



*Brainware company*



# Company presentation

Focus on Transports domain

## Company Description

Intecs S.p.A is a Small-Medium Enterprise, private company operating in the information technology field.

In the 2005 turnover the 40% share has been in the Transport market. Intecs has about 210 employees located in Rome, Naples, Pisa and Toulouse. More than 80% of all employees have a university degree, either in Computer Science, Engineering or other scientific disciplines.

In December **1994** Intecs passed the formal certification audit for **ISO 9001** and in 2003 for **VISIO 2000** and in the 2005 the **CMM level 3** has been achieved. This places Intecs among the first Companies certified in Italy. The Certification applies for any software development project in the Civilian, Space, and Defense domains. The business area of the Company is in the Information Technology field applied to the Transport, Space and Defence Domains. It provides big national and international organizations with consultancy services on high-tech systems, as well as prototype, product and "turn-key" software systems developments. It is also capable of developing systems with security-related features, such as access control, authentication and authorisation and the policy management.

In the following the main experiences of Intecs in the transports domain are reported.

## Embedded Systems for Automotive domain

Intecs is experienced in the development of software for Vehicle Diagnostic tools for an important European car manufacture. As an example :

- Design and development of a Hard Real Time firmware for the 'Vehicle Measurement Interfaces' needed to carry out a complete vehicle fault diagnostic.



- Management of the entire validation and assessment procedure for the 'Generic Diagnostic tool' used to support full on-board device control, test and fault detection.

- General function assessment and validation of the 'Vehicle

Communication Interfaces and Vehicle Diagnostic Tools' for an important European car manufactures.

INTECS is also involved in the design, development and software validation of firmware and high-level application software for antitheft systems: it includes the complete management of various sirens, sensors and the utilization of many communication Buses (eg. CAN, LIN, proprietary) and protocols.

## Embedded Systems for Telecommunication domain

Since 1995 Intecs has collaborated with an important Italian company for the development of TETRA network systems. Intecs is involved in the design, development and testing of embedded real-time software for the Base Station and Hand Portable subsystems. It includes: the management of all of the peripherals (firmware), and the processes devoted to the TETRA protocol management. Intecs has also an important role in the Integration and testing phases of the entire system where we are involved for the design and execution of the tests and the development of simulators and ad-hoc software to support the verification phase.

## Real-Time Safety Critical Applications for Embedded Systems

A number of activities belonging to different domains and related to the development of embedded "fail safe" Software Applications have been performed, with different criticality requirements. The major projects carried out are:

**Design, development and functional testing of a safety on-board subsystem to be suitable for the Italian SCMT railway system (ground and On-board subsystems).** The software was certifiable (Safety Integrity Level 1, 4) against the CENELEC EN 50128 safety critical software international standards.

**Design, development and functional testing of the safety protocol to be used for the Italian railway High Speed Systems.** The protocol is compliant with the European ERTMS standard.

**Requirement analysis, design and implementation of the software for the Star Tracker and Navigation Camera for the ROSETTA spacecraft (Officine Galileo contract).** Design and implementation of the software for the Star Tracker of the XMM spacecraft (Officine Galileo contract).

## Operating Systems

**As a result of two Industrial contracts and R&D activities, INTECS has acquired a thorough experience on Real Time Operating Systems and has proprietary products which can be immediately used for On-Board applications.** In particular, the core kernel (**MicroExec**) is currently being extended in order to take into account all those dependability and security mechanisms needed on railway safety-critical systems. The extension will foresee the full validation of the MicroExec for safety-critical applications and the development of the **MICROSEK** (see. [www.microsek.it](http://www.microsek.it)) proprietary products which is also certifiable and support

the **OSEK-VDX** standard. It can be promptly used or adapted in order to meet specific customer needs mainly in the automotive domain. Today MICROSEK is available for the Micronas CDC16xxF, Micronas CDC32xxG, Janus ARM7 and Motorola 68K processors. It is under development the porting of the RTOS on the ST10 processor.

INTECS expertise on Real Time Operating Systems is offered to customers in order to provide high-quality and cost-effective solutions for the deployment of the basic software layer of on-board systems. Finally, the experience on commercial operating systems (e.g. VxWorks, pSOS, LynxOS, VRTX) and POSIX interface can be useful to support customers developments.

Design, development and functional testing of an Embedded and Safety Real-Time operating system to be used in the railway field. The software was certifiable (Safety Integrity Level 4) against the CENELEC EN 50128 safety critical software international standards.

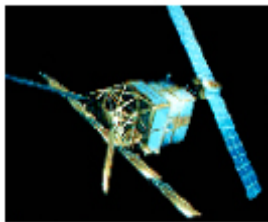
Implementation of a real-time Operating System and Network File System for the Columbus space station (COLOS), based on the INTECS executive and integrated with the Alsys Ada Runtime Support and including a portable debugging module.

## Satellite Navigation Applications

### Safety Criticality

Within the **GALA** (GALileo Architecture definition) project, INTECS has participated to the definition of the Safety Toolset.

This activity addressed the identification and evaluation of the most appropriate tools available on the market for the execution of Reliability and Safety analysis. To this end, a number of requirements for safety tools have been specified and then used as a baseline for the evaluation process. Subject of evaluation have been a number of tools for the support of Hazard Analysis (HA), Fault Tree Analysis (FTA) and Failure Modes Effects Analysis (FMEA).



### Railway applications.

Intecs exploits its knowledge in assessing methods and procedures for the verification of software together with its experience in the navigation domain in order to increase train security. In fact Intecs is currently realizing a tool for Railway Navigation (named RUNE) for ESA and should allow, in the near future, to increase security on trains



without excessive cost burdens. The tool works by comparing and integrating the standard train positioning information with the GNSS Receiver positioning, thus guaranteeing a higher level of precision for the train position without an excessive cost increase. Moreover once it is realized for railways it may be easily customized in order to be reused on other domains such as marine applications and so on.

### RADAR Applications

Intecs is developing a prototype system for increasing the safety of Railway systems. Our system, using RADAR technologies, will be in charge of measuring the train speed and will be able to detect the presence of an obstacle on the tracks. The used Radar technologies operate in the 'W' band (millimetric band) and will use an FMCW (Frequency Modulated Continuous Waveform) type waveform. All of the software elaboration is performed using a redundant safety architecture (2oo2) including the voting, synchronization and message exchanging mechanisms.

### RFID Technology

INTECS is also in charge of experimenting the utilization of the RFID (Radio Frequency Identification) technology for the development of auxiliary systems to be used in the railway field to increase the safety of the entire system.

### Personal location applications

INTECS is currently involved in the definition of a new GPS sensor for blind and tourist mobility applications. The new system includes the utilization of the GPS and EGNOS receivers to precisely measure the blind person's position and provide him audio suggestion about the environment and the suggested path to reach a requested location. The project, funded by Italian Space Agency, is called **POSSYBLI**.

Intecs is designing in the context of an ESA-ESTEC contract a product of the software receiver (namely **SoftRec**) according to the Software Define Radio philosophy. Software Receiver, thus a reconfigurable navigation terminal based on software radio techniques. The software approach will enable to produce receivers smaller, lighter, less expensive, and more flexible and hardware independent.

### Products

Intecs' offer includes the following products:

- **MICROSEK**, is a new Hard Real Time Operating System designed and developed by Intecs which is compliant to the Osek/Vdx standard and suitable for the development of embedded Real-Time Applications. MICROSEK is also certifiable against the safety critical software international standards.
- **UML-HRT CASE** tool, supporting the UML notation and the feature of the HOOD-HRT methodology. The HRT-UML method provides a comprehensive solution to the modelling of Hard Real Time systems by replacing the HRT-

HOOD method with a customized version of UML that incorporates all the advantages of the HRT-HOOD method and improves the HRT-HOOD design concepts by converging to a more powerful and expressive modelling notation.

- **Software Receiver** : a GPS/EGNOS positioning receiver using the Software Define Radio paradigm.

## Services

Independent Verification & Validation of Safety Critical Software

INTECS has a long experience in the IV&V of Safety Critical Systems. The availability of specialized software laboratories and well established methodologies provides the best solution for IV&V in the following domain:

- Railway systems
- Automotive embedded systems
- Space and Aeronautics systems

In particular, the main activities are:

- Design, development and execution of Module testing. The tests are executed on the Host machine or directly into the target using the CANTATA (IPL) tool.
- Design, development and execution of the software Integration tests. The tests are executed in order to verify the designed software architecture.
- Design, development and execution of the Software and Hardware Integration Tests. The tests are necessary to verify the interaction between the software and the hardware elements that compose the system.
- System and Software Validation : design, development and execution of the tests necessary to verify the conformity of the system against its requirement specification.

All of these activities require the production of specific documentation (Test Plan, Verification Plan, Reports, etc.) which Intecs can provide as result of the activity.

Intecs has also a consolidated experience in the development of simulators and ad-hoc software necessary for the verification phase of a 'fail safe' system.



## Languages / Technologies / OS

The main languages, technologies and Operating Systems used in the transport domain are:

*Languages* : C, C++, Assembly, Ada 93, Ada 95, Visual Basic, Java

*Technologies* : CORBA, XML, UML, Microsoft MFC

*Real-Time Operating Systems (RTOS)*: VxWorks, pSOS, LynxOS, VRTX, Virtuoso, Infinity, MicroSEK

*Host Operating Systems* : Windows, Linux (RT), Windows CE

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