Marcello Colledani was born in Milan in 05/05/1978. He started the Mechanical Engineering studies in 1997 in Politecnico di Milano. In 2001-2002 he studied at Universidad Politecnica de Catalunia in Barcelona, within the Erasmus program. He graduated in Mechanical Engineering in 2003. In 2007 he received his Phd cum laude from Politecnico di Milano, presenting a thesis titled "Integrated Analysis of Production Logistics and Quality Performance in Manufacturing Systems". Since 2006 he has a permanent position as Assistant Professor in the Mechanical Engineering Department. In 2008-2009 he spent one year as a visiting scientist at the Laboratory for Manufacturing and Productivity of the Massachusetts Institute of Technology, MIT, US, collaborating with Prof. Stanley Gershwin.

His research activities are related to three areas: (I) Modelling, performance evaluation, design and reconfiguration of complex manufacturing systems; (II) Integrated analysis of quality and production logistics performance of manufacturing systems; (III) Modelling and design of material separation technologies and systems for recycling.

In area (I), he develops decomposition-based analytical methods for evaluating the performance of complex production systems such as multiproduct, merge / split and assembly / disassembly systems, and systems with stages involving parallel machines and operations. Performance measures such as average throughput, work in progress, system flow time, and blocking and starvation probabilities, can be predicted by these methods. The main advantages of these approaches are the high computational speed and high accuracy if compared to alternative techniques such as discrete event simulation. These techniques have been used to analyze, design and improve real production systems in the automotive, white goods, mechanical components and medical technology industries.

In area (II), the mutual relation between production logistics and quality performance is investigated at manufacturing system level. This research aims at integrating two areas that are typically considered in isolation, by providing highly integrated production models and analysis methods to identify improved system configurations that suitably exploit the quality/quantity trade-offs. In this area, the joint determination of quality and production control parameters has been proposed in order to meet a reference output target, synthetized in terms of desired production rate of conforming products. It was shown that configurations obtained without considering the mutual quality/productivity relations are sub-optimal, thus great benefits for companies can derive from this quality/productivity theory at system level.

In area (III), the objective is to develop system engineering methods to support the design of material separation systems for recycling. In recent years, interest in material recycling has surged due to both fluctuating material prices and international laws introduced to improve the reuse, recycling and recovery of end-of-life product wastes. High value multi-component wastes, such as WEEE - Waste Electric and Electronic Equipment -, car scraps, and municipal wastes require processing by complex multi-stage separation systems to maximize output material value. The design of these systems is a critical task due to the high volatility of the price of recovered products and the variability in the input material composition and quantities. The developed approach integrates process models, including shredding and separation stages, and multi-stage material flow models to enable setting the parameters of the machines as well as regulating the material flow dynamics in the system in order to meet specified recovery/grade requirements.