AMATHO (A.dditive MA.nufacturing T.iltrotor HO.using) is aimed to design, assess and manufacture a novel tiltrotor drive system housing exploiting the features of additive manufacturing techniques. Preliminarily, functional, structural and technological peculiarities of rotorcraft main gearbox housings are analysed and relevant requirements are issued. In the meantime, viable AM processes are reviewed, on the basis of specific suitability, technological potential and degree of maturity. In particular, powder feed direct energy deposition techniques (Direct Laser Deposition - DLD) and powder bed fusion techniques (Selective Laser Melting - SLM and Electron Beam Melting - EBM) are considered. The powder precursors are investigated as well, in terms of chemical nature (magnesium, aluminium, titanium alloy, stainless steel), particles granulometry and morphology. Static, fatigue, fracture mechanics, damage tolerance, corrosion endurance, chemical compatibility, machinability, weldability and heat-treatability testing are worked out and final trade-off process accomplished for choosing optimal materials and processes. Characterisation methodologies and NDI techniques are assessed as well. In
addition to test activity on dedicated specimens, smaller, but fully representative, full-scale gearbox housing components (to be considered as proof of concept) are manufactured through the traded-off technologies and tested to check the compliance with general functional aspects of r/c drive system housing. In parallel, design rules and methodologies for detail design, optimisation and structural substantiation of AM components are defined and supporting numerical tools are set-up. Full-scale housing is manufactured and structural and functional tests are performed to support flight clearance on the NextGenCTR Demonstrator and procedures (engineering cost and industrial capability assessment) for the start-up of high-volume production are defined.

Field of science

/natural sciences/chemical sciences/inorganic chemistry/inorganic compounds
/engineering and technology/mechanical engineering/manufacturing engineering/additive manufacturing
/natural sciences/physical sciences/theoretical physics/particles
/engineering and technology/mechanical engineering/vehicle engineering/aerospace engineering/aircraft/rotorcraft
/natural sciences/physical sciences/optics/laser physics

Programme(s)

Topic(s)

Call for proposal

H2020-CS2-CFP02-2015-01

Funding Scheme

CS2-IA - Innovation action

Coordinator

POLITECNICO DI MILANO

Activity type | EU contribution
--- | ---
Higher or Secondary | € 1 250 000
Education Establishments | 

Address

Piazza Leonardo Da Vinci 32
20133 Milano
Italy
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<th>EU Contribution</th>
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<td>SCUOLA UNIVERSITARIA PROFESSIONALE DELLA SVIZZERA ITALIANA</td>
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<td>Stabile Le Gerre 6928 Manno</td>
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<td>PRIMA INDUSTRIE SPA</td>
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<td>Strada Torino Pianezza 36 10093 Collegno</td>
<td>Private for-profit entities (excluding Higher or Secondary Education Establishments)</td>
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