Allegato A PROGETTO Scienza senza Frontiere – Brasile

Name of the doctoral program

Meccanica

Full degree ☒ **Cotutelle** ☒

Title of the research activity

Gearbox acoustic emission and diagnostics of low noise emission vehicles

Short description of the research activity

This research activity concerns the acoustic requirements of new generation gearboxes to be fitted in electrical mobility systems, such as for public and private transports.

The experience on gearbox fault detection and noise emission of Prof Fasana research Group has been acquired during the GREAT 2020 project on aeronautical gearbox faults detection and prognostics, and is still under development thanks to the project on gearbox noise emission which started early 2012 in the framework of Regional Fund for industrial Development (collaboration with ARVIN-Meritor); other important projects have taken place with leader partners such as Oerlikon Graziano and Carraro.

Although the problem for aeronautical applications is closely related with early diagnostics of faults and prognostics on gears and bearings, mainly adopting statistical tools, orthogonal decomposition, new signal processing techniques such as Empirical Mode Decomposition and Support Vector Machines, similar algorithms can be fruitfully adopted to isolate gears noise and emission variation along the time.

Some extra tools such as the Blind Source Separation and Path recognition have to be adopted to minimize the noise emission as requested for very electrical powered vehicles.

Planning of the research

a) Study and development of new algorithms to numerically computed noise emission starting from Transmission Error (analysis of dedicated algorithms).
b) Set-up of a double rig for vibroacoustic acquisition on specific gearboxes and planetary gears
c) Correlation of numerical data and measured noise
d) Improvements of the confidence levels and analysis of faulted / scuffed gears
   - Prognostics of durability and noise trend as a function of gearbox life

Scientific responsible (name, surname, role)

Professor Alessandro Fasana

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Number of vacancies for XXVIII cycle (begin January 2013)

2 (two)

Specific requirements (experiences, skills)

Dynamics, acoustic, Finite element models, data acquisition and experimental devices skill, Matlab; It is welcome some experience on codes such as Helical3D,LDP or Calyx for error transmission modeling

Website of the research group (if any)

http://www.dimec.polito.it/en/personale/scheda/%28nominativo%29/alessandro.fasana