European Good Practices in New Materials and New Applications

New uses of advanced technical textiles in aeronautical products

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National Research & Development Institute for Textiles & Leather

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European Union
European Regional Development Fund

About INCDTP

Timeline

1951

The Textile, Leather and Rubber Research Institute was established

1956

The institute has divided into:
- Research Institute of Textile;
- Research Institute of Leather, Rubber and Plastics

1990

According to Government Decision 1284/1990, the institutes have become companies:
- S.C.CERTEX.S.A
- S.C. CERPI S.A.

1996

According to Government Decision 1304 / 1996 the INCDTP was set-up as National Institute

With a tradition of over 65 years, ***National Research and Development Institute for Textiles and Leather/INCDTP*** *is a centre of excellence in RDI in the field of textile-clothing, leather-footwear-rubber goods.*

About INCDTP

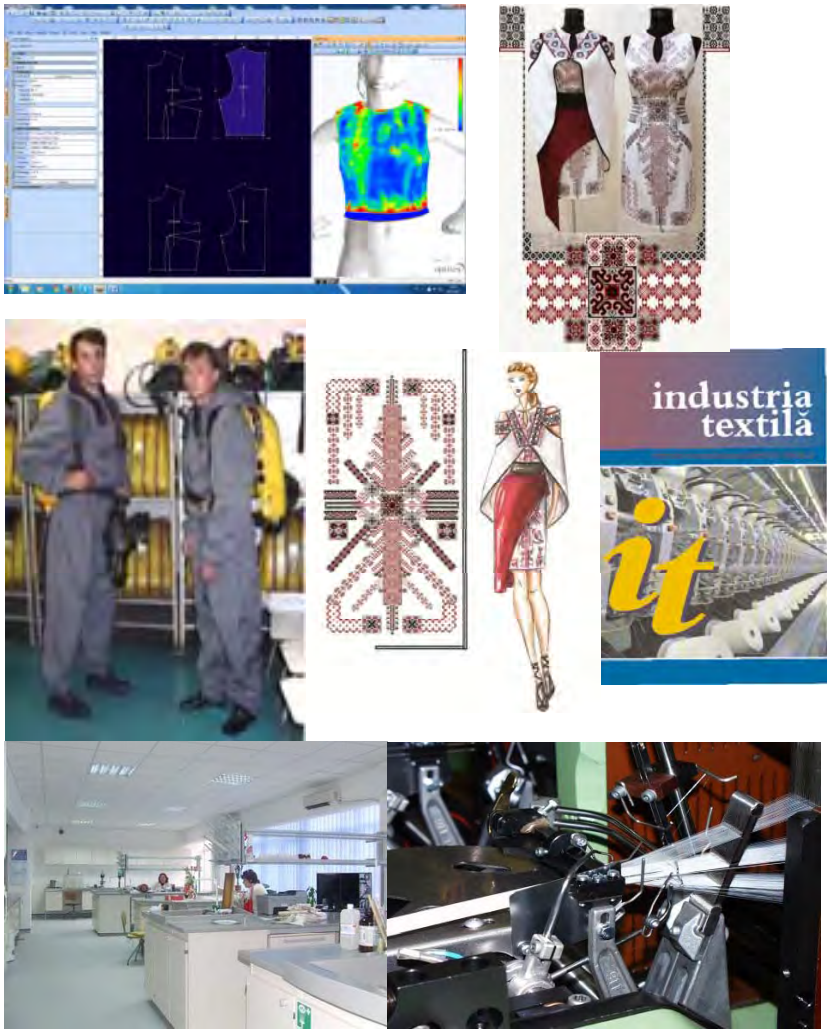
The structure

Textile Research Departments

- Engineering of Textile Materials and Processes
- Textile Chemical Finishing - Environment Protection
- Information Technology in Industrial Engineering
- Textile Systems for Aeronautics
- Fashion Design and Anthropometry

Textile Related Departments

- Laboratory of Testing and Control of Materials
- Quality Assurance
- Standardization
- Professional Competence Assessment Center
- Experimental Pilot Unit
- The “CERTEX” Publishing House
- ITA-TEXCONF- Entity of infrastructure and technology transfer



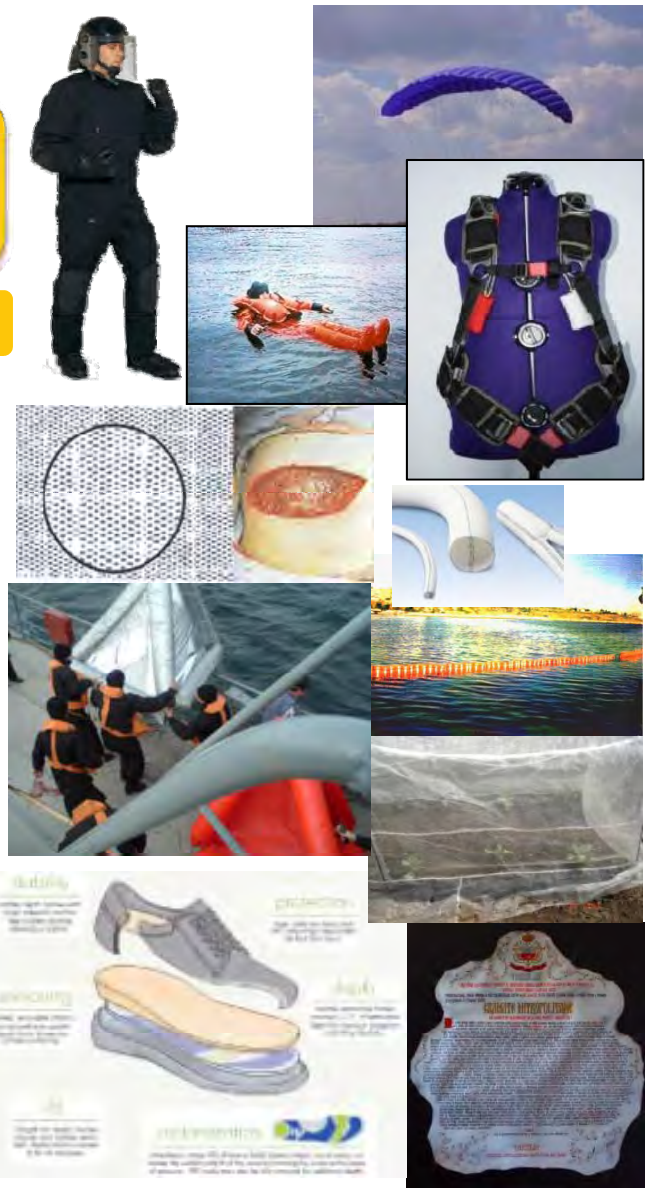
About INCDTP

The activities

INCDTP promotes and develops **multidisciplinary applied research activities** in textile-clothing, leather – footwear - rubber goods., for the economic sector and various related fields.

The research fields of interest

- Advanced products and technologies for textiles-clothing and leather-footwear- rubber consumer goods
- Functionalities for high performance materials
- Increase of flexibility and efficiency in the development of the products and materials through design
- Invasive and non-invasive medical devices with biomedical and bio-functional characteristics specific to the clinical use in medicine, health
- Clean technologies for textile and leather field and environment protection
- Conservation and protection of cultural heritage
- Support instruments for developing RDI capacity



Research and Development
Textile Systems for Aeronautics

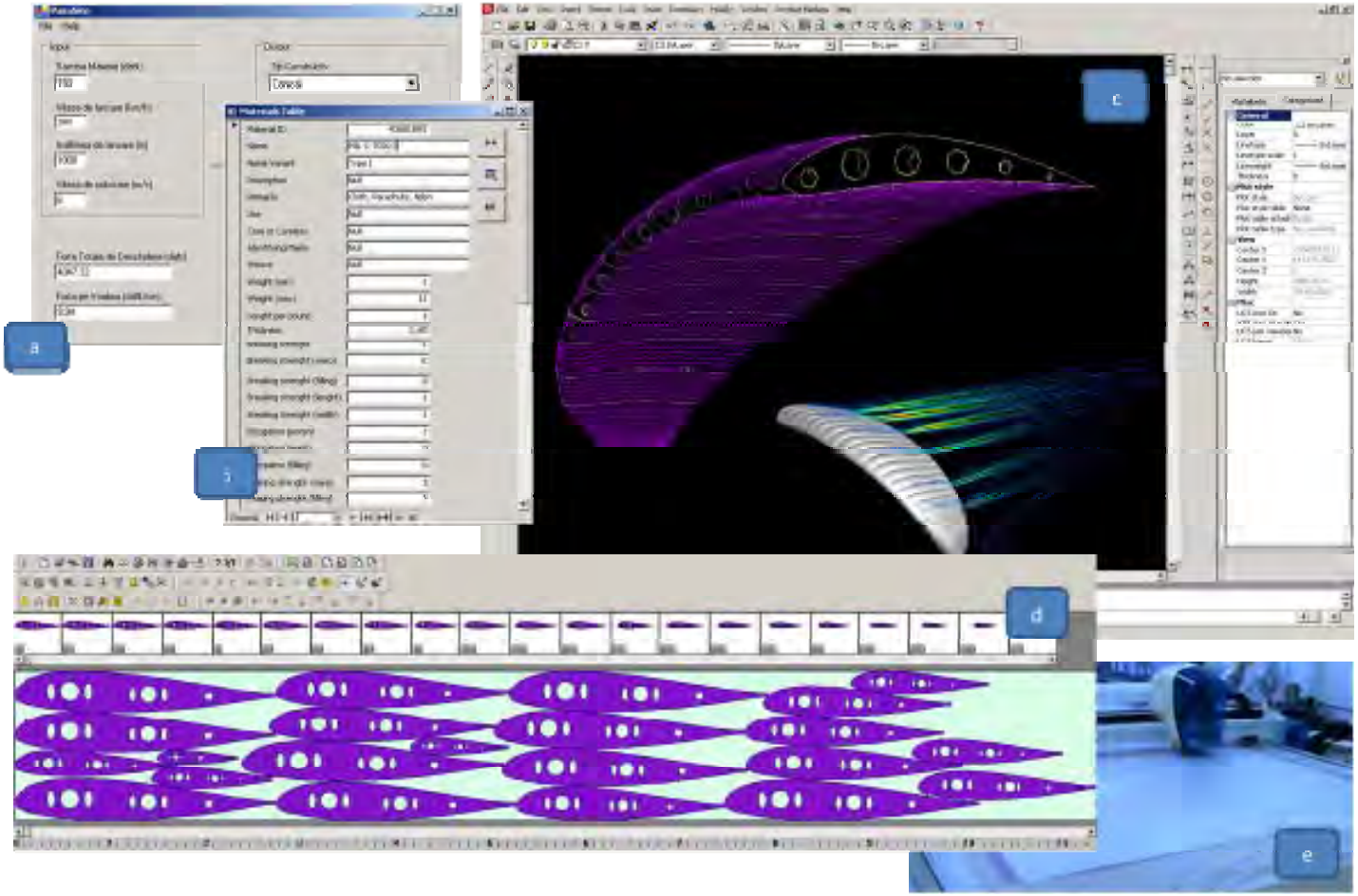
- In 1975 has established the Research and Design Special Products the first center in the country in the domain of the Personnel, Rescue, Cargo and Deceleration Parachutes; Flight, G-compression and Survival Suits;
- The end users of the products developed in this laboratory was Ministry of Defense;
- After 1990 it approached the design of different types of parachutes and paragliders from initiation to performance, up to motorized and unmanned variants;
- Now the current research and design is focused on new uses of technical textiles for aeronautical products;
- Research and development of new products are done using an machine integrated software system for designing, analyzing and manufacturing paragliders, parachutes products and autonomous platforms using the above;
    - We show the use of this as a working good practice.

Description of the GP

- We use an in-house developed software/hardware chain system that can provide: a comprehensive digital model prior of manufacturing; provide a virtual testing bed for the concept parachute; shortens the time between concept and effective prototype manufacture by the use of computer assisted machinery.
- The topics to be taken into consideration on design stage are:
  - Turbulent flow prediction, vortices formation and influence on drag characteristics, selecting optimal solutions to increase the drag and/or lift for better performance;
  - Inflation stages progression, geometrical modelling of the inflation stages especially for ram-air chutes, pre flight simulation of new design concepts;
  - Opening shock and snatch force progression during deployment, reefing systems influence and effectiveness, selecting optimal solutions to reduce these forces.
- The topics to be taken into consideration at manufacturing stage is the reduction in material consumption, selecting optimal fit of patterns on the fabric spool.

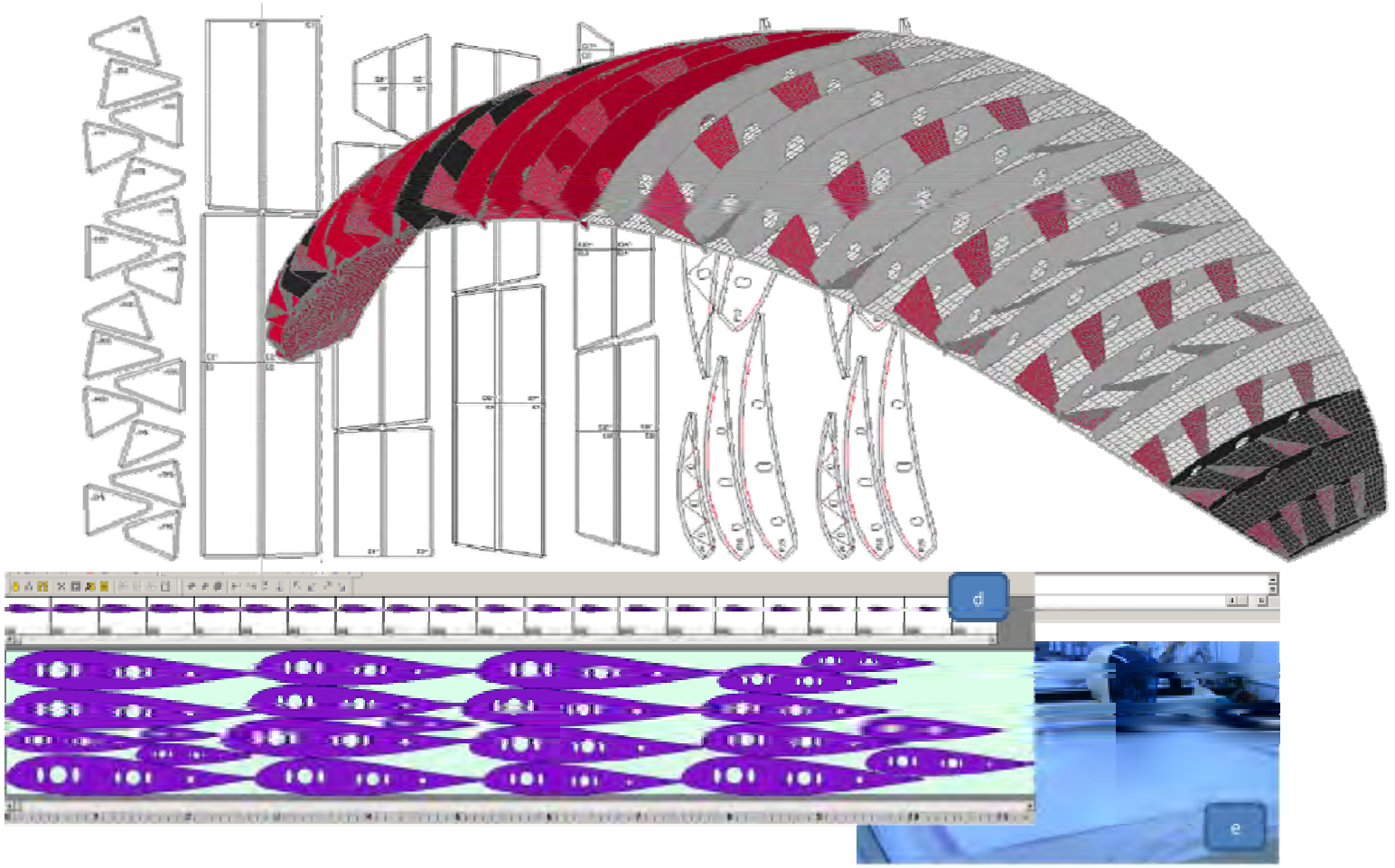
Description of the GP

- The creation of a prototype starts with pre-dimensioning and input of main characteristics of the product (a), followed by the materials selection (b), a 3D model is generated and a panel code simulation is performed (c).



Description of the GP

- The 3D model is interactive thus can be modified at will, when all details are set a script extracts all fabric patterns and optimally fits them on the fabric width (d) and then sent them to the cutting machine (e).



Description of the GP

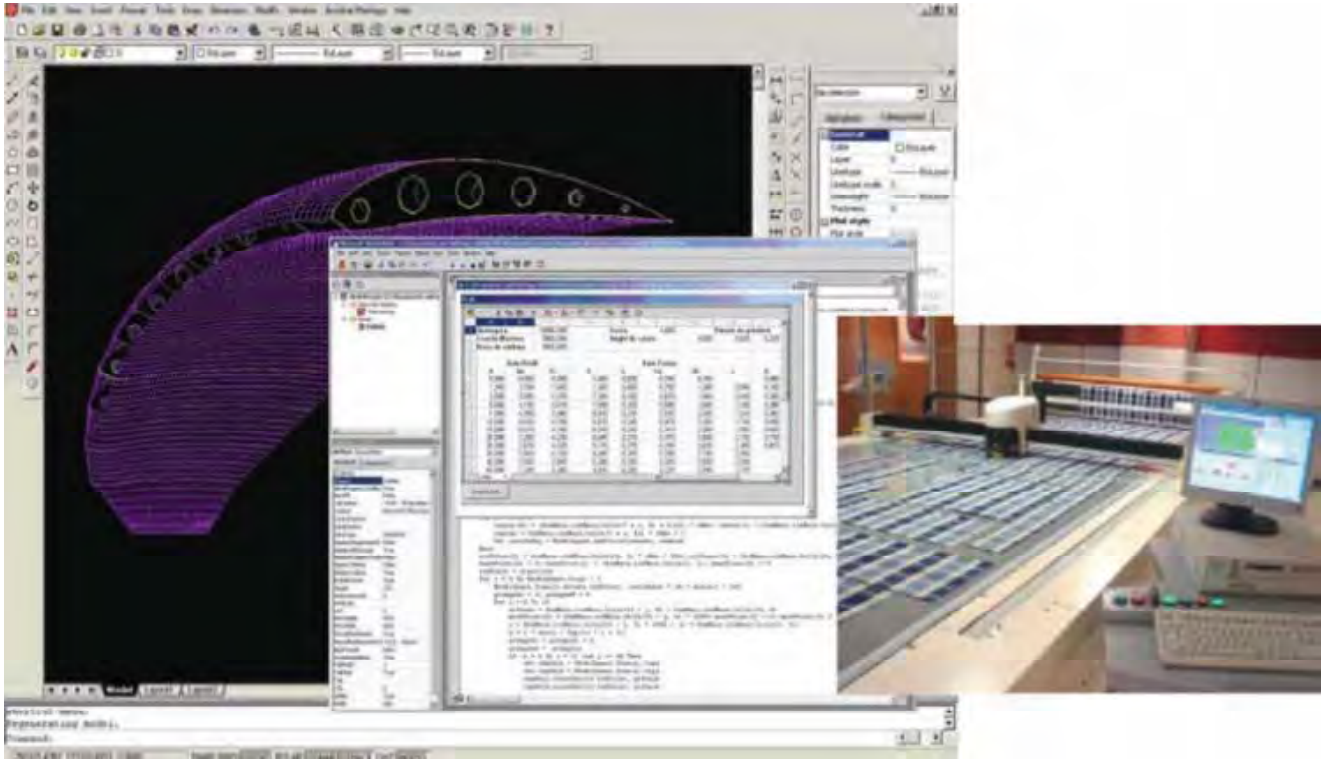
- We consider the Integrated management system for designing, analyzing, manufacturing and conformity assessment a good practice because:
  - reduces the manufacturing costs of prototypes by testing and simulating the behavior of a virtual prototype;
  - the accuracy of product patterns by using the extraction of patterns from 3D virtual form;
  - the possibility of ordering the cutting of the patterns remotely (from the product design location);
  - reducing the consumption of material and energy consumed to manufacture the products by reducing and optimizing the time and manufacturing process;
  - provides the ability to highly customize the products;
  - The design and development cost for any new products is high, this system help us ease the costs of this.
- This GP has been developed in the national research programs, which has the aims of increasing the competitiveness of R&D.

Description of the GP

- *e.g.* Products made by applying this system:
  - personal parachute (made from PA 6 fabric with air permeability 200 l/m^{2}s);
  - paraglider rescue parachute (made from PA 6 fabric with air permeability 200 l/m^{2}s and PA 6 fabric with air permeability 30 l/m^{2}s)
  - tandem paraglider (made from PA 6.6 fabric with 0 air permeability, coating with PU);
  - autonomous air platform (made from PA 6.6 fabric with 0 air permeability, coating with PU).

Transferability of GP – Success factors

- The possibility of designing any type of paraglider or parachute in accordance with their performance requirements
- The possibility of manufacturing paragliders and parachutes in locations different from the center where they were researched and designed
- Reducing the product's design time
- Making new products at the desired time, cheaper and with good quality
- Reviewing the classic principles of product design



Good Practice value added at regional and transregional (EU) – levels

- The new way of design and its implementation could have an important and durable impact on economy and employment if the products are commercialized
- Reduced costs related to the design of new aeronautical technical textiles products
- The paragliding is a great recreational activity, it is also a sport in the true sense of the word, a very competitive aeronautical sport practiced by many people around the world
- This GP (or some aspects of this practice) can be interesting for SMEs from other regions that want to manufacture paragliders and parachutes

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RESET

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Thank you!

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