



**New Designers for Production Processes Highly
Ergonomic and Safe (ERGOMAN)**

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Executive Summary

ERGOMAN Project aimed to define a new "process and workplace ergo-designer" profile and to then subsequently establish a training model based suitable for it. At the moment, there isn't on the marketplace a real specialist for the analysis and design of production processes, workplaces and environment with applied knowledge of the ergonomics.

The target audience is composed by professionals, workers in big industries, students and postgraduates. It is envisaged that this model should have a strategic impact on all industrial product designers and will be used Europe-wide.

The main project objectives has been the identification of the competence profile according to the real needs of the market and the design of the most efficacy and efficient training model to improve the continuing Education of European Ergonomists. The project involved the participation of a high level of educational systems and industries in order to meet the real target needs and to build a solid co-operation between them. Effective collaborations with other organisations in Europe, such as the International Ergonomics Association, SIE, and CREE has been developed to enhance opportunities for learning and for the use/application of these acquired competences.

The consortium of expertise involved in the project was composed by experts competent in pedagogical/andragogical design and methodologies, universities with a strong experience in ergonomics, a large Italian enterprise which has been working for many years on research applied to the ergonomics and safety and a small enterprise whose role is that of the pilot company where these new profile will be performed.

The strategies and methodologies used in the project established a high quality reference model for lifelong learning that can be used by all; Ergonomics Centres, Companies, Networks and Universities (starting form CREE, SIA, etc.). Given the interdisciplinary nature of the knowledge area and to best support trainees in their personal development, the ERGOMAN pedagogical methodology exploits not only the training goals and materials required to reach the defined competences, but also recommends learning topics, methodologies (action learning, guidance from experts during the training period, etc.), activities (exercises, laboratory activities, problem solving approaches etc.), tools (ICT aided learning), and frequency of training (given the fact that most participants will be in full-time employment).

The project has managed to: a) identify the main needs of industry as for the ergonomic design of workplaces and work environment of production processes; b) analyse the existing competence profile for ergonomists (professionals in industry, students and post graduates) and consequently identify the differences in competences necessary to become process and workplace ergo-designers; c) define the structure of process ergo-designer Training Model with definition of training methodologies, topics (syllabus), methods and technologies, and assessment approaches; d) refine the Ergo-designer Competence Profile and Training Model according to the validation results.

Sustainability of project results relies on the detailed exploitation plan that has been released. Some exploitation actions have already been done and will continue with Universities, Small and Medium Enterprises, Large industries and Professional associations where ergonomic has an important role (industrial productive associations, safety ones, etc). The plan contains clear objectives and specific actions focusing on both international/national Ergonomic associations, university departments, policy makers etc.

The project website, www.ergoman.eu, is available in EN-DE-IT-SLO and contains information on the project, indications on events, ERGOMAN results.

It is possible to subscribe for free to a mailing list of interested parties from which being update about the project evolution and related events/documents.

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1. Project Objectives

The main purpose of the project has been the development of a new professional profile in the field of Ergonomics for the design of processes and workplaces (Process Ergo-designer).

Ergonomists today make mainly assessment of ergonomics situation at plant level according or not with the quality and efficiency of production principles. There are very few ergonomists able to sustain the design of work methods, production process equipments, and give a concrete support for product design finalized to the manufacturability.

Consequently, the aim of the project was creating a new profile, with competences, skills and knowledge aimed to design work processes, work stations, and environments according to the requirements defined in the project.

More specifically, the three objectives of the project have been:

- the definition of the competences necessary to become a Process Ergo-designer
- the development of an educational model to train this new profile
- the creation of a network among centres of excellence, educational structures and new ergo-designers.

The benefits of the project for the wide community of users (composed by ergonomists, safety engineers, doctors for occupational health, professionals already working in the manufacturing areas both in big and small/medium enterprises, students, companies interested in the new profile, International/National ergonomic associations and university departments, policy makers) are several:

- Reduction in injuries to workers and compensation costs to companies
- Reduced occupational health social welfare costs for EU states
- Improved productivity and quality in workplaces and in production processes
- Improved flexibility in accommodating new product design at short notice and process changeover costs
- Higher quality and more innovative engineer problem solving skills
- Increased implementation of knowledge competence roadmaps, safety legislation and standards into European workplaces.

Our strategy for the valorisation has been/is to involve users and organisations directly in the Project: in fact partners involved professionals (IAD, CRF, VIVAPEN) and companies (FIAT and network of Limerick) to perform the need analysis, but also to have a continuous feedback during the competence profile building and pedagogical modelling work and to have an ongoing assessment of the “theoretical” methodology into the real life practice.

After the finalisation of the main products, an exploitation strategy has been planned and started in order to disseminate and exploit results at an international level.

2. Project Approach

The first important item of the project approach has been the **Needs Analysis**, because it allowed a direct relation with all target groups (professionals, designers, students and postgraduates), that, in an international dimension, have been part of a survey whose purpose was the analysis of the real needs-in terms of process ergo-designer required competences- exploited by the market .

The survey has been led to the various typologies of participants, collecting the different points of view both of the workers and their managers, of university students and professionals, obtaining important feedbacks for the **definition of the competence profile**.

This approach has been interdisciplinary, because the points of view of the different categories are kept into account:

- from an organizational point of view, since different level and approach of workers were involved
- from a pedagogical point of view, in terms of definition also of the level of competence that each category of target claimed.
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A number of interesting suggestions have been risen during:

- the **First Ergoman Workshop** organised in Darmstadt, and inserted in the GfA Ergonomic Congress, where 17 representative of big industries participated to a round table on ERGOMAN topics
- the **Second Ergoman Workshop** organised in Limerick, and endorsed by the Irish Ergonomic Society, where about 30 representatives of SME participated to an interactive and stimulating discussion
- several meetings with professionals and representatives form higher education institutions, SME and large industries.

In order not to overlap to existing standards, the definition of the ergo-designer competence profile was also based on the intersection between results of the needs analysis and standard international existing profiles.

The second and fundamental step of the project was then to detail the identified **Ergo-designer profile** in a way that could be easily read, understood and used by the users, besides allowing a fundamental –given the sector of interest- flexibility of usage. Targets groups using ERGOMAN results will be not only experts in training, but also professionals, workers, experts not necessarily funded on the specific terminology related to the design of profile by competence. The final choice to answer to this problem was the presentation of the profile in the form of a matrix of competences, each one analysed with respect of the 3 target levels of the project.

The same approach was used for the **Training Model**, where the identification of topics, tools, training activities, assessment methods and concept maps have been defined.

An important aspect has been the **validation of the identified competence profile and training model**, conducted on different levels:

- comparison with the industrial needs (gap analysis);
- comparison of the competence description and the field of application (with panel of external experts also belonging to ergonomics societies);
- evaluation of ability of implementation as for design criteria and rules;
- evaluation of the training model made by trainers

evaluation of the training model made by users (professionals, students, designers). The Dissemination plan outlined a promotion and diffusion of the project through different

channels (Web sites, Mailing lists, Conferences/Events, Academic publications/journals, Network activities, organisation of the ERGOMAN Workshops).

The Exploitation plan detailed future and already started activities to let project results be adopted in the different contexts (universities, companies, vocational institutions).

Dissemination and exploitation activities have been fundamental to let the results of the project being adherent to the real world and therefore sustainable in terms of gathering interest from the different parties and be used/spread.

3. Project Outcomes & Results

The project has achieved the following results (public results are available on the ERGOMAN web site www.ergoman.eu):

- **Identification of main needs** of industry as for ergonomic design of workplaces and work environment of production processes. The activity investigated different kind of analysis: Context, Work, User and Content analysis. The Needs analysis was performed through observation, interviews and focus groups as well as by questionnaires spread to the people working in the ergonomics field. The investigation has been performed on a international sample of users, belonging to different segments (primary target of the project - managers, designers, professionals, students) in different countries, that exanimate the perception about this new professional profile and compared it also to the current standard ergonomic profiles. The result of this work is in the deliverable **Need Analysis**, published in the ERGOMAN web site, www.ergoman.eu. This result was related to the Needs Analysis and Survey work package.
- Definition of the **Process Ergo-designer profile**, objective of Competence Profile Building workpackage, structured on the basis of:
 - Role and functions of the profile (who he/she is, what he/she does)
 - Kind of target (university student, professional, manager)
 - Main Competence areas describing the profile
 - Set of required competences for each identified competence area
 - Required level of competence to be fulfilled according to the entry level of the target and on the basis of the specialization required by the target
 - Gap analysis made on the basis of the results of needs analysis
 - Training goals to be reached for the fulfilment of the identified level of competence
 - Knowledge Areas
 - Ethical outline of the profession
- Definition of the **Training Model** (objective of Training Model Design workpackage) to be adopted for an efficacy and efficient achievement of the Process Ergo-designer profile of competence, defined through:
 - - Ergonomics multidisciplinary Knowledge Areas for students, professional and workers
 - Main topics (syllabus) to be trained/learned in order to reach a given level of competence
 - Suggested pedagogical approaches on the basis of the target (active learning, experiential learning, traditional training, distance learning, problem solving approach...) and of learning goals

- Suggested training activities for each level of competence
- Suggested training technologies that could be adopted for each level of competence
- Suggested assessment methods that could be adopted for each level of competence
- Concept maps of learning units (entry level, topics, goals)
- **Validation of the competence profile and of the training model** made by an identified assessment methodology and built through the involvement of external panels (experts, ergonomics society members, trainers, real users of the 3 different categories-students, professionals, designers).

Given the importance of the results and believing that sharing experience is a key factor to promote ergonomics high level training and continuing education, the consortium agreed on deliver for free to the public all obtained results, especially the Ergo-designer profile and the Ergo-designer Training model. In order to be used in an easy, friendly and functional way, these have been structured in tables, namely:

- the **Ergo-designer Cross-Matrix**: a table where the profile is presented through 6 main areas of competences, each one punctually declined, split in 3 levels (according to the different target user) and connected to the needed knowledge areas.

-the **Ergo-designer Training Model**: a table where, for each identified competence/level of the Cross Matrix, a list of topics, training methods, technologies and assessments are suggested.

- As results (and goals) of the **Dissemination** workpackage:
 - Realization of the Project web site (www.ergoman.eu), 5250 visits until 30/09/11
 - Realization of the project leaflet, about 2.500 leaflet distributed
 - Creation of an interested parties mailing list
 - Realization of the **First Ergoman workshop in Darmstadt** (Germany) with production of the proceedings (17 large industries representatives involved)
 - Realization of the **Second Ergoman workshop in Limerick** (Ireland) with production of the proceedings (about 30 SME representatives involved)
 - Realization of the **Third Ergoman workshop in Celje** (Slovenia) with production of the proceedings (representatives involved by university and some SME)
 - Realization of the **Final Ergoman workshop in Turin** (Italy) with production of the proceedings (representatives involved by 3 universities and 10 large industries)
 - Publication of 9 papers presented at International Conferences and Journals
- As results (and goals) of the **Exploitation** workpackage:
 - Definition of the exploitation plan and realization of some actions.
 - Decision of the consortium to share **for free the main results of the project** (Needs analysis, Cross Matrix profile, Training model)

During the project more about 3.500 among professionals, workers and students have been already involved or informed about the project.

4. Partnerships

The partnership was composed by members coming from 4 European countries:

- **COREP - Consorzio per la Ricerca e l'Educazione Permanente (P1)** , Italy, a no profit consortium specialised in high level training and continuing education
- **TUD - Technische Universitat Darmstadt, (P2), Germany** which Institute of Ergonomic enjoys a worldwide reputation
- **CRF - Centro Ricerche FIAT, (P3) Italy**, involved in the design an development of workplaces and work activity of factory lines
- **UL- University of Limerick, (P4) Ireland**, with a strong tradition of researches and applications in the ergonomic field
- **Vivapen, (P5) Slovenia**, a SME producing writing instruments.
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The added value represented by this multi-country partnership has been:

- the different – and wide - expertises of the consortium of members (two universities, an educational centre with deep connections with both the Academic and Industrial world, a research centre of one of the largest factory group in Europe and a small enterprise coming from a new EU member state);
- the several connections – at a national and international level – of the partners has put in place a wide network in the field of Ergonomics and safety: companies, stakeholders, policy makers, universities and associations, involved in the project in the analysis of the needs, in the competence profile building, in the validation of the profile, in the testing of the training model and –of course- in dissemination and exploitation activities.

The partnership has worked a lot both with *in praesentia* meetings (five coordination meetings have been organised), and with an electronic collaboration, realized through:

- an Ergoman mailing list, created in order to manage communication between partners
- a Skype group for the virtual meetings (usually twice per month),
- a virtual platform, to share documents and have a common virtual space to work.

The collaboration between partners has a strong component not only in writing the deliverables, but also in approving them.

5. Plans for the Future

The importance of the profile of the Process Ergo-designer as a professional figure mainly consists in the fact that his work has a deep impact with the health and safety of a large number of workers. For this reason the ERGOMAN partnership considers the exploitation of the results a crucial element of the project. Hence the exploitation plan details how the results will be used post project.

Valorisation comprises dissemination and exploitation and forms a very important part of European Commission and other agency funded projects. Exploitation is concerned with how the results have been and will be used and this requires a careful planning of activities.

The short term plan will see exploitation of the Ergoman project results within training programmes of the universities and industry partners in the current project. This has been achieved to a highly level already by the conclusion of the project with very positive results. The tangible exploitable results of the project have lent themselves to efficient exploitation, especially the key deliverables around needs assessment, profile building, the training model and the validation. But the non tangible results, especially those aligned with methods and experiences have also been exploited to a high degree in this short term span to date. Furthermore, the partners have engaged in strong European Collaboration efforts before the end of the project, mainly in the FP7 research area.

The medium and long term exploitation of the Ergoman results will build on those completed to date. Achievement of the medium and long term exploitation goals will concentrate on stakeholder networks outside of the Ergoman project consortium, especially professional bodies such as CREE, Industry networks both national and international, training networks, safety bodies and national and international safety and training policy bodies. While the current plan details the achievements to date and the future plans for the exploitable components and routes to exploitation, this current deliverable is considered a live document reflecting the dynamic nature of exploitation. Table 1 details the current exploitation network.

Table 1 Exploitation network

Body	Website
ADAM Portal	www.adam-europe.eu/adam/homepageView.htm
AIAS (Associazione Professionale Italiana Ambiente e Sicurezza)	www.aias-sicurezza.it/
AIDII (Associazione Italiana degli Igienisti Industriali)	www.aidii.it
AMMA (Aziende Meccaniche Meccatroniche Associate)	www.amma.it
ARPA Piemonte (Regional Agency for environmental protection)	www.arpa.piemonte.it/
ASP (Association for the Scientific and Technological development in Piedmont)	www.asp.torino.it
Berufliche Bildungsinstitut (BiBB)	www.bibb.de
Centre for Registration of European Ergonomists	www.eurerg.org
Chambre of Commerce of Turin	www.to.camcom.it
Corep	http://www.ergonomia.corep.it/
Economic Association for Safety and Health at Work - GZVZD	http://www.zvzd.si/
Engineers Ireland	www.engineersireland.ie/

Ergonomic group for automotive industry	www.autoerg.de
European Factory of the Future Research Association	www.effra.eu
European Trade Union Confederation	www.etuc.org
Federation of European Ergonomics Societies	www.fees-network.org/
Fondazione Ordine degli ingegneri della Provincia di Torino	www.foit.biz/
German Ergonomic Society	www.gfa.de
German Society for Occupational Medicine	http://www.dgaum.de/
Health and Safety Authority	www.HSA.ie
Holistic Center for Ergonomics	http://www.eh-center.si/
INAIL (Istituto Nazionale Infortuni sul Lavoro)	www.inail.it
Industrial Union of Turin	www.ui.torino.it/
Institute of Ergonomics and Human Factors	www.ergonomics.org.uk/
Institute of Occupational Safety	http://www.zvd.si/
Institute of Occupational Safety and Health	www.iosh.co.uk
International Ergonomics Association	www.iea.cc
Irish Business Employers Confederation	www.ibec.ie
Irish Congress of Trade Unions	www.ictu.ie
Irish Ergonomics Society	www.irishergonomics.com
Irish Small and Medium Size Enterprises	www.isme.ie
ISPESL (Istituto Superiore Prevenzione e Sicurezza sul Lavoro)	www.ispesl.it
Italian Workers' Compensation Authority	www.inail.it/
Laboratory of Engineering of Neuromuscular System and Motor Rehabilitation	http://www.lisin.polito.it/ver_it.htm
Laboratory of Ergonomics, Faculty of Organizational Sciences, University of Ljubljana	http://www.fov.uni-mb.si/Raziskovanje/Raziskovalnicenter/Laboratoriji/Laboratorij-za-ergonomijo
LEAS The Laboratory of Applied and experimental ergonomics	http://www.leas.unina.it/
MESAP (Meccatronica e Sistemi Avanzati di Produzione-Italian Regional Innovation pole)	www.mesapiemonte.it
National Body for Standards	http://www.uni.com/it/
National journal of Occupational medicine	http://gimle.fsm.it/
National Standards Authority of Ireland	www.NSAI.ie
National Training Agency in Ireland	www.fetac.ie
NETVAL. Association of the Italian universities involved in the valorisation of the results of the public research	http://www.netval.it
Ordine degli Ingegneri di Torino	www.ording.torino.it/
PhD School in Human and Social Sciences	http://dott-su.campusnet.unito.it/cgi-bin/home.pl/View?doc=organizz_indirizzi_applicata_ergo.html
Piedmont government	http://www.regione.piemonte.it/innovazione/assessorato.html
POLITO (Polytechnic of Turin)	www.polito.it
Proton network, the European Knowledge Transfer Association	www.protoneurope.org/
SIE (Italian Society of Ergonomy)	www.societadiergonomia.it/
Supply Network Shannon	www.snshannon.com
TECOS Slovenian Tool and Die Development Centre	www.tecos.si
Torino Wireless (ICT Italian Regional Innovation Pole)	www.torinowireless.it/

UNITO (University of Turin)	www.unito.it
UPO (University of the Oriental Piedmont)	www.unipmn.it
Virtual Reality and Multimedia Park (Multimedia Italian Regional Innovation Pole)	www.vrmmp.it/

6. Contribution to EU policies

The project is in line with the Priority 4 of Leonardo da Vinci Programme related to the development of vocational skills considering the labour market needs.

The will to create a new professional, the designer of ergonomic production processes and workplaces (ergo-designer), will in fact have a strategic impact on all industrial product designers.

Identified competences and methodology in ERGOMAN -keeping into account the European dimension- try to establish a high quality reference model for lifelong learning of this target, that could be used by ergonomics centres and companies, networks and universities (starting from CREE, SIA, etc.).

The project identified detailed and effective ways to improve the continuing education system. The project involved the high level of educational systems and industries in order to meet the real target needs and build a solid cooperation among them.

Effective links with other organisations in Europe, like International Ergonomics Association, SIE, CREE, have been exploited and further developed to largely inform about the developed training model usable to reach skills and competences needed and identified in the new **ergo-designer** profile.

The project succeeded in creating a network among companies, universities, centres of excellence and professionals interesting to the Ergonomics area, specifically related to work production sites.

Results of the project are exploitable in all countries of Europe because the professional profile is finalised to respond to the industrial needs and to the standards at European level.

The uniform approach to the ergonomic and safety problems coming from the network (another result of the project) could guide and push standards and legislation towards the improvement of working condition in uniform and organic manner. The project included the development of a training model to build competences of professionals at European level for a concrete and effective application in designing of ergonomic work processes/workplaces. The model has been also generalised in order to develop different professional profiles able to operate at European level. English language has been selected in order to have as much as possible integration of the knowledge and to spread as much as possible the results of the project.

