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DI PERUGIA

UNIVERSITY OF PERUGIA

Ing/Ind 17  
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XVI Summer School  
Francesco Turco



XVI Summer School "Francesco Turco" Impianti Industriali Meccanici  
Abano Terme (Padova, Italy) - 14-16 September 2011



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Where we are



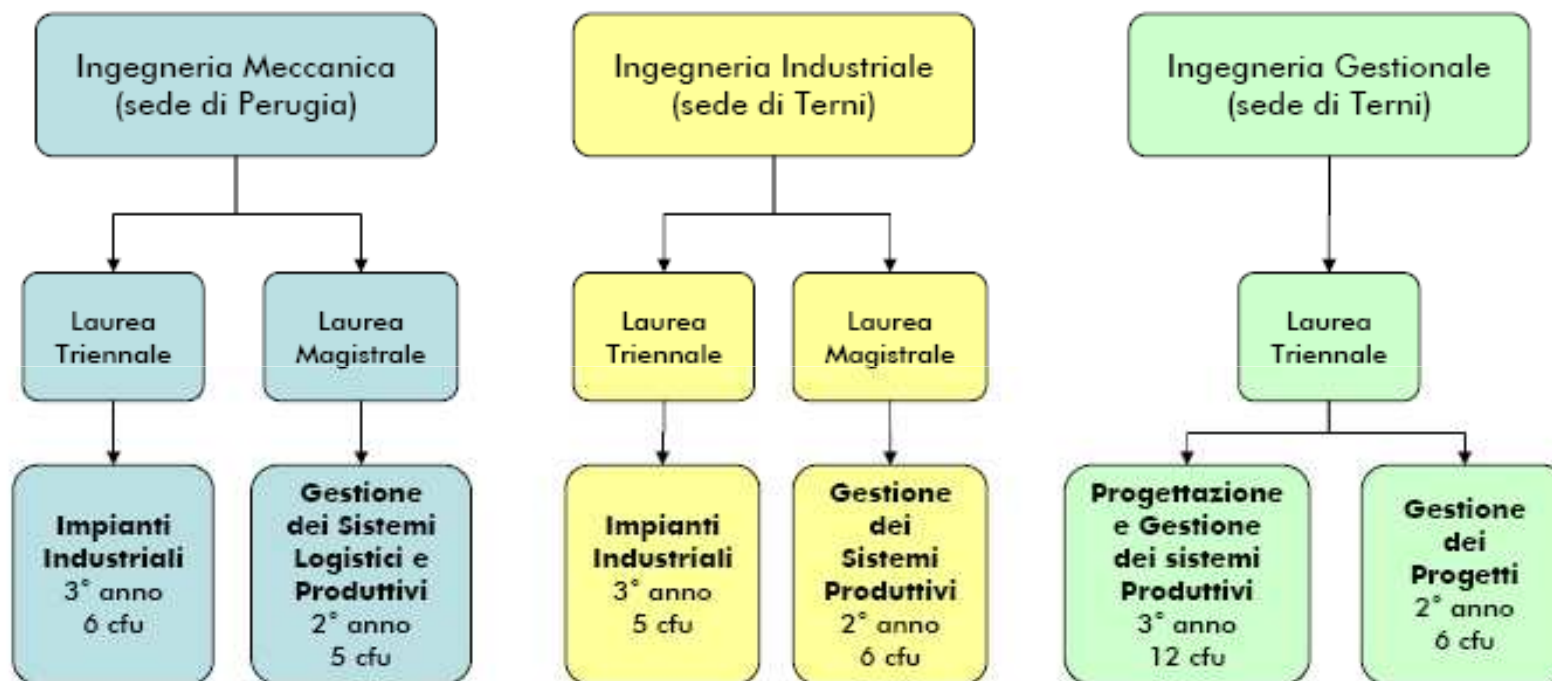
"Umbria" region



Sede di Perugia



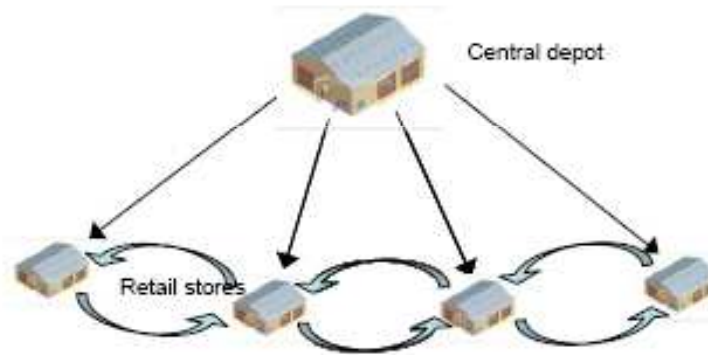
Sede di Terni





## Lateral transshipments heuristics

By lateral transshipment units can be moved from one location with excess inventory to another location, at the same echelon, in shortage, with the aim of pooling inventory, reducing lost sales and the connected stock out costs.

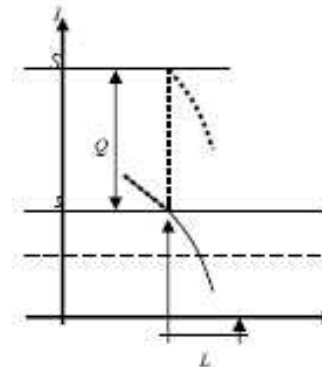


Transshipment policy: when and how much to transship?

At the end of each day, after each retailer having placed, if necessary, an order to the central depot, decisions on transshipments are taken on the basis of:

- + The benefit (in terms of expected stockout costs reduction) at the receiving retailer
- The cost (in terms of expected stockout cost increment) at the shipping retailer
- The transportation costs

- **Preventive Transshipment**
  - shipments can be used to balance the inventory level of different locations at the same echelon before that a shortage happens
  - it reduces the risk of future stockout
- **Emergency Transshipment**
  - shipments between locations occur only when a shortage happens
  - shipments are usually assumed to be fast enough to satisfy the location in shortage
  - it responds to stockout



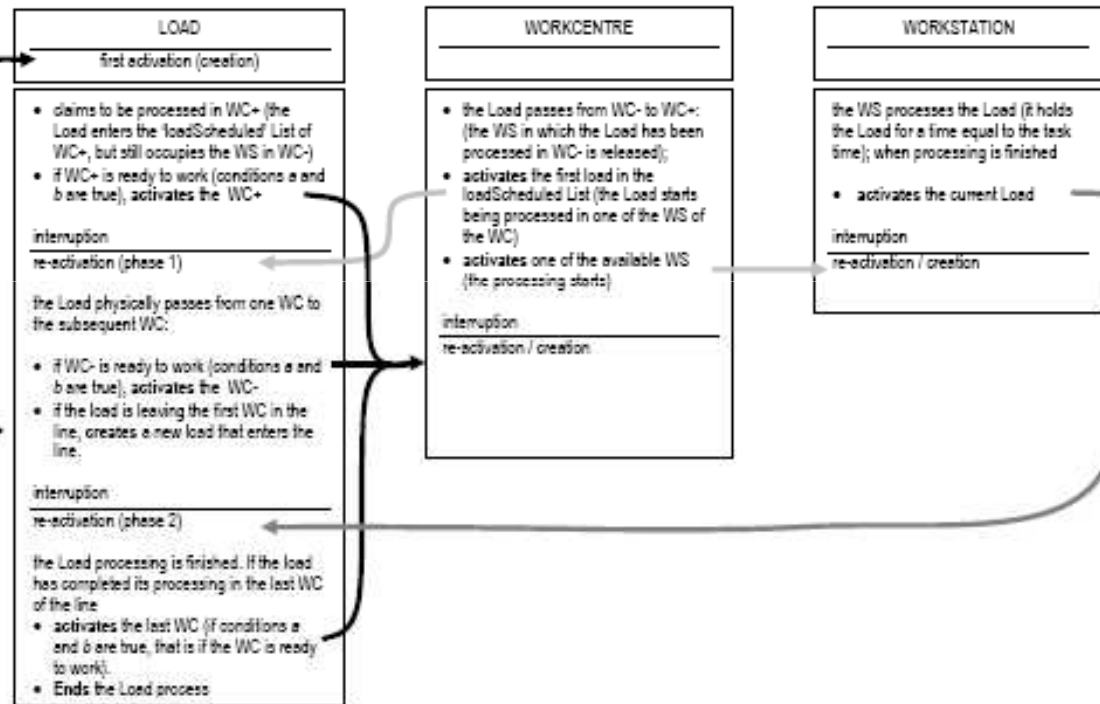
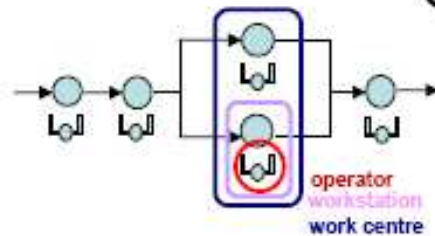




## Mixed-model Assembly Lines

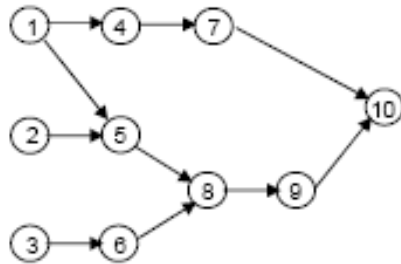
## JAVA CLASSES

Measuring operational objectives of MAL with parallel stations – stochastic task times – variables input sequencing through object-oriented simulation.





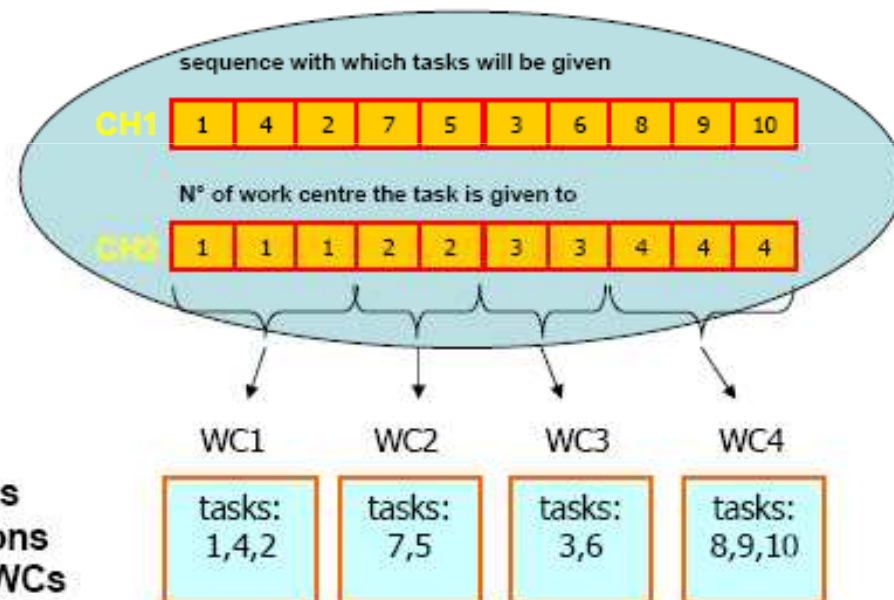
# FACILITIES PLANNING AND DESIGN



task	$t$ min	$\sigma$ min
1	7	2,1
2	6	1,8
3	9	2,7
4	7	2,1
5	10	3
6	6	1,8
7	5	1,5
8	10	3
9	4	1,2
10	7	2,1

Mixed-model Assembly Lines – Genetic algorithms to solve MALBP

## FEASIBLE SOLUTION

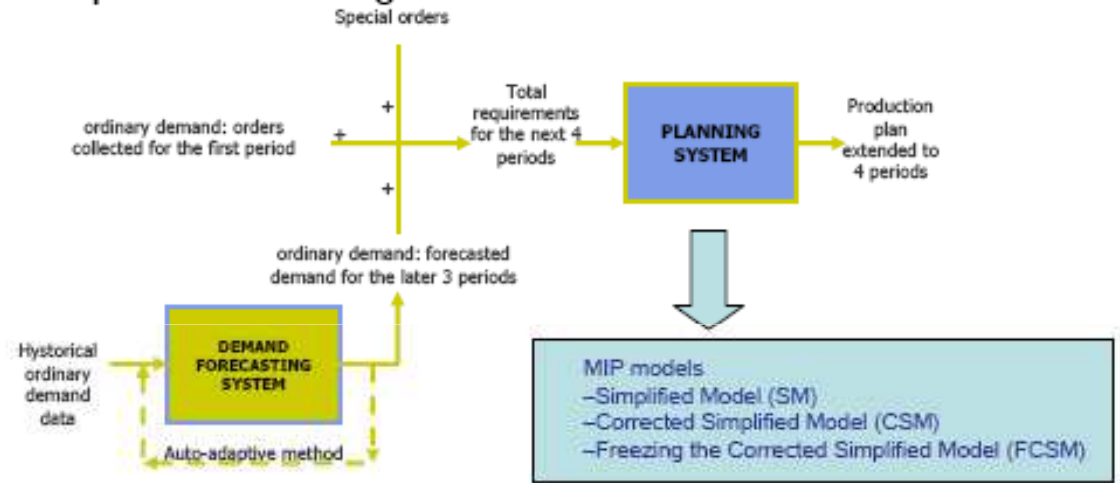


Tasks  
positions  
within WCs



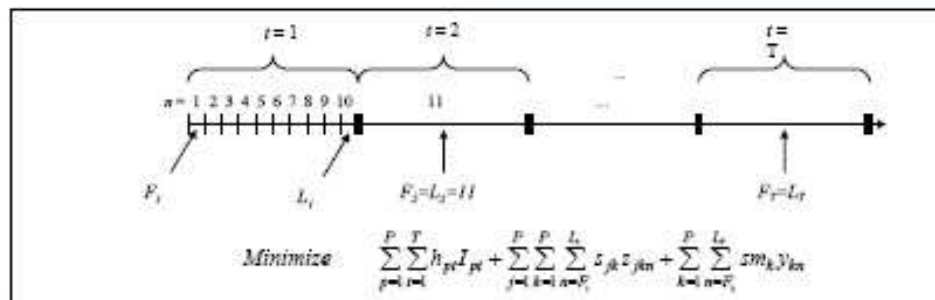


Demand Forecasting, Lot sizing and Scheduling in multi-item / sequence dependent setups costs / rolling horizon environments



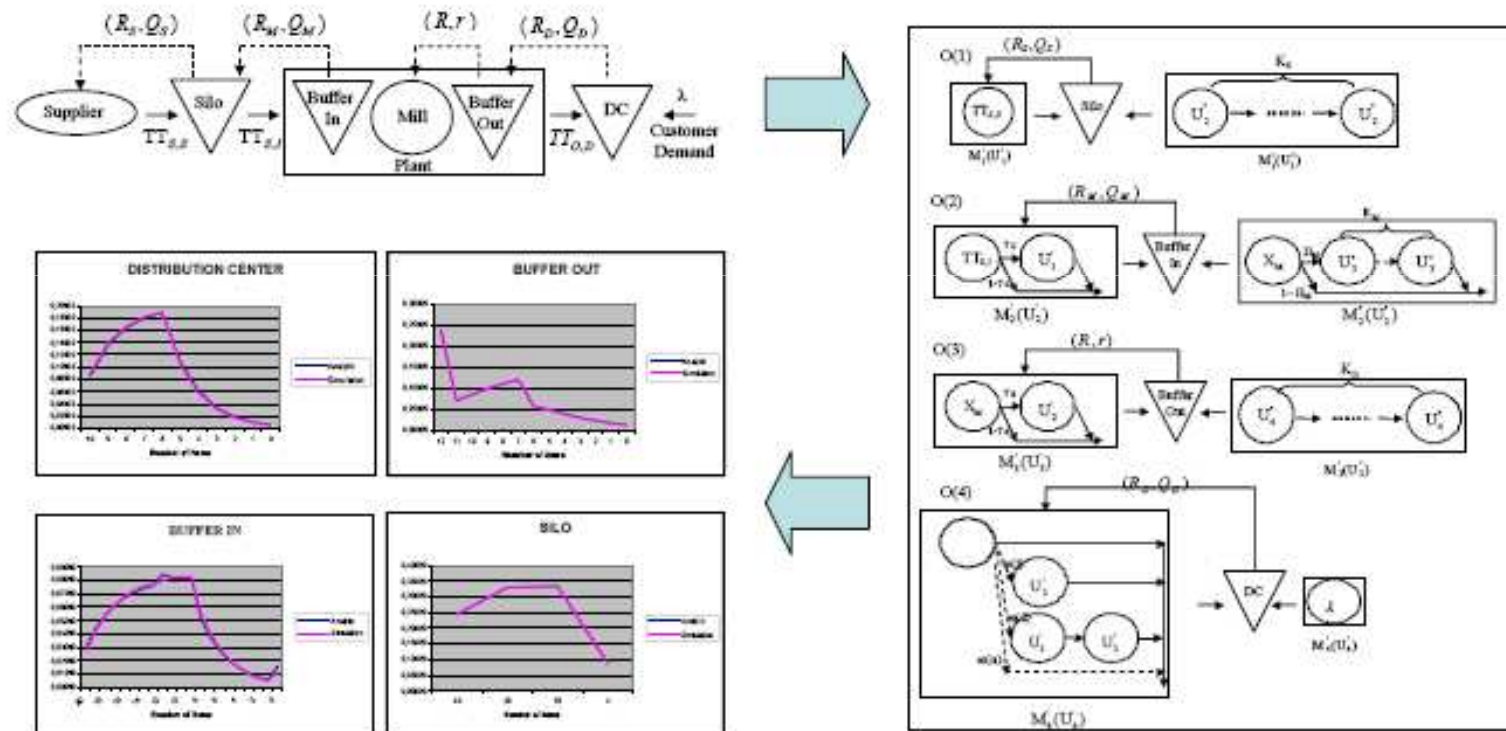
Production decisions on later periods are often only represented, because are obtained using data (forecasted demand) that will change in the next period.

when applying MIP formulations to real cases, it is of primary importance to find the appropriate level of simplification of the MIP formulation





## Decomposition methods for supply chain performances analysis

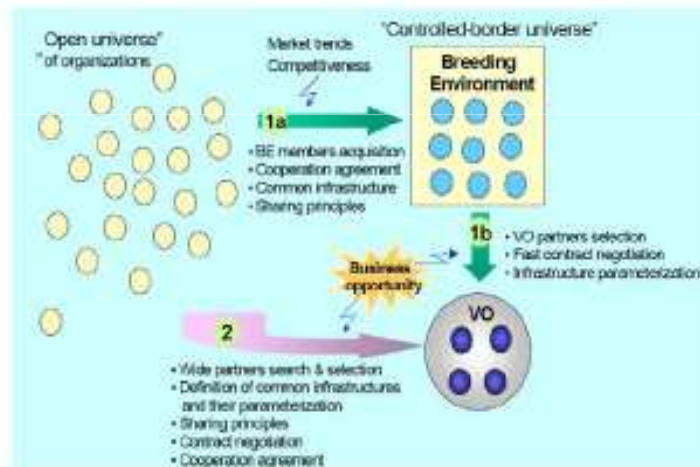




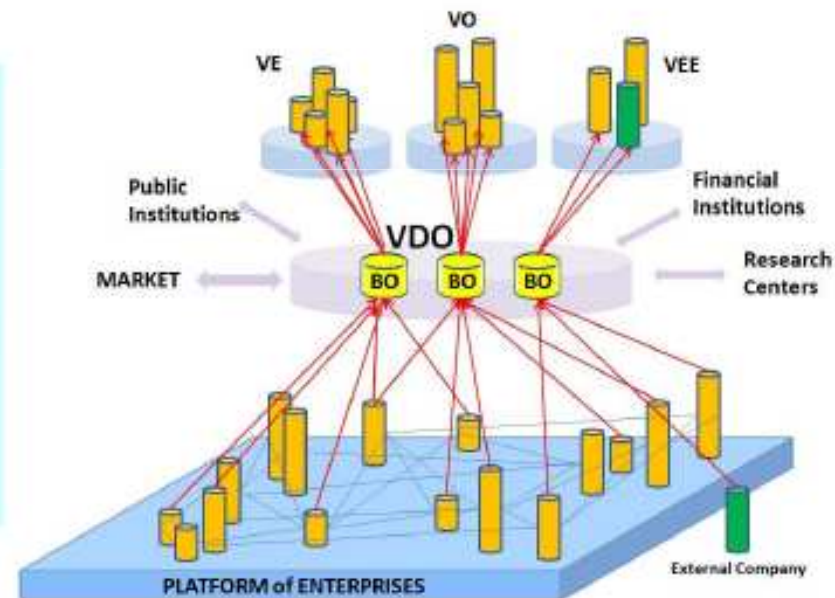


## Supply and Collaborative Networks: New Models

### Virtual Organizations Breeding Environment



### Virtual Development Office



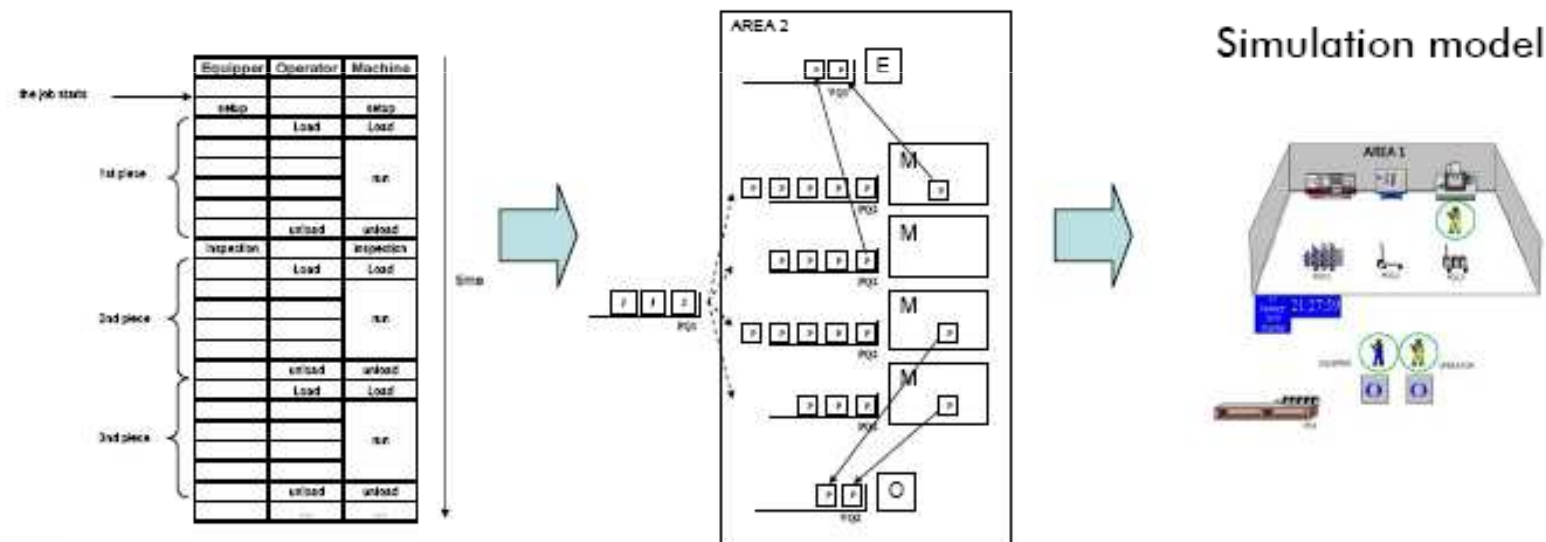




## Simultaneous scheduling of machines and operators in a multi-resource constrained job-shop scenario

Scheduling is constrained by machines and by two types of human resources, namely 'equippers' and 'operators'. Equippers and operators do not perform the same action with different efficiency, but are assigned to completely different and non-overlapping actions related to the job cycle.

### Conceptual model







Authors	Title	Journal / Conference	Year/vol/pp	Research Topic
Tiacci, Sietta, Martini	Balancing Mixed-Model Assembly Lines with Parallel Workstations through a Genetic Algorithm Approach	International Journal of Industrial Engineering, Theory, Applications and Practice	2006 13(4), 402-411	1
Tiacci, Sietta	Process-oriented simulation for mixed-model assembly lines	Summer Simulation Multiconference	2007 1250-1257	1
Sietta, Tiacci, Di Maria, Ruggeri	Technical and economic evaluation of different emissions abatement systems in mechanical pulp manufacturing plants	Third International Conference on Applied Energy	2011 1751-1764	2
Tiacci, Sietta	A heuristic for balancing the inventory level of different locations through lateral shipments	International Journal of Production Economics	2011 131(1), 87-95	5
Sietta, Paolini, Tiacci, Altiock	A Decomposition Approach for Performances Analysis of a serial multi-echelon supply chain	International Journal of Production Research	IN PRESS	5
Tiacci, Sietta	An approach to evaluate the impact of the interaction between demand forecasting method and stock control policy on the inventory system performances	International Journal of Production Economics	2009 118,63-71	5
Tiacci, Sietta	Reducing the mean supply delay of spare parts using lateral transshipments policies	International Journal of Production Economics	2011 131(1), 182-191	6
Sietta, Tiacci	A Model for the Optimisation of The Routing Problem for the Transportation Activity in a Process Industry	The International Workshop on Harbour, Maritime & Multimodal Logistics Modelling and Simulation	2005 20-22	6

Research Topics – Ing/Ind-17

1	2	3	4	5	6	7
Production system analysis and design	Auxiliary plant analysis and design	Processes and production technologies	Ergonomics and safety of industrial systems	Production system management	Logistics	Production system automation





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## RESEARCH PROJECTS

PROJECT	Title	YEAR	€	Research Topic
MIUR	Sviluppo di nuove soluzioni produttive. Studio dei criteri e applicazioni per valutare soluzioni logistiche e impiantistiche nel settore della produzione delle pietre naturali	2006-2010	417.000	1
EU Life + Program	VOC-LESS waste waters	2010-2013	90.000	2
EU Life + Program	VOC-LESS: Control of VOC emissions from mechanical pulping beyond BAT	2006-2008	71.200	2
ICE	GIPIETRE: Gestione innovativa della filiera logistico-produttiva delle pietre naturali	2005-2006	240.000	5
Fondazione CRP	Modelli e strumenti per costituzione e sviluppo di reti di impresa con particolare attenzione alle PMI	2011	70.000	5
PRIN	MIGEN: Modelli Innovativi per la Gestione dei Network di Impresa	2005-2007	90.000	5
Fondazione CRP	Studio e applicazione di tecniche avanzate di ricerca operativa applicabili alla gestione integrata dei processi di distribuzione ed approvvigionamento ai fini del contenimento dei costi logistici aziendali	2007	50.000	6

Research Topics – Ing/Ind-17

1	2	3	4	5	6	7
Production system analysis and design	Auxiliary plant analysis and design	Processes and production technologies	Ergonomics and safety of industrial systems	Production system management	Logistics	Production system automation



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### Istitutional Partners



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# Network partners: THE SIMULATION TEAM

[www.simulationteam.com107](http://www.simulationteam.com107)

## Simulation Team

Universities, Research Centers and Companies operating worldwide in synergy for developing Innovative Solutions with a particular focus in Modelling and Simulation



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