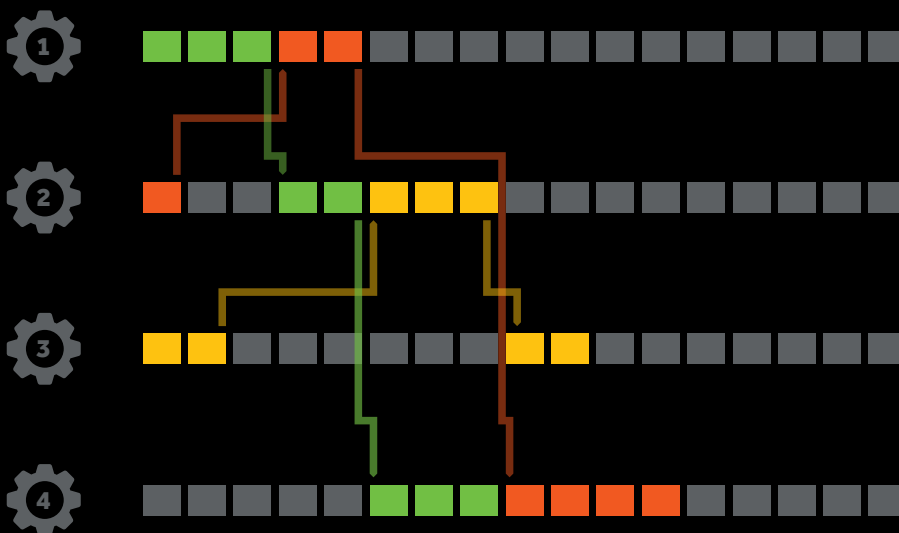




ADVANCED PLANNING AND SCHEDULING SYSTEMS



ADVANCED PLANNING AND SCHEDULING SYSTEMS

In a globalised world manufacturing organisations seek to improve their competitive position by increasing operational performance. Production planning and operations scheduling are crucial to this end, representing today one of the most challenging tasks to managers. Furthermore, planners are struggling with the increasing complexity of production processes and with the lack of support planning tools that consider constraints and specific features of real world problems.

INESC TEC has a large experience in designing and developing innovative tools to optimise production planning and operations scheduling, thus contributing to reduce the gap between the practical needs of real production planning and commercially available solutions which are in general very strict and hard to use.

INESC TEC has designed and developed an optimisation engine that can be integrated with standard ERP or scheduling systems to enhance the global quality of schedules. This engine uses state-of-the-art, multi-criteria optimisation procedures and leads to considerable gains in productivity. Criteria such as reduction of delays or increase in resource utilisation can be considered at the same time, by using these procedures.

The benefits of this approach are even more evident in scenarios with a large number of production orders, different types of resources, complex product structures, or bottlenecks. Moreover, in a context where multiple criteria are taken into account, planners are involved in the process and they interact with the system to choose one of the multiple generated scheduling solutions (which correspond to different trade-offs between objectives).

Each solution is shown in a Gantt chart, allowing the planner to assess the quality of the schedule under analysis, in a multiple perspective way.

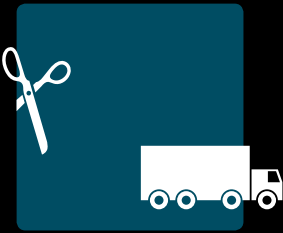


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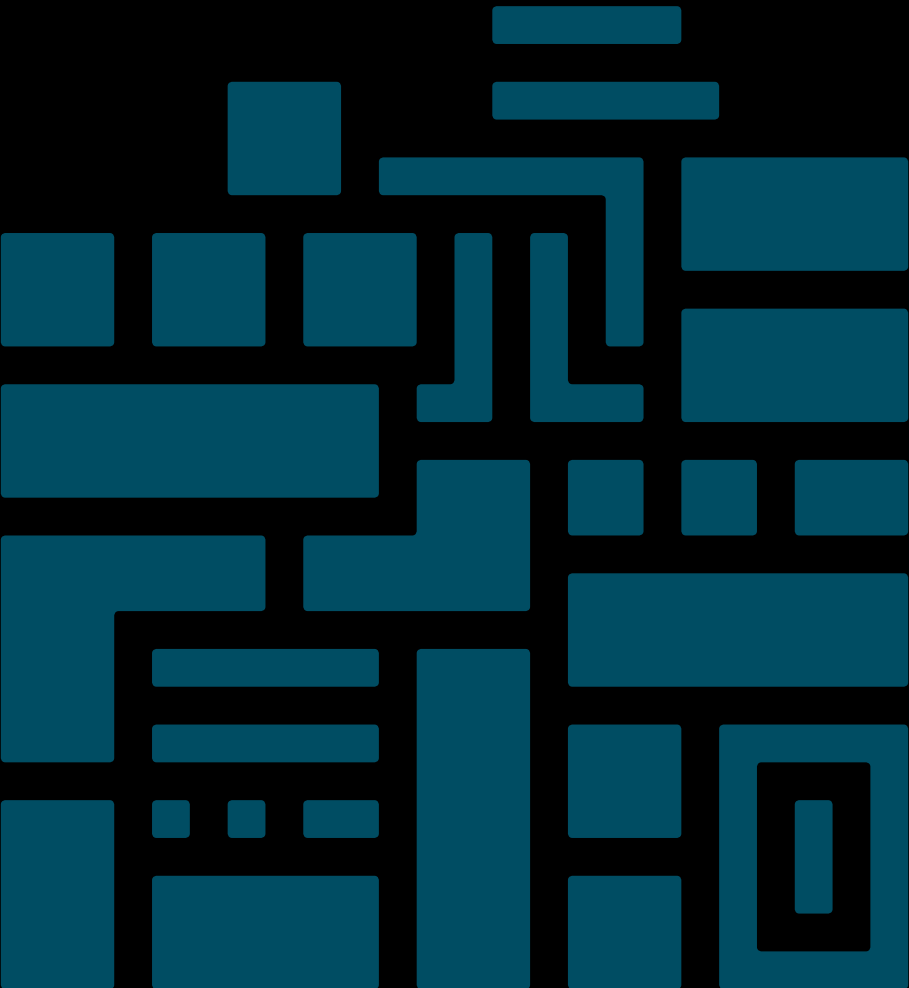
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CUTTING AND PACKING OPTIMISATION



CUTTING AND PACKING OPTIMISATION

Cutting and packing problems are at the core of many manufacturing networks and logistic systems. These are complex combinatorial optimisation problems, with a strong economic and environmental impact.

These problems arise in the context of several real-world applications, both in industry and services, whenever one or more large objects or container spaces have to be divided into smaller items in order to minimise waste. Examples include cutting paper rolls into narrower rolls in the paper industry, cutting large boards of wood into smaller rectangular panels in the furniture industry, cutting irregularly shaped components of garments from fabric rolls, and also packing boxes into containers or loading items on pallets in logistics applications.

INESC TEC has a large experience in designing and developing innovative solutions to optimise the cutting of 1D, 2D and 3D figures. This includes, for example, optimising the use of raw materials or truck loading. Industrial solutions have been developed for the textile, paper, wood and metalworking industries.

For the container-loading problem, a set of boxes must be packed inside a container, maximising the use of space. In some cases, some arrangements of boxes will not be loadable as there may not be a sequence to load them in the right positions. Moreover, other arrangements can be unstable during the loading process or during the transportation process. Constraints for each cargo unit (such as this side up or maximum bearing weight) must also be taken into account.

INESC TEC has created new algorithms that generate balanced solutions, considering objectives such as space utilisation, and cargo and worker safety.

The practical impact of these results in the performance of certain industrial sectors can be significant as the use of raw materials and product packing will be optimised, and waste will be reduced.

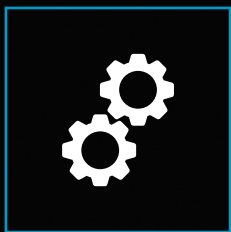


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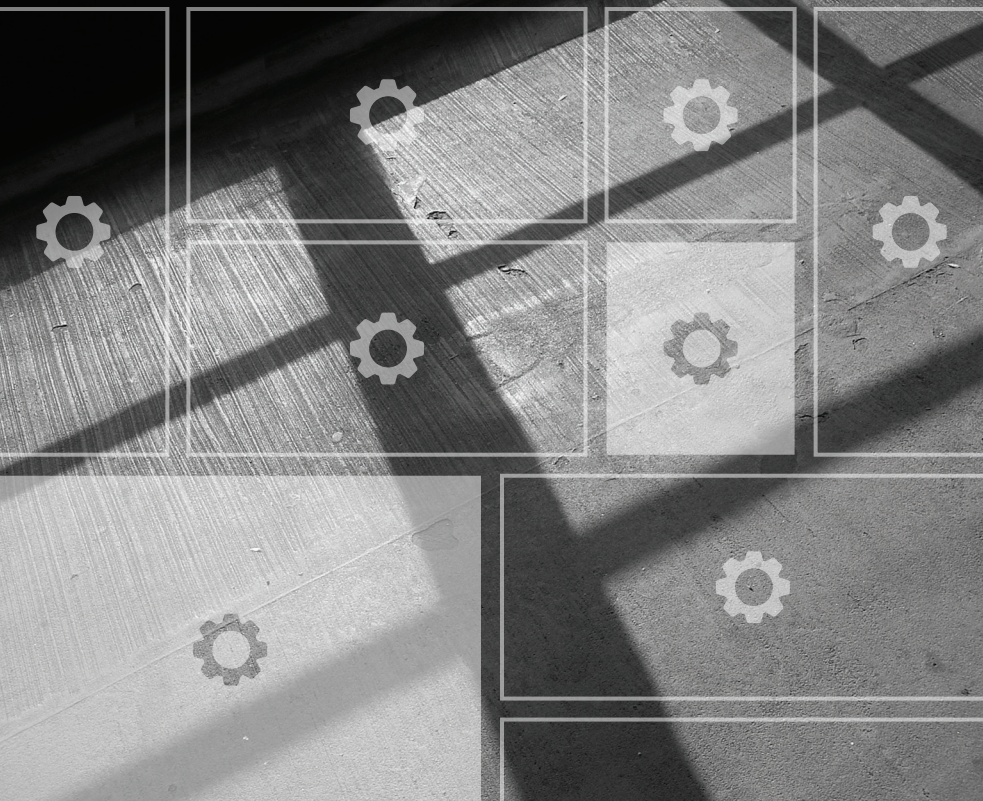


PRODUCTION SYSTEMS ENGINEERING

CONSULTING SERVICES
TO SUPPORT PRODUCTION
SYSTEMS DESIGN, ANALYSIS
AND IMPLEMENTATION



INESCTEC
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PRODUCTION SYSTEMS ENGINEERING

CONSULTING SERVICES TO SUPPORT PRODUCTION SYSTEMS DESIGN, ANALYSIS AND IMPLEMENTATION

INESC TEC offers a consulting service dedicated to designing the best production system for each manufacturing company, from business model definition to implementation roadmapping. The service is based on a well-proved and extended methodology and supported by a complete toolbox covering the entire lifecycle of the project.

This service can be applied either to greenfield projects or to improve facilities already in operation. The methodology is based on lean concepts and focuses on added value creation throughout the entire process. It can be used in Make-to-Stock, Make-to-Order or Engineering-to-Order environments.

MAIN BENEFITS

- A holistic and integrated approach where Operations and Production Resources Management, Internal Logistics, Quality Management and Information Management are considered simultaneously.
- Easy-to-use concepts supported by self-learning materials and pre-defined templates.
- Multi-scenario business demand analysis and system performance using Key Performance Indicators.
- Possible integration with process simulation software tools.



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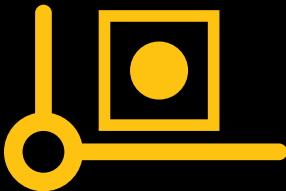




INTELLIGENT AUTOMATION AND INTERNAL LOGISTICS



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INTELLIGENT AUTOMATION AND INTERNAL LOGISTICS

In partnership with logistic systems manufacturers and software houses, INESC TEC designs and develops innovative solutions for transportation, distribution and intermediate warehousing in different industries, such as footwear, furniture and metal working.

These innovative logistic systems are supported by advanced software tools for managing, automating, monitoring, maintaining, balancing and scheduling production. Simulation is used to support the design and operations of these systems.

MAIN RESULTS

- production capacity and throughput is increased
- operations that do not add value to the product are eliminated
- flexibility of production systems is increased
- different products can be produced simultaneously
- work in progress is reduced
- lead time is reduced

The One-Step Production System, Logicstore and LogicTrans are examples of products that were designed and developed in this context.

INESC Porto (the coordinating entity of INESC TEC) holds two patents in this field, the Modular Multi-ring System for Flexible Supply of Workstations, and the Distribution and Provisional Storage System for Transport Units.

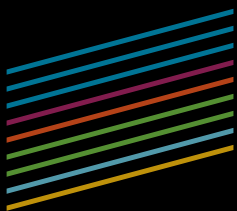


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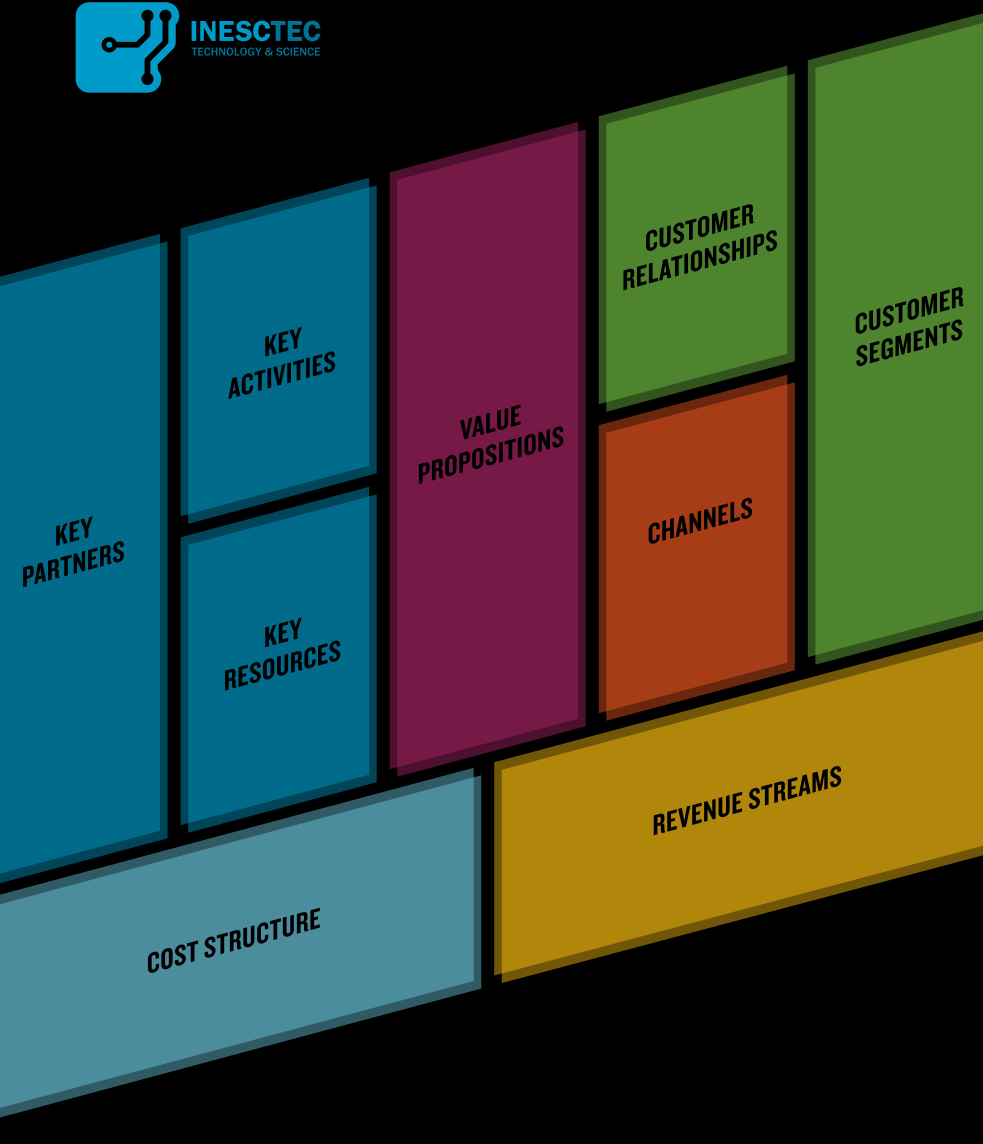


OPTIMAL-IT

CONSULTING SERVICE:
FROM BUSINESS MODEL
TO IT IMPLEMENTATION



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TECHNOLOGY & SCIENCE



OPTIMAL-IT

CONSULTING SERVICE: FROM BUSINESS MODEL TO IT IMPLEMENTATION

OPTIMAL-IT is a consulting service offered by INESC TEC to help organisations improve Business Processes and implement Information Systems in an effective and efficient way. The service starts with a Business Model Assessment and supports Business Processes analysis and improvement, and the implementation of Enterprise Information Systems.

This service can be applied either to greenfield projects or to improve systems already in operation.

These services are based on a coaching consulting approach. Therefore, projects are developed by progressively introducing concepts and by working closely with the Client in order to achieve concrete results. This way it is possible to ensure that after the project is concluded the Client will have the necessary skills to monitor the implementation of the identified improvement opportunities.

APPROACH

- Business Model Assessment
- Business Process Mapping
- Business Process Modelling
- Information System Specification
- Information System Procurement
- Advice during Business Processes and Information Technology Implementation

MAIN BENEFITS

- Reduce implementation risk
- Reduce the total cost of ownership
- Reduce implementation duration
- Advice independent from technological solutions and suppliers
- Multidisciplinary and holistic approach
- Use of world class industry best practices



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with INDUSTRY 4.0

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- › Management of Information, Knowledge and Collaboration
- › Flexible and Resilient Systems

INTERACTION AND CO-CREATION WITH THE CLIENT

- › Omni-channel experience (Web, Social Networks, Stores)
- › Intelligent Stores
- › Product-service Systems

LOGISTICS AND MOBILITY

- › Automation and Optimisation of Internal Logistics
- › Transport and Logistics Systems

BUSINESS INFORMATION SYSTEMS

- › Architecture and Technology for Cyber-Physical Systems, IoT and Big Data
- › Analysis and Design of Business Information Systems

OPERATIONS, RESOURCES AND PROCESS MANAGEMENT

- › Design and Simulation of Manufacturing Systems
- › Integrated Planning, Scheduling and Control Systems
- › Asset Management and Predictive Maintenance

ROBOTICS AND INTELLIGENT SYSTEMS

- › Collaborative Manipulators and Programming by Demonstration
- › Mobile Manipulators
- › 2D/3D Artificial Vision and Intelligent Sensors
- › Technology Integration and IoT

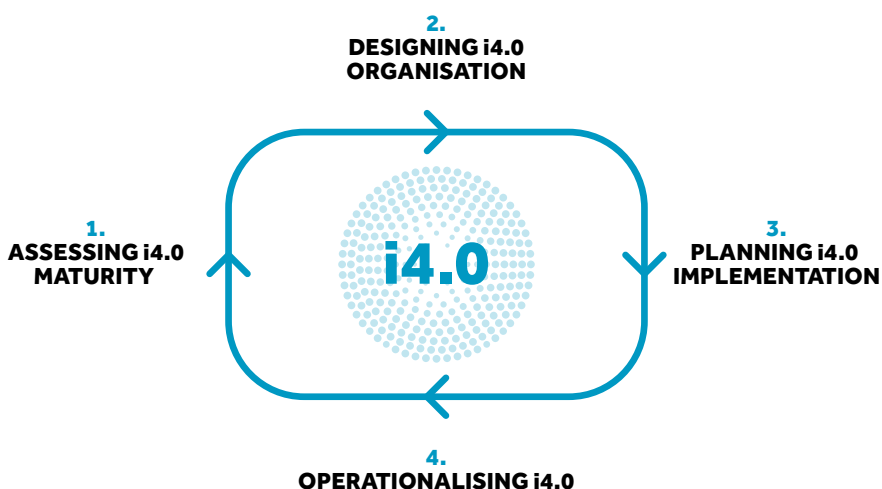
BUSINESS ANALYSIS AND INTELLIGENCE

- › Intelligence in Manufacturing and Business
- › Performance Management Systems
- › Decision-support Systems and Intelligent Reporting



MEET YOUR R&D PARTNER FOR i4.0 SUCCESS

Manufacturing enterprises are facing important challenges regarding the adoption and development of innovative concepts – technological, business, organisational, social – around Industry 4.0. To overcome uncertainty and to maximize success, it is crucial the definition of suitable strategies and action plans, scoping all complexity and dimensions of the adoption of i4.0 in industrial organisations.



INESC TEC's research track record, and extensive consultancy experience in developing and deploying solutions for industrial enterprises and value chain management, enabled the offering of high-value services to help companies assess, design, plan and operationalise i4.0 strategies.

INESC TEC i4.0 framework has been developed using a multi-methodological and multi-disciplinary approach including a conceptual modelling and qualitative and quantitative methods for field validation.



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