innovation of personal transportation by means of Light Piston Engine Rotorcrafts (2-4 seats).
- It is currently headquartered with production facilities in Naples, within an important district for aerospace engineering and production in Italy
- Although K4A was incorporated in 2005, its experience in designing and manufacturing light helicopters goes back to 1996 when the experimental model of the L221 helicopter was designed and manufactured with several major technical innovations and successfully completed the initial flight testing (100 hours)



The L221 Experimental Helicopter in flight

An introduction to K4A

- Since its foundation K4A has been aimed to creating a breakthrough in light helicopters technology, knowing in the same time that introducing strong innovations in today's aviation is a very hard task.
- The project has been involving Italian and European Universities, Research Centers, Industries and Agencies for 6 years up to now with a total investment of about 6 M Euro.
- K4A is now running the “build and fly” phase of the 2-seat helicopter project.
- The project has been recently founded by some Italian and international investors. International agreements are currently underway for the industrialization phase (Joint Ventures).



An introduction to K4A

Partners



(Italian Aerospace Research Center)



**POLITECNICO
DI MILANO**
**Dipartimento di
Ingegneria Aerospaziale**

(University of Milan - Aerospace Engineering Dept.)



Dipartimento di Meccanica e Aeronautica

(University of Rome - Mechanical and Aeronautical Dept.)



UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II



(University of Naples - Aerospace Engineering Dept.)

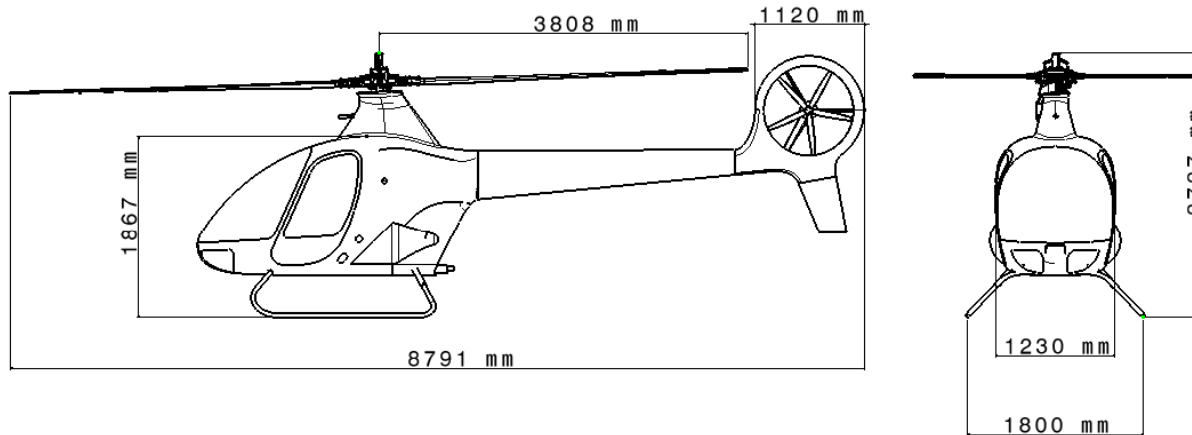




KA-2H (2 seats)

- KA-2H is a 2-seat helicopter.
- K4A is currently implementing the «Build and Fly» program, that will enable the first prototype of this model to fly by the end of 2013. Then the KA-2H will go through final Certification process
- It is equipped with two piston engines working in a parallel way, so that the failure of one engine is never a fatal failure.
- It will be the first light helicopter:
 - Provided with two piston engines working in a parallel way thereby will apply to certification to fly over built-up areas in Europe and other countries where strict regulations do not allow single engine light helicopters to fly.
 - Able to fly using automotive gasoline instead of the Avio gas, with lower consumptions and pollution.

KA-2H



Weights

Parameter	Unit	Value
Design Gross weight	[Kg]	650
Empty weight (estimated)	[Kg]	443
Max payload weight (estimated)	[Kg]	207
Fuel	[Kg]	53

Performances (estimated)

Parameter	Unit	Value
V_H	[kts]	95
Never Exceed Airspeed (VNE)	[kts]	105
Best Range Airspeed (BRA) @ S.L.	[kts]	68
Best Endurance Speed (BEA) @ S.L.	[kts]	44
Hovering Ceiling OGE	[ft]	5800
Hovering Ceiling IGE	[ft]	10200
Maximum Operating Altitude	[ft]	12000
Max Rate of Climb	[ft/min]	1600
Endurance @ BEA (5% fuel reserve)	[h]	4
Range @ BRA	[Nm]	330
Rate of Descend in Autorotation @ BEA	[ft/min]	1400
Temperature range	[°C]	-20 ÷ +50

Powerplant

2 x K4A V2400 –A2HT Four Cylinders

Derated a 104 kW at 1753 RPM

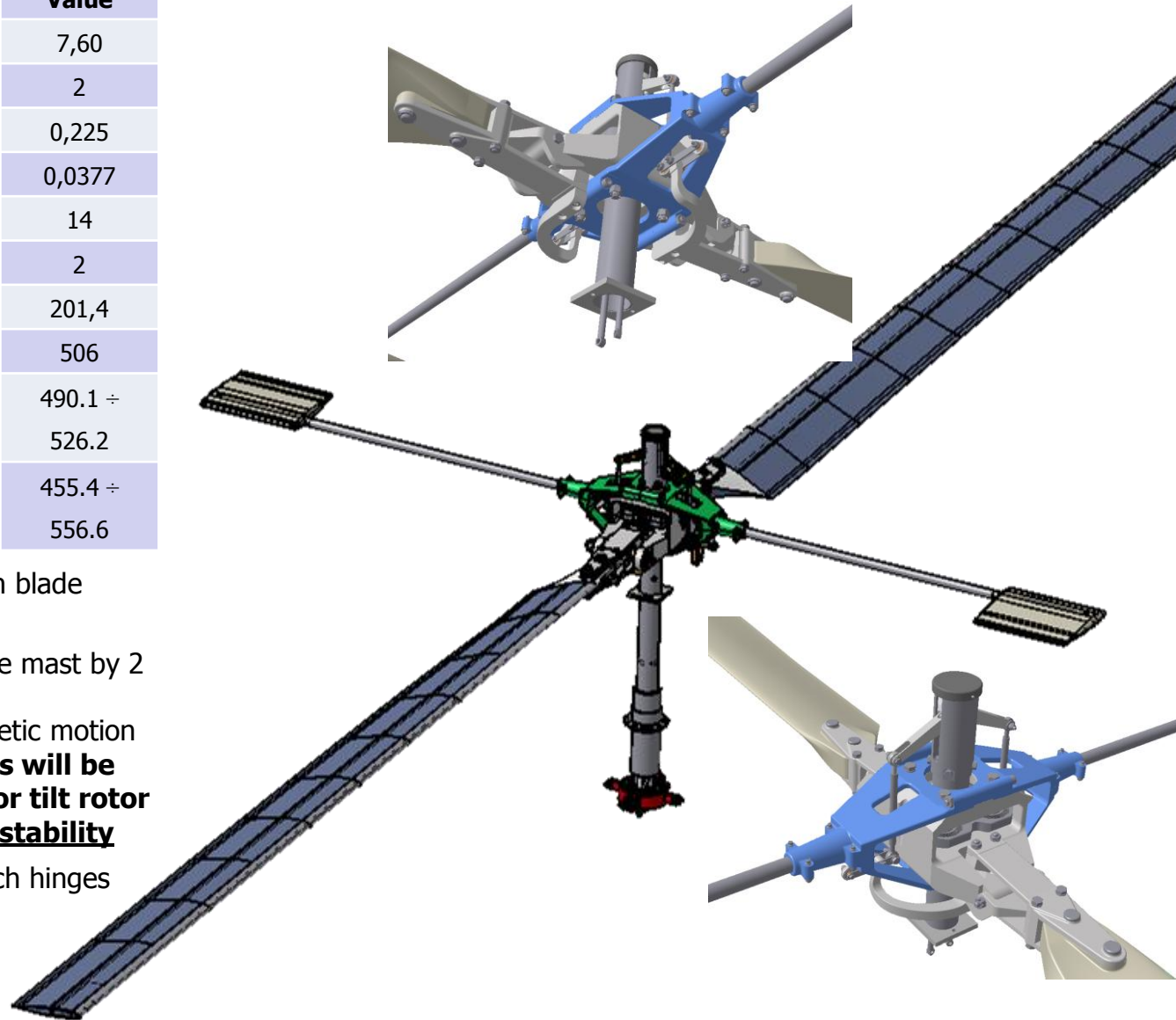
Fuel: Automotive MoGas min. MON 85 RON 95

MAIN ROTOR (patented homokinetic joint)

Main Rotor Features

Parameter	Unit	Value
Diameter	[m]	7,60
Number of Blades	-	2
Constant Chord	[m]	0,225
Solidity	-	0,0377
Blade Twist (unlinear)	[deg]	14
Shaft Tilt FWD	[deg]	2
Tip Speed	[m/s]	201,4
Shaft RPM (100%)	[rpm]	506
Power ON RPM Range (97% - 104%)	[rpm]	490.1 ÷ 526.2
Power OFF RPM Range (90% - 110%)	[rpm]	455.4 ÷ 556.6

- The main rotor is a gimballed twin blade type, rigid in plane with fly bar
- The rotor head is connected to the mast by 2 semi-spheric hinges and by other components that ensure homokinetic motion transmission: **this class of rotors will be useful in UAV platforms and for tilt rotor machines, due to its inherent stability**
- The blades grip are fitted to 2 Pitch hinges that allow the feathering motion

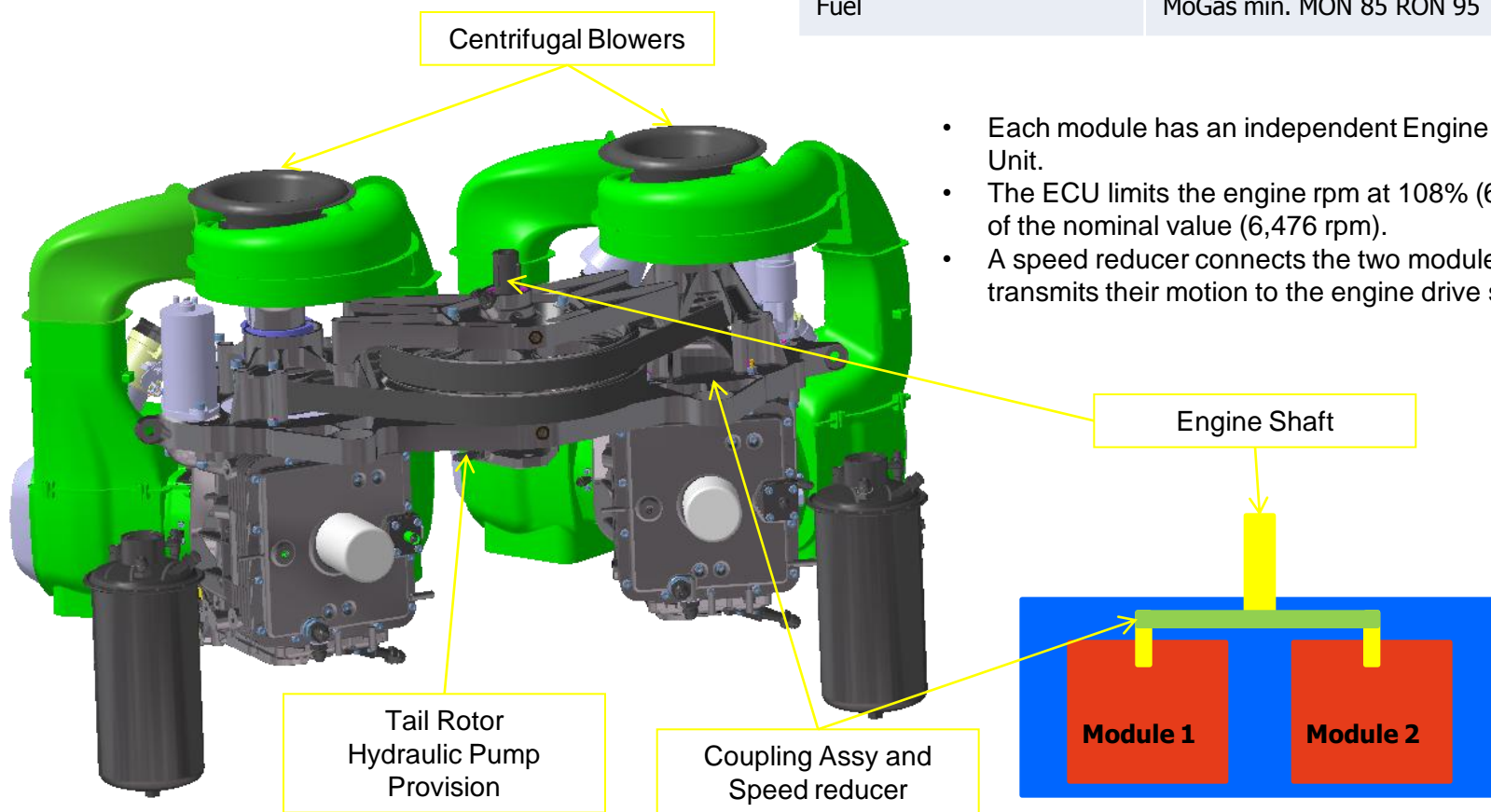


ENGINE

The engine (V2400-A2HT) is constituted by two modules each of which is:

- two cylinders reciprocating engine, horizontally 90° V
- four valves per cylinder
- air cooled by a centrifugal fan and oil cooled with an independent cooling pump
- one injector per cylinder
- single ignition.

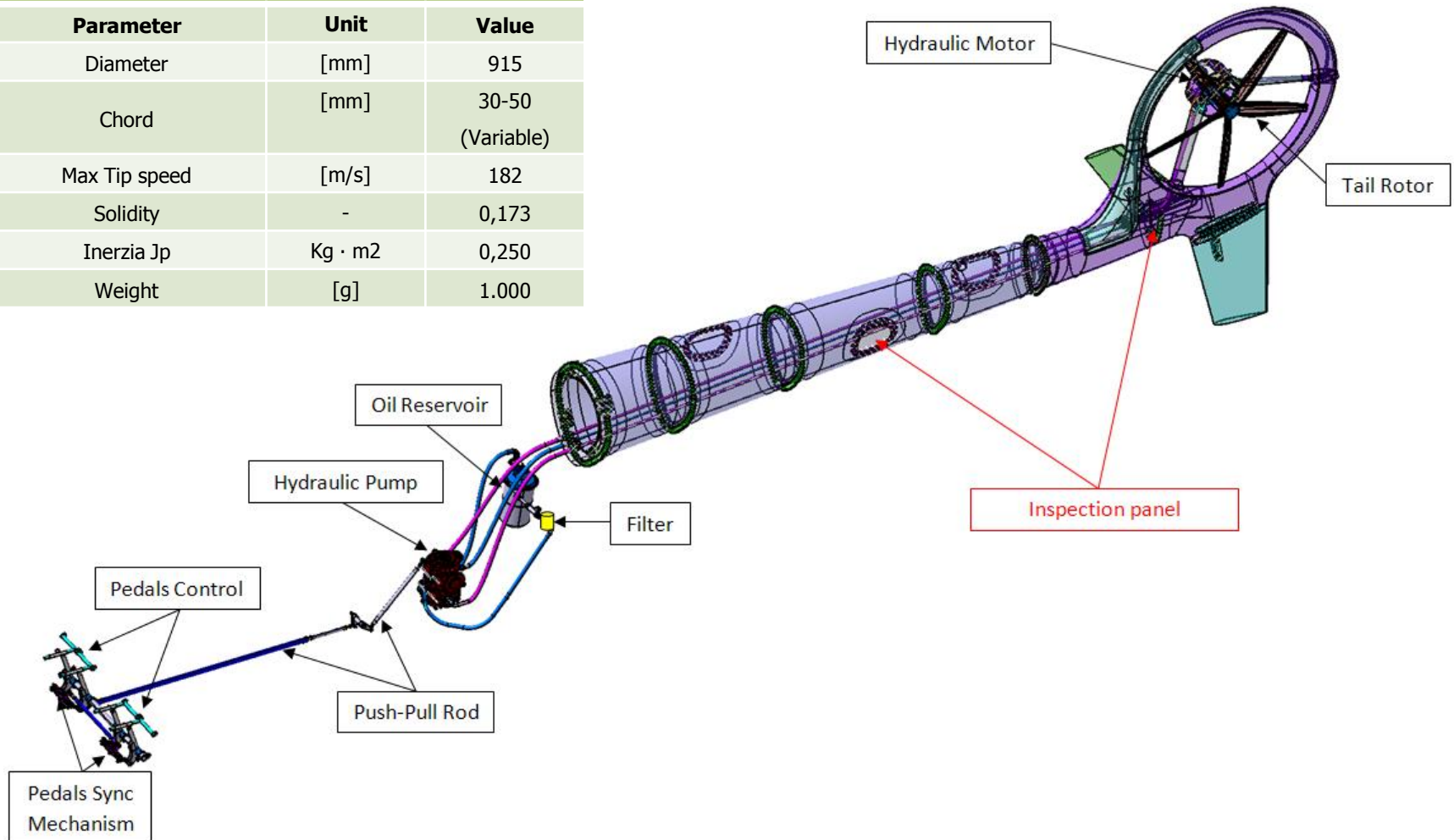
Engine Type	2 x 2 Piston 90° "V"
Displacement [cm ³]	2302
Power [kW]	104 at 1753 rpm (min 1685 rpm - max 1806rpm)
Torque [Nm]	591 at 1685 rpm – 556 at 1806 rpm
Fuel	MoGas min. MON 85 RON 95



- Each module has an independent Engine Control Unit.
- The ECU limits the engine rpm at 108% (6,994 rpm) of the nominal value (6,476 rpm).
- A speed reducer connects the two modules and transmits their motion to the engine drive shaft

HYDRAULIC TAIL ROTOR SYSTEM

Propeller Data		
Parameter	Unit	Value
Diameter	[mm]	915
Chord	[mm]	30-50 (Variable)
Max Tip speed	[m/s]	182
Solidity	-	0,173
Inerzia Jp	Kg · m2	0,250
Weight	[g]	1.000



The tail propeller is a five-blade, with fixed pitch, and is obtained with CNC milling by a single block of laminated maple wood. It is coated with carbon fiber, and has metallic protection on the leading edge and on the trailing edge. This system is backed with another one based on an electric motor not shown here



Contact Information

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