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UNIVERSITÀ
DEGLI STUDI
DI PADOVA

DIPARTIMENTO DI INGEGNERIA INDUSTRIALE

Seminario

Venerdì 20 dicembre ore 8.30

Aula RH02 "De Ponte", Sede M

Design, monitoring and predictive maintenance of heat exchanger networks in the Industry 4.0 era

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Abstract

Traditional heat exchanger design and monitoring methodologies rely on the use of fixed fouling factors to account for the reduced thermal performance of heat exchangers operating in non-clean services. This practice has been criticised in the past as it does not account for the dependency of the underlying fouling mechanisms on process conditions and time, often leading to oversized equipment which exacerbate fouling. Neglecting fouling dynamics and its dependence on process conditions at the design stage has also been identified as the cause of major failures. In recognition of these limitations, much research effort has been put in recent years to improve the fundamental understanding of the various fouling mechanisms and industry has started shifting to a different paradigm which involves the use of system-specific models to account for the fouling dynamics. This lecture will point out severe limitations and consequences of using the fouling factor approach and will propose novel methodologies for improved design and predictive maintenance of heat exchangers and their networks. These methods leverage the combination of big data, advanced analytics and multi-scale modelling to improve design, optimise operations, maximise production and minimise maintenance, resulting in significant economic and environmental benefits.

Bio

Dr. Francesco Coletti is the co-founder and CEO of Hexxcell Ltd, a high-tech Imperial College London spin-out company serving, amongst others, five of the top ten oil&gas companies. He is also an Associate Professor at Brunel University London where he contributed to the setup of a new Chemical Engineering Department and previously worked as a Development Specialist in the Cryogenic Systems R&D group at Praxair Inc., in Buffalo, NY.

He has published over 70 journal articles and refereed conference proceedings, co-edited a monograph dedicated to Crude Oil Fouling and since 2013 he is the Executive Editor of Heat Exchanger Design Handbook.

He is one of two elected representative for the UK serving on the Scientific Committee of the International Heat Transfer Conferences, the top global conference in the field held every 4 years. Francesco is also the Secretary of the UK National Heat Transfer Committee and a Director of the Fuels&Petrochemical Division of the American Institution of Chemical Engineers (AIChE). He holds a Laurea degree in Chemical Engineering from Padova University, Italy; an MSc in Process Systems Engineering and a PhD in Chemical Engineering from Imperial College London, UK.