ALL. B

SCHEDA PER LA RELAZIONE ANNUALE DEL DOTTORANDO CICLO Anno

- Nome e Cognome ABBAS RAZAVYKIA
- Dottorato in **INGEGNERIA MECCANICA**
- Ciclo 31 Anno di Corso II
- Dipartimento di afferenza DIMEAS Department of Mechanical and Aerospace Engineering
- Coordinatore **Prof. Luigi GARIBALDI**
- Tutore **Prof. CRISTIANA DELPRETE**
- Area Culturale di Interesse (in Italiano e Inglese)

  Analytical Modeling of Piston Ring Assembly Friction

- Breve descrizione dell'argomento della tesi o dell'Area Culturale di Interesse (massimo 20 righe, in Italiano e Inglese)

  Piston ring-pack assembly accounts for one of the major sources of friction losses in internal combustion engines. The regime of lubrication varies during the piston cycle because of the transient nature of applied load and kinematic contact conditions; ring geometry, surface topography, and lubricant rheology also play an important role. One method to increase the efficiency and reduce the emissions of an internal combustion engine is to reduce the mechanical friction power loss on lubricated surfaces of the engine. For the achievement of these goals, the instantaneous investigation of lubrication characteristics and the various improvements are indispensable. From literature studies it is found that friction between piston and cylinder falls mainly in two different regimes: mixed or boundary lubrication and hydrodynamic lubrication. The main purpose of the PhD research work is to develop analytical and numerical reliable engine friction models that could be used in transient engine simulation to predict actual engine output in terms of friction losses. The analytical model currently under development is based on lubrication theory using Reynolds equation to evaluate lubrication mechanism, oil film thickness and friction losses. Based on the fact that the piston assembly friction models are sensitive to selected boundary condition, different boundary conditions will be examined to obtain reliable approach to predict piston assembly lubrication. The model will be validated by experimental results; once the reliability will be examined, DOE and ANOVA analysis will apply to optimize the influential parameters.

- Attività di formazione svolta nell'anno (corsi, seminari, etc.); per ogni attività specificare natura, durata e sede

Course Title	CFU	Skill Type	Duration (hrs)	Location
Communication	1	Soft	5	Scudo
Communication II	2	Soft	12	Scudo
Introduction to Thin Film Lubrication: Models and Examples	3	Hard	15	DIMEAS
Joining and Integration Issues of Advanced Materials	2	Hard	10	DISAT
Powertrain components design	10	Hard	50	DIMEAS
Project management	1	Soft	5	Online
Public speaking	1	Soft	5	Online
Research advances in fastening and joining material	4	Hard	20	DIMEAS
Wear of materials	4	Hard	20	DISAT

- Eventuale partecipazione del Dottorando ad ulteriori attività di ricerca nell'anno (progetti e convenzioni di ricerca)

  1. AIAS summer school- Design of Mechanical Components Using Additive Manufacturing, 12-15 JUNE 2017, Ferrara, Italy,

2. Second Edition of AIT's Summer School: Surface engineering, lubrication models, nanotribology, novel materials, August 28th to Fri September 1st, 2017, Salerno, Italy.

- Eventuale partecipazione del Dottorando ad Attività interne di supporto alla didattica nell'anno (specificare su quali corsi, e se eventualmente il Dottorando sia stato nominato Cultore della Materia)

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- Eventuali soggiorni presso altri Centri di Ricerca nell'anno

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- Eventuali collaborazioni con imprese nell'anno

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- Elenco delle Pubblicazioni del Dottorando

Journal Paper:

1. Delprete, C., & Razavykia, A.* (2017). Piston ring–liner lubrication and tribological performance evaluation: A review. Proceedings of the Institution of Mechanical Engineers, Part J: Journal of Engineering Tribology. (Quartile 2, I.F. 1.32)

Conference Paper:

1. Delprete, C., & Razavykia, A.* (2017). Modeling of Oil Film Thickness in Piston Ring/Liner Interface. International Journal of Mechanical Engineering and Robotics Research, 6(3), 210-214. (Paris, France)

2. Iranmanesh, S., Esmaeilzadeh, A., & Razavykia, A.* (2017, April). Optimization of Electrical Discharge Machining Parameters of Co-Cr-Mo Using Central Composite Design. In International Conference on Sustainable Design and Manufacturing, Springer. (Italy, Bologna)

3. Razavykia, A.*, Esmaeilzadeh, A., & Iranmanesh, S. (2017). The Effect of Tool Path Strategy on Surface and Dimension in High Speed Milling. World Academy of Science, Engineering and Technology, International Journal of Mechanical, Aerospace, Industrial, Mechatronic and Manufacturing Engineering, 11(9), 1475-1479. (Czech Republic, Prague)

Torino,

Cristiana Delprete
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Firma del Tutore

Abbas Razavykia
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Firma del Dottorando

Il Coordinatore

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