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A BRIEF HISTORY
The Mondragón Higher Polytechnic School was created in 1943 on the initiative of Father José María Arizmendiarieta, Founder of the Mondragón Cooperative Experience. It has grown constantly from the outset, also giving rise to the creation of many innovative business experiences.

A major landmark in the history of the School was the founding of the Mondragón cooperative movement’s first industrial cooperative society by five of its technical engineers in 1956: ULGOR, S. Coop.

Another milestone was the creation of the industrial cooperative society ALECOP in 1966, which enabled students to combine their studies with work at a company.

Later on, in 1972, internationalisation took place when the first university exchange programmes were organised with centres abroad. The School has also been actively involved in numerous international Training and Research & Development projects since 1986.

1974 marked the creation of the IKERLAN Research Centre, which is now one of Spain’s most cutting-edge technology centres, employing some 200 researchers.

In 1983, the Gizabidea Private Educational Foundation was recognised, posthumous work of Fr. José María Arizmendiarieta, and it took over the running of the School’s buildings.

The School has also played an active role in other socio-corporate initiatives over the last three decades, such as DIARA, a pioneering Industrial Design company founded in 1985, and various education centres. More recently, in 1996, the company CEI-SAIOLAN was created as a business incubator for new enterprises in advanced sectors, although this activity had already been delivering benefits since 1984.

In 1995, the Higher Polytechnic School became he first university centre in Spain and one of the first in Europe to obtain the ISO 9001/1995 Quality Certificate.

Mondragón University (Mondragón Unibertsitatea) was created in 1997, together with two more university centres in the Alto Deba area: ETEO S. Coop. in Oñati and Irakasle Eskola S. Coop. in Eskorialta, now respectively known as ENPRESAGINTZA and HUHEZI.

In 2002, in collaboration with the Fundación Goierri the EPS campus in Ordizia was opened.

The Silver Q Award was received for the 2003-2004 academic year, with a score of over 400 points in an external evaluation conducted by the EUSKALIT Foundation.

In 2008, the School was the first Basque University to adapt its engineering studies to the new European Higher Education Area.
September 2010 saw the official opening of the Centre for Technological Research and Innovation in Electronics and Embedded Systems, located at the Garaia Innovation Park and which combines research and training in the fields of electronics, computer science and telecommunications.

In September 2013, the EPS in alliance with Orona Ideo opened the new Donostialdea campus in the Fundación Orona building.

In July 2014, AUDIT Certification was awarded following the assessment by UNIBASQ and ANECA.

**COMPOSITION OF THE HIGHER POLYTECHNIC SCHOOL**

The legal name of Mondragón University’s Higher Polytechnic School (EPS) is Mondragon Goi Eskola Politeknikoa (MGEP). It is a mixed cooperative with three types of member/s in equal numbers:

- **Working partners.**
- **User partners** (students).
- Collaborating partners (companies and local government bodies).
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The Assembly, which is its ultimate decision-making body, and the Governing Board, which establishes its lines of action, are both made up of equal numbers of these three types of Partners. This structure enables the students and companies to become directly involved in running the centre.

Bearing in mind that EPS’s main mission is to train students for a professional career in an industrial environment, the legal formula of the mixed cooperative, which has integrated to the business world and mainly cooperative societies in our case, has been an essential factor in its constant evolution and adaptation to external demand.

In addition, the real possibility for our students to carry out training in rotation, through the ALECOP (study-work) model, gives added value throughout our development. As too does the performance of end-of-degree and master’s projects carried out directly in companies, or at the EPS itself in R&TD projects under contract with companies.

The employment status of the EPS teaching staff is equivalent to that of professionals belonging to an industrial cooperative. Specifically, aspects such as the working calendar, timetables, wages and the staff promotion system are all equivalent.
With the aim of providing information to our members and making our School known to society in general, we have drawn up this report on the most relevant events occurring in the 2013-2014 academic year. During this year, we increased the number of training activities on offer for young people and professionals, as well as our own research programme. As regards curricular education, we started up the first year of the three new Engineering degrees: Biomedical Science, Energy and Eco-Technologies in Industrial Processes. A year in which the new Donostialdea campus was opened in Orona Iidea.

A very positive balance since although we are still in a period of economic crisis filled with uncertainty, we have achieved 1.5% growth compared to last year. The 2013-2014 academic year began with a severe emotional and economic blow from the bankruptcy of Fagor Electrodomésticos, but by all partners and contributors pulling together we were able to end the year on a high note.

The EPS was not unaffected by the situation caused by the bankruptcy of Fagor Electrodomésticos, and it is at times like this that our mission to transform society takes on most meaning, ratifying our commitment to the cooperative model, just as we have done over the last 70 years, with a valid and competitive model, which promotes the development of a fairer and more sustainable society. A cooperative model that serves to strengthen our commitment to the training of young people and, as an active agent in the transformation of the more than 500 companies in the Basque Country with which we cooperate each year, through our curricular and continuing education activities and research and transfer projects.

We are now entering a new period, in which science, technology and innovation are to be considered as global strategies, country-wide strategies for the economic development of Euskadi, and it is here that institutions like the School should align their activities to guarantee the current and future competitiveness of companies in the Basque Country and the MONDRAGON Corporation in particular.

This new period also coincides with reflection about the MONDRAGON of the future, and the cooperative experience. A cooperative experience which, in the words of Fr. Jose Maria, could be understood as an economic movement that makes use of educational action, or as an educational movement that makes use of economic action. In this project for the future and as it was in its early days, the School aspires to play a relevant role in the MONDRAGON of the future.

We wish to highlight the support received in the 2013-2014 academic year from the Basque Government through its University Plan and through the Education, Linguistic Policy and Culture Department, the Economic Development and Competitiveness Department and the Employment and Social Policy Department. We would also like to mention the funding received from the Guipuzcoa Regional Government’s Innovation, Rural Development and Tourism and Environment and Planning Departments and, last but not least, the Central Government through the Ministry of Education, Culture and Sport, the Ministry of Industry, Energy and Tourism and the Ministry of Economy and Competitiveness. This funding enables us to improve the training given to our students, qualifying them to become a driving force for the changeover...
Our successful response to the challenge of maintaining a university model committed to local business and to training its professionals is reflected by a 3% growth in our Continuing Training programme. In 2013-2014 more than 300 courses were attended by approximately 3,000 professionals, and more and more companies are asking us to provide tailored training, including a professional development plan and backing in the use of methods and tools.

As regards Research and Transfer, we uphold our commitment to improving company competitiveness in the Basque Country through the development of our Collaborative Research model. The main proof of the value added by the EPS to companies lies in the fact that during 2013-2014 60% of this research was funded by businesses.

14 theses were read this year and 96 theses are currently being prepared, 72% of which are entirely funded by companies. Regarding scientific production, in 2013-2014 we published 29 articles in publications included in the Journal Citation Report (JCR), 45% of which corresponded to first quartile publications.

A University model in line with business requirements, the development of new strategic areas, the Donostialdea campus, etc. New challenges will arise in forthcoming years, although we will tackle them from the perspective of a sustainable economic model, obtaining collaboration and support from MONDRAGON, collaborating companies and local government bodies to maintain our spirit of providing higher education for all. In the words of Fr. Jose Maria, “making the most of the talent of our young people, whatever their personal or family economic status, is a basic premise of any society, and
education is the key to a successful future for our young people and our society as a whole”. More than 2,000 young people received university-level training at the School during the 2013-2014 academic year, with courses including Degrees and PhDs.

All these challenges were firmly geared to the transformation of society through comprehensive training and by generating and socialising knowledge in the scientific and technical fields.

As regards the economic and financial situation, our total income for 2013-2014 was €27,550,000, an increase of 1.5% compared to last year, which we can consider to be very positive given the backdrop of the economic crisis.

Legal surplus amounted to €228,000, after provision for the COFIP (Mandatory Contribution for Purposes of Public Interest) and payment of interest on the contributions.

Common investment made during the year amounted to €828,000, slightly lower than last year’s figure and it was basically financed by subsidies from the MONDRAGON Corporation’s Inter-Cooperative Education and Promotion Fund (FEPI) and the Basque Government.

The Balance Sheet at 31-08-2014 showed €57,487,000 with solvency and independence ratios worthy of mention and positive evolution.

Lastly, we would like to stress that none of these activities would have been possible without the participation and commitment of the 453 people who have led the Mondragón Higher Polytechnic School project with enthusiasm, respect and responsibility. This is an educational project geared to the development of a free society, committed to its future.
POLYTECHNIC INSTITUTE

>> DEVELOPMENT OF THE ACADEMIC ACTIVITY

Vocational Training continues to be an important part of academic activity at MGEP. Six university-level courses have been taught, belonging to the four professional fields most directly connected with the local industrial sector: Mechanical Manufacturing, Electricity and Electronics, IT and Communication, and Installation and Maintenance.

In the 14 groups studying the university-level courses, 239 students were trained. During this academic year, all courses that were taught corresponded to LOE (Organic Law on Education) degrees, except for the end of the degree in Maintenance of Industrial Equipment and Automatic Regulation and Control Systems corresponding to LOGSE (General Organic Law on the Education System) degree courses. 100 students completed their studies and were awarded their degree.

In addition, in collaboration with the MONDRAGON group and the Basque Government’s Vice Ministry for Vocational Training and Lifelong Learning, the degree in Industrial Mechatronics has been designed in the form of a part-time offer (to be able to combine work and study), to meet the requalification requirements of partners of Fagor Electrodémiticos in particular and the MONDRAGON Group in general. The first course will begin in 2014-2015.

A fundamental element of the courses is Workplace Training (WT), which enables both students and work experience tutors to work directly with companies. A total of 100 students undertook Workplace Training at 46 different companies. Also, in collaboration with HETEL (the Association of Vocational Training Centres created by Social Initiative), 6 students trained at companies abroad as part of the ERASMUS programme in countries such as Italy, the Netherlands, the UK and Poland. Furthermore, a group of students and teaching staff from different degree courses travelled to Eindhoven for the FTC competition organised by Lego, where the assistance of Danobat Group, Mondragón Assembly, Fagor Arrasate, Fagor Automation and Grupo Mondragón was essential.

Additionally, 5 students obtained their degrees this year through the work-study courses run by the Basque Government’s HEZIBI programme, with a further 7 embarking on the programme before completing their first year of study.

The general level of satisfaction of our students is high, both with the academic studies carried out at MGEP, particularly the practical sessions and group projects, and the Workplace Training, and these are key indicators for our activity.

>> INNOVATION IN THE TEACHING-LEARNING PROCESS

During 2013-2014, we began the programme for redesigning learning processes based on the achievement of results from learning. This knowledge will serve as a base for the professional skills that students have to master to participate in work environments.
sessions, as well as projects for innovation. The projects for innovation for this academic year are:

- Micromanufacturing, in collaboration with HETEL in the BETEKU project.
- Electrical innovation in the new alternative propulsion engines in automotive.
- Machining of non-conventional materials.
- Sensor technology and data processing to control efforts.

The latter three projects were piloted by the TKNIKA Vocational Training Innovation Centre in collaboration with other Vocational Training centres:

>> ENTREPRENEURSHIP

This academic year we continued our activity with the entrepreneurship working party, geared to motivating the entrepreneurial culture. Our participation in TKNIKA’s Urratsbat scheme enabled us to enhance this area through exchanges of experience.

The following activities were held:

- Entrepreneurship awareness-raising lectures.
- Entrepreneur’s Day, with activities to motivate entrepreneurship and guest speakers.
- Procurement of complementary training for the students’ professional development.
- Finding employment opportunities on today’s complex market.
- Empowerment for creation and launch of the students’ own business ideas.

In the academic year 2013-2014, all of our Degree Courses
took part in the “IKASENPRESA” project. This is a learning tool based on practical experience (development of a business project) and interaction with external agents. The project includes an “ENTREPRENEUR FAIR” which was held in February and involved all the centres participating in the scheme. The aims of this project were to:

- Foster development of entrepreneurial skills.
- Give students the chance of finding out about local institutions, entities and companies and contacting them.
- Help clarify misconceptions regarding entrepreneurship.

In addition, a group made up of one female student and two male students from the second year of the Management of Networked IT Systems degree course developed an IT-based entrepreneurial business initiative, which they will start to run in September 2014.

>> RELATIONSHIPS WITH OTHER CENTRES AND ENTITIES

As an approved centre, in addition to our working relationship with the Basque Government’s Vice Ministry for Vocational Training and Lifelong Learning, we also participate in different schemes set up by the Guipuzcoa and Lanbide Regional Government.

We liaise with educational centres and associations in our region and in other areas. This includes membership of HETEL, the Association of Vocational Training Centres created by Social Initiative, which is present in numerous regions of the Basque Country.
ENGINEERING

In the 2013-2014 academic year, we offered 9 Degree courses, 5 Master’s Degrees and one PhD programme adapted to the European Higher Education Area (EHEA). These were as follows:

• Degree in Mechanical Engineering.
• Degree in Engineering in Industrial Design and Product Development.
• Degree in Engineering in Industrial Organisation.
• Degree in Engineering in Industrial Electronics.
• Degree in Computer Engineering.
• Degree in Engineering in Telecommunications Systems.
• Degree in Energy Engineering.
• Degree in Engineering in Eco-technology in Industrial Processes.
• Degree in Biomedical Engineering.

• Master’s Degree in Business Innovation and Project Management.
• Master’s Degree in Strategic Product Design and Associated Services.
• Master’s Degree in Industrial Engineering.
• Master’s Degree in Energy and Power Electronics.
• Master’s Degree in Embedded Systems.

• PhD in Mechanical Engineering and Electric Power.

ANECA (National Agency for Assessment of Quality and Accreditation) and UNIBASQ (Agency for Assessment of Quality and Accreditation of the Basque University System) favourably assessed the Degree in Mechanical Engineering the ACREDITA PLUS programme, awarding the international stamp “EUR-ACE European Accreditation of Engineering Programmes”. The Degree in Industrial Electronics was also favourably assessed under the ACREDITA programme.

We were also awarded certification for the Internal Quality Guarantee System under the ANECA AUDIT programme.

>> ACADEMIC ACTIVITY

All the academic activities planned for 2013-2014 were carried out in full compliance with the Management Plan.

In our work to train skilled young people, 1,853 students studied Engineering at the EPS, with 542 of them graduating.

From a quality viewpoint, the good academic results obtained in general on both the degree and master’s courses are noteworthy, as is the students’ satisfaction with PBL (Project Based Learning) methodology and project development. These active methods enable the students to develop key professional skills through individual and team-based learning.
Our School is characterised by providing practical, business-oriented training within an increasingly international framework. To advance in this challenge, we continue to develop and implement our own distinctive educational model, which has the following cornerstones:

- Intensive use of active methods in the teaching/learning process.
- A model based on developing and acquiring skills and learning outcomes, rather than a subject-based model.
- Continuous overall assessment of students as a key tool for skills evaluation.
- Work-study alternation with the work practice taking place in companies.
- Studies and end-of-degree projects abroad.
- Teaching in three languages.
- A change in role of the teaching staff and students.

For students to discover the usefulness of theoretical principles and to develop technical skills, we use the following teaching methods for all the subjects on our courses:

- Theory classes and lectures in the classroom.
- Classroom exercises. Problem-solving as a group, individually or in small teams (cooperative learning).
- Practical sessions in the computer room. Scheduled practical activities using a software application as a working tool.
- Practical work in laboratories. When equipment or machinery needs to be used for testing, measuring, etc.
- Case work and/or studies. Students draw up a report and present it in class.
- Shared projects called PBL projects. One project is carried out each semester, concentrating on knowledge development and the practical application of technical and across-the-board skills.
- POPBL (Problem Oriented Project Based Learning) in Degree courses. Students are posed a problem, which they must solve through a project.

Skills Development and Assessment

Some of the most notable aspects of the skills assessment system are as follows:

- **Continuous assessment**: Written/oral exams, tests, assignments, projects, etc. are carried out and assessed throughout the semester, taking into account all the teaching activities that have taken place during this time.
as opposed to a single assessment milestone such as an end-of-semester exam.

- **Feedback**: This is a key component of the learning process. The students receive assessment and individual guidance throughout the semester from their teachers.
- **Re-sits**: A second chance to pass any activities the students may have failed is scheduled within the actual semester, eliminating the September retakes.
- **Global assessment**: Assessment based on the student’s general performance and skills acquisition throughout the semester or year, based on a joint assessment by the teaching staff.

**Multilingualism**

In the first year, technical English is included as a study subject; after this, oral and written communication in English is included in the various courses as an across-the-board skill in project presentation and defence; finally, some technical subjects are taught in English.

50 subjects were taught entirely in English this year, with satisfactory academic results.

**Work-Study Alternation**

A large number of students at the School combine their studies with work placements, either working in the actual School facilities as assistants in the research departments and laboratories or at other cooperatives through ALECOP S.Coop. A total of 169 engineering students combined work and study in the 2013-2014 academic year.

**>> END-OF-COURSE PROJECTS**

The main aim in the end-of-course project area was to obtain quality applications from companies that were suited to the students’ professional profile, with well-defined objectives, an adequate dimension according to the length of the projects and with the highest possible technology level, meeting their needs.

Significant data include the fact that a total of 324 students completed their end-of-course projects in the 2013-2014 academic year. Through the ERASMUS Internship Programme, 39 end-of-course and Master’s projects took place in European countries and 2 students also did theirs in India and China.

**>> PhD COURSES**

In the 2013-2014 academic year, the School also offered numerous post-graduate courses. 96 doctoral students were registered and 14 theses were read, 6 of them obtaining the European Doctorate Mention.
The doctoral theses read during the academic year were as follows:

**Engineering Doctorate Programme**

- **BEAMURGIA BENGOA, MAITE**
  Design and implementation of dynamic genetic algorithms for lift group control with passenger information to improve time and energy performance with adaptation to traffic patterns. EUROPEAN DOCTORATE MENTION.

- **BERASATEGUI AROSTEGUI, JOANES**
  Analysis of the influence of fluid and conditions for movement in the response of magnetorheological shock absorbers.

- **COSTA PEREIRA, SOL CAROLINA**
  Numerical characterization study of pressure drop and heat transfer phenomena in woven wire matrix of a Stirling engine regenerator.

- **GARITANO GARITANO, IÑAKI**
  Behavioral Modeling for Anomaly Detection in Industrial Control System. EUROPEAN DOCTORATE MENTION.

- **GOMEZ SANCHEZ, CHRISTIAN**
  Bioabsorbable nanocomposites for biomedical applications.

- **IRAOLA IRIONDO, UNAI**
  Electro-thermal optimization of an energy storage system based on li-ion batteries. EUROPEAN DOCTORATE MENTION.

- **LOPEZ DE VERGARA VICENTE, UNAI**
  Microwave Curing of Furan Resins Reinforced with Basalt Fibre: Characterization on Fire and Impact.

- **LOZARES ABASOLO, JOKIN**
  Semisolid forming of steel component for automotive industry. EUROPEAN DOCTORATE MENTION.

- **PUERTO MANRIQUE, PABLO**
  Development of intelligent control systems to increase productivity in grinding processes and guarantee the surface integrity of the part.

- **QUINTANA AZPIAZU, ION**
  Numerical modelling of cold crucible induction melting (CCIM) process and fabrication of high value added components of titanium and its alloys. EUROPEAN DOCTORATE MENTION.

- **SORIANO MORENO, JOSU**
  Understanding the machining of bone through the use of advanced techniques for studying the cutting process.

- **TRINIDAD NARANJO, JAVIER**
  Development of biodegradable magnesium alloy scaffolds for tissue engineering. EUROPEAN DOCTORATE MENTION.
PhD Programme in Mechanical Engineering and Electric Power

- **SANCHEZ RUIZ, ALAIN**
  Design and analysis of high power conversion structures for medium voltage systems and high fundamental output frequency.

- **SARASKETA ZABALA, ELIXABET**
  A novel approach for lithium-ion battery selection and lifetime prediction.

**INTERNATIONAL RELATIONS**

Activity in International Relations during 2013-2014 continued to develop the actions started in the previous year but with emphasis not only on those related to external mobility but also to the internationalisation of students who have not had this experience, this is the concept “Internationalisation at home”. Specific actions were:

- Encouraging around one third of Degree and Master’s students to have an international experience of at least one semester during their period of training.
- Promotion of “Internationalisation at home” through the inclusion of content in the teaching programmes, the inclusion of Incoming students in university activities and life and the establishment of a semester taught completely in English in each Degree course.
- Reaching a number of foreign exchange students in line with the size of the EPS so that they contribute to the Internationalisation of the Campus and it becomes a sustainable activity.

- Renew and activate collaboration agreements with foreign universities under the new European “Horizon 2020” strategy. In particular, work in the participation of strategic networks and alliances with other institutions which, in some cases, can lead to joint degrees.
- Strengthen the participation of EPS in the process of internationalisation of local companies, both through its collaboration in the training of a source of qualified personnel and by participating in joint actions with foreign institutions and/or companies.
- Continue to coordinate and participate in European Projects like the current Erasmus Mundus LAMENITEC (with Latin America) and INTERWEAVE (with Asia). Participation in schemes under the new “Horizon 2020” framework programme is necessary to increase the visibility of the EPS.

Below are details of the outcome of some of these actions during 2013-2014:

**a. Actions to promote mobility among EPS students.**

- Monitoring and enhancement of existing double diplomas:
  - INSA Toulouse (France): Master in Industrial Engineering and Master in Embedded Systems
  - ENSEEIHT Toulouse (France): Master in Energy and Power Electronics and Master in Embedded Systems
  - ECN Nantes (France): Master in Industrial Engineering
  - University of Skövde (Sweden): Master en Embedded Systems / Web Computing

- Management of study abroad (4th year of Degree course, 2nd year of Master’s and PhD programme).

Of the 170 people who applied to study abroad in 2013-2014, 121 were selected on the basis of their academic record and foreign language skills and they were allocated to the following programmes:

- Study Mobility: 66
- Project Mobility: 39
- PhD Mobility: 10
- Erasmus IP internship: 6

The countries and/or cities in which our students completed their placements are Spain (Valencia), Switzerland, Finland, Belgium,
Sweden, Germany, the Czech Republic, Denmark, Ireland, Poland, France, the Netherlands, Italy, Turkey and Mexico.

b. Actions to improve Internationalisation at home.

- 85 students from abroad and other parts of Spain are currently studying at the EPS, under ERASMUS, ERASMUS MUNDUS and SICUE programmes and through inter-university agreements. The visiting students came from the following countries and cities: El Salvador (2), Colombia (8), Nicaragua (8), Honduras (4), Guatemala (4), Turkey (13), Malaga (2), Mexico (34), Germany (1), Poland (5), Finland (1), Sweden (1) and France (2).
- Activities were organised for welcome and integration through the Buddies system.

c. Actions intended to support internationalisation of companies and society.

- As part of the backing we provide for the international expansion process of Basque companies, 9 students carried out their end-of-course and end-of-degree projects at Basque companies abroad: United Kingdom (2), India (1), Czech Republic (3), China (1), France (1) and Romania (1).

CONTINUING TRAINING

The EPS offers a wide selection of high-quality training programmes, with tailored, flexible all-round organisation. These include master's degrees, expert courses, advanced courses, specialisation courses and in-company training, all with the aim of meeting the needs of companies and the professionals who work for them in order to increase their technological, management and innovation capacity.

2013-2014 saw the participation of 2,987 professionals in the 291 training programmes that took place, giving a total of 13,279 hours of training. More and more companies are coming to us to obtain tailored training combined with a professional development plan and support in the use of methods and tools. During this academic year, 326 companies placed their trust in us. 113 teachers supported these professionals in the learning process and the average grade in terms of satisfaction was 8.14.

Two courses associated with professional certificates were run in the 2013-2014 academic year as part of the scheme organised by Lanbide, the Basque employment service. A total of 1,030 hours of training took place on the courses in Cutting Machining and Assembly and Use of Capital Equipment and Industrial Machinery. The Hobetuz scheme offered 9 courses giving a total of 540 hours of training. A total of 122 professionals took part in these two vocational training programmes for employment.

In February 2014, the third Executive MBA in Operations Management was run. A total of 10 professionals from various companies took part in this training programme, which included lectures by internationally-acclaimed management and enterprise development speakers.

The 2013-2014 academic year also saw the twelfth edition of the Advanced Course in Maintenance Management. In the area of quality a Design of Experiments DOE programme was developed and an Advanced Course in Continuous Improvement Programmes Lean-Six Sigma Black Belt level. In the area of Production Engineering, various Advanced Industrial Management programmes took place both in our open offer and as tailored courses for several companies.
After the award was made to several members of the EPS teaching staff of the Demand Driven Planner Certificate, various conferences were held to transfer this methodology to companies. This enables our experts to train professionals in an innovative method for Materials Management, resulting in a dramatic reduction in stock levels, improved service and support for the implementation of this method in their companies.

EPS believes that project management is a key competence for enterprise development, as it forms an essential part of companies’ projects for change and innovation. In the 2013-2014 academic year the PMP (Project Management Professional) Certification Programme was run once again in Bilbao and in Zaragoza. A tailored in-company course was also held with the same objective. Over 100 professionals have already been awarded certificates and 85.3% of PMP certificate holders in the Basque Country trained with us. PMP certificate holders can collect PDUs awarded by the University (unit of measure used to quantify training activities and time spent in project management) as the EPS has been awarded certification as a Registered Educational Provider (R.E.P.) by the Project Management Institute (P.M.I). During this year 5 PDU training days were held. With the launch of a new edition of the advanced course and the expert course the aim is to respond to an area of knowledge that is becoming increasingly important in organisations.

In the field of Mechanical Engineering, more than 20 open courses have been taught in subjects including Industrial Design and Product Development, Materials, Manufacturing Processes and Maintenance. An increasing number of companies are turning to us for needs analysis and tailored course design, and we provide practical, applied guidance to offer solutions to their problems. In the 2013-2014 academic year, 14 in-company courses were run with this approach.

This year saw the 4th edition of the “Design Konferentziak” being held, where 69 professionals met to create a forum for reflection on service design. This new discipline of design changes how products and services are conceived, with
products and services being understood as part of a unique comprehensive experience offered to customers. This has made Service Design into a new business innovation strategy.

As in previous years, the EPS ICT team organised and hosted more than 90 conferences connected with Digital Marketing as part of the Enpresa Digitala initiative. They took part in the Enoturismo Rioja Alavesa Forum, the AFM Assembly (Machine Tools), in the Encounters between Mayors in Navarre, WP Cantabria, WP Valladolid, Euskal Encounter, Araba Encounter and Hernani, Bergara and Tolosaldea ICT weeks. The Indusmedia, Interdigitala and WP Euskadi conferences and 5 Technology Barnetegis were organised. As a training supplement, the ICT team of teachers supported 8 companies in the application of these Digital Marketing tools in their companies.

To cater to the demand for our new degree courses, we launched a new series of adaptation courses for the online Degrees in Mechanical Engineering and Industrial Electronics Engineering, in collaboration with the Official Experts and Engineers Association of Guipuzcoa (COPITIG) and the Official Association of Industrial Technical Engineers of Aragon (COITIAR). We also launched the second of our adaptation courses for the semi-hands-on Degree courses in Computer Engineering, Telecommunications Systems and Industrial Design Engineering. 103 professionals took part in these programmes during 2013-2014.

The EPS offers an Online Industrial Organisation Degree training plan so that students can obtain a double degree. It is geared to mechanical, electronics, electrical, chemical and industrial engineering graduates, and over 100 professionals are taking part in the programme.

To make our offer more flexible and enable professionals to undertake more tailored training, this academic year included 5 online training programmes: Steel Designation, Manufacturing Process Quality, Integrated Logistics, Lean Manufacturing and an Expert Course in Computer Security. Over the course of the 2013-2014 academic year, 5 new programmes were designed that can be viewed on the new web platform www.mondragon.edu/profesionales which shows the training catalogue for professionals for 2014-2015 with the new MONDRAGON UNIBERTSITEA brand.

**RESEARCH AND TRANSFER**

In an academic year that was genuinely made complicated by the economic crisis, which had an overwhelming impact on our environment, the EPS was able to continue to strengthen its activity of research and generation of knowledge in 2013-2014, despite the reduction of investment and support for research by the public administration. The two keys were, once again, the skill of the EPS researchers in aligning their technological abilities with business requirements and the ability demonstrated when it came to finding a comprehensive and multi-disciplinary response to these needs. In other words, effective coordination between the generation of knowledge and its transfer to businesses (which provide 60% of the 10.7 million euros earmarked for
Research and transfer, including 72% of the doctoral theses in progress.

The main proof of the value that the EPS adds to businesses is the fact that 60% of this research funded by businesses, mainly industries, is linked to the existence of a long term collaborative research programme. In the context of these Collaborative R&T programmes projects are taking place ranging from fundamental oriented research to industrial research and experimental development projects, which lead to innovative products, processes and services, in areas related to manufacturing technologies, innovative materials, energy, information and communication technologies, industrial design or management, with companies that are leaders in their sector, such as Orona, CAF, the Automotive and Components divisions of MONDRAGON Corporation, Fagor Arrasate, Ingeteam, ITP, Ampo, Fagor Ederlan, Ormaizabal, etc., but also with local SMEs that have fewer resources and require tailored services.

As for scientific production in 2013-2014, this period saw the publication of 83 scientific articles, 29 in publications included in the Journal Citation Report (JCR), 45% of which corresponded to first quartile publications and another 45% to second quartile publications, which gives an idea of their quality. In addition, 3 new patents were granted. Most of these results are linked to theses that are in progress and they are indicators of the good work being carried out by the EPS researchers.

The Specialisation Plan has been maintained, financed by the Basque Government’s Department of Education, Language Policy and Culture. Also, competitive research programme performance has been very satisfactory with the following stand out data for active projects during the 2013-2014 academic year: 8 Etortek programmes under the Basque Government Department of Economic Development and Competitiveness, 5 Collaboration Challenge projects under the Ministry of Economy and Competitiveness and 10 under the European Framework Programme, as well as involvement in a total of 29 projects under the Etorgai programme under the Basque Government Department of Economic Development and Competitiveness.

Lastly, it must be acknowledged that such achievements were fruit of the work of the researchers that comprise the 16 Research and Transfer Groups, grouped into the following Science-Technology units:
SCIENCE, TECHNOLOGY AND MATERIAL TRANSFORMATION PROCESSES

- High-Performance Machining.
- Advanced Material Forming Processes.
- Plastics and Composites Technology.

MECHANICAL BEHAVIOUR AND PRODUCT DESIGN

- Acoustics and Vibrations.
- Structural Mechanics and Design.
- Fluid Mechanics.
- Surface Technologies.

ELECTRICAL ENERGY

- Drives applied to traction and the generation of electrical energy.
- Energy storage systems.
- Electronic power systems applied to electrical energy control.

INDUSTRIAL MANAGEMENT AND DESIGN PROCESSES

- Innovation in Industrial Design.
- Industrial Management.

EMBEDDED SYSTEMS AND INFORMATION SYSTEMS

- Software Engineering and Web Engineering.
- Intelligent and Distributed Control Systems.
- Telematics.
- Signal Theory and Communications.

>> SCIENCE, TECHNOLOGY AND MATERIAL TRANSFORMATION PROCESSES

HIGH-SPEED MACHINING

The main goals of the High Performance Machining research group are to improve the machining production processes employed in different industrial sectors (automotive, aeronautics, health, machine-tool, moulds and dyes, etc.) and to generate new ideas for manufacturing innovative products or entering new businesses or markets.

The general strategy pursued is to create, together with other research groups at the EPS, multidisciplinary teams including personnel from companies, research centres and universities, with a view to providing an advanced scientific response to industrial problems with a view to transferring the knowledge directly or by means of highly qualified young people.

Such is the case with (I) the definition of machining processes including the optimum selection of working conditions, tools and fastening equipment, (II) the approval of machining processes based on customer requirements or (III) the pre-industrial development and evaluation of new machining technologies and products.

The group has broad experience in the analytical and numerical simulation of machines and processes, as well as in cutting-edge machining equipment for milling, turning, broaching and grinding processes, etc... and advanced experimental machining analysis techniques: high speed filming, thermography-based temperature measurement, scanning electron microscopy, etc.

The main work areas are machinability of materials, study of the cutting and modelling process, machining process design, high-velocity machining, micromachining, grinding, intelligent machining and biomachining.
ADVANCED MATERIAL FORMING PROCESSES

The general objective of the Advanced Material Forming Process group is the experimental characterisation, development and optimisation of materials, processes and tools that make it possible to produce parts that are adapted to the use for which they have been designed at the lowest possible cost. Experimental characterisation includes, whenever possible, the production of prototypes in the University laboratories and monitoring of processes in an industrial environment.

The group also works on the optimisation of forming processes through the use of monitoring and control systems adapted to each process. The aim is to reduce the influence on the final result of involuntary variations in the process parameters or of external agents.

Work is taking place on the development, application and experimental validation of behavioural models of materials adapted to the different processes (deformation, fusion, solidification, etc.) as a tool for optimising the process variables and the design of tools. Amongst others, there are multi-scale models that integrate mechanical, rheological, thermodynamic and microstructural evolution.

PLASTICS AND COMPOSITES TECHNOLOGY

The main objective is to create and transfer knowledge about composite structural applications that meet lightening/weight, cost and productivity criteria. Emphasis is placed on targeted research projects that develop plant-pilot level demonstrators or processes. The activity is organised into three areas:

- Advanced resin transfer processes (RTM); thermoplastic RTM (TP-RTM), compression RTM (CRTM) and hybrid material RTM (FML-RTM).
- UV curing technology applied to: Pultrusion, automated fibre placement (ATL) and filament winding.
- Deformation and fracture of polymers and composites: Stamping/thermoforming, Simulation of impact/damage and Morphing.

Industrial partners include companies from the machine tool sector (Fagor Arrasate), railway (CAF), civil engineering (Acciona Infraestructuras, Irurena), and sport (Orbea).

MECHANICAL BEHAVIOUR AND PRODUCT DESIGN

ACOUSTICS AND VIBRATIONS

The Acoustics and Vibrations team at the EPS works on the characterisation and analysis of vibration and acoustic emissions, with the aim of proposing practical solutions that optimise the vibratory and acoustic behaviour of industrial products and processes. Research activity is mainly focused on the following areas:

- Squeal sounds in brakes and clutches.
- Electrical machines.
- Monitoring of mechatronic actuators.
- FML (Fiber Metal Laminates) structures.

In addition to the research, transfer projects are also carried out for:

- Identification of noise and vibration sources.
- Optimisation of behaviour through vibratory and acoustic simulation, and experimental comparison.
- Sound quality.

STRUCTURAL MECHANICS AND DESIGN

Growing competitiveness means that not only is it necessary to create technical solutions to respond to market requirements, but that these solutions must also have as much added value as possible. On the one hand, structures are exposed to increasingly tough conditions, and on the other, they also need to fulfil an increasing number of functions.

The objective of this group is to contribute to the launch of robust products, providing material behaviour models together with techniques and numerical simulation tools that will enable the working behaviour of the products to be evaluated and optimised before their production begins.

In this sense, the group addresses the following aspects:

- Development of multi-functional structures.
- Obtaining behavioural rules for materials.
• Numerical methods.
• Finite element simulation (plasticity, impact, fatigue, thermal analysis and fluid-structure coupling).
• Experimental analysis.

FLUID MECHANICS

The EPS Fluid Mechanics Group was created in 2004. This group is currently involved in three lines of research: Thermal fluidics; Complex Fluids and Magnetorheological Materials, and it is classified as a type-A excellence group by the Basque Government Department of Education, Language Policy and Culture.

The group’s objective is to generate new knowledge in basic research as well as in development and to carry out their technological transfer in the midterm, within the collaborative research framework.

The activities developed by the three lines of research combine models and methods, both analytical and numerical, with experimental techniques to respond to problems of Fluid dynamics, Aerodynamics, Thermodynamics, and Heat Transfer, Microfluidics, Biotechnology, Transport Phenomena and Magnetorheological Material. The results of these activities have created new work synergies that materialise in collaboration with internationally renowned institutions, such as the European Space Agency (ESA), among others.

SURFACE TECHNOLOGIES

The aim of this group is to gain knowledge about and improve the properties associated with part surfaces including corrosion behaviour, tribological properties (friction, wear and lubrication) and optical or aesthetic and physical properties (thermal, electrical, magnetic) of products. This knowledge enables the working behaviour of the components or parts to be improved, reducing degradation or malfunctioning due to interactions with the atmosphere, working conditions and the properties of the components or parts themselves.

The main lines of work are as follows:

• Analysis of the working behaviour of the materials in relation to their surface properties (corrosion resistance, tribological properties, optical or aesthetic properties, thermal, electrical or magnetic properties, etc.)
• Development and control of materials, techniques and processes for advanced surface treatments and coatings, and optimisation of the current ones.
• Analysis, development and use of numerical simulation techniques and computer programmes as a tool for characterising the surface behaviour of the materials and improving the manufacturing processes associated with the products analysed.
• Development of micro-nano technologies and micro-nano parts in the sensor field.

>> ELECTRICAL ENERGY

The Electrical Energy Research and Transfer Unit focuses its activity on electrical energy management in applications aimed at distributed generation (generation, transmission and distribution), traction (railway and naval) or electrical capital goods (control of industrial processes, machine-tools, elevation).

The specialisation lines are linked to the area of power electronics and electrical machines, basic components of most electrical systems. The design area, linked to a detailed analysis of the final application, enables electrical-electronic equipment to be optimally designed and specified from the start of its development.

DRIVES APPLIED TO TRACTION AND THE GENERATION OF ELECTRICAL ENERGY

The aim of this research group is to develop the knowledge required for designing, modelling, simulating and controlling devices that use the principle of electromagnetism to function.
For the specific case of electrical machines, actuators and sensors, the aim is to master the process that includes the design, construction and production of the most suitable control system. The specifications for the design of these devices and their control system are specific for each application, and are taken into account from the first stages of development.

Thereby, the main issues to be tackled are:

- **Modelling, simulation and control of electrical machines**: design of vectoral, direct torque and specific power controls for each type of machine, as well as status observers, sensorless system design, adaptation of on-line and off-line parameters and automatic tuning of inverters.
- **Design of Electrical Machines**: design tools for electrical machines and actuators and analysis of their electromagnetic behaviour via advanced analytical models and finite-element techniques.
- **Protection and Diagnosis in Electrical Drives**: Implementation of off-line and on-line algorithms for drive protection and early detection of failures in the drive or the application.
- **Application analysis**: The need to specify the electrical machine and the control system makes it necessary to master the final application. Therefore, particular emphasis is placed on knowledge acquisition in the fields of wind energy generation, vertical transport and electrical traction.

**ELECTRONIC POWER SYSTEMS APPLIED TO THE CONTROL OF ELECTRICAL ENERGY**

This research group develops scientific-technological knowledge about systems based on Power Electronics applied to the control of electrical energy. The progress made in the manufacture of high-powered semiconductors and the development of new conversion topologies now allows the tackling of applications for the integration of Distributed Energy Resources in the electrical distribution network: electricity generating microsystems, electrical energy storage technologies, devices based on power electronics to improve the supply quality as well as resources that control the electricity consumption or demand.

The integration of power electronics in the electrical system enables the study of its transformation with a view to making the system more reliable, flexible and intelligent, and developing the concepts of distributed generation and active distribution.

The research group develops research activities in:
- Application of the new power electronics components.
- Development of new electronic converter topologies.
- Development of devices connected to the Medium Voltage network to improve supply quality.
- Study of electrical-electronic component coordination issues in the context of Distributed Generation.
ENERGY STORAGE SYSTEMS

The research carried out by the group focuses on the development of scientific-technological knowledge of electrical energy storage systems. It mainly encompasses electro-chemical systems based on technologies such as batteries and supercapacitors.

Advances in electrochemical storage technologies for portable systems like computers and mobile phones have led to a new niche of large storage applications that is still emerging. In this context, the research focuses on storage systems both on-board for electrical traction and stationary for electrical grid applications. In the latter, research is focused on both residential consumers and on transport and distribution. In this scenario, the integration of storage systems enables power fluctuations to be balanced and filtered when Generation does not coincide with Consumption.

The Energy Storage Systems research group develops research activities in:

- Complete electrical, thermal and mechanical design of storage systems based on electrochemical cells.
- Design of Battery Management Systems (BMS) for storage system monitoring and protection.
- Dimensioning of application-oriented storage systems.
- Management of the energy in networks that integrate storage systems and renewable energy.
- Electrochemical storage system feature analysis and experimentation.

INDUSTRIAL ORGANISATION AND MANAGEMENT

INNOVATION IN INDUSTRIAL DESIGN

The main aim of this research group is to use innovation in industrial design to provide added value for products and services, to develop innovative products of value for a constantly changing market and to redesign or adapt companies’ current products or production resources to different customers/users.

For this purpose, the following activities are carried out:

- Redefinition, strengthening or implementation of product development processes.
- Identification of user/customer and their needs.
- Complete, detailed product specification.
- Product conceptualisation using cutting-edge creativity techniques, and all aspects of Industrial Design.
- Product or productive resource design and/or redesign in accordance with different criteria such as: minimum cost, range variety on the basis of product platforms, assemblability, manufacturability, etc. throughout its life cycle.
- Development of prototypes and models.

INDUSTRIAL MANAGEMENT

The main objectives of the Industrial Management group relate to increasing the value added for value processes and chains developed in different industrial and non-industrial sectors, and improving the operation and quality of products, services and processes, together with efficient installation and organisational performance as a whole, in order to maintain and increase their competitive advantage.

Activity is focused on manufacturing engineering, industrial asset management, production management, project management, organisational models, reliability engineering, process improvement and optimisation, and the management of innovation and technological entrepreneurship.

This group also develops transfer projects and lifelong training activities in areas related to improving the management of key processes (production, innovation, logistics, etc.) business project performance excellence, product and process quality, as well as business operations efficiency management (personnel, maintenance, etc.) bearing in mind that organisations are based on people and that organisations need to manage change efficiently.

EMBEDDED SYSTEMS AND INFORMATION SYSTEMS

SOFTWARE ENGINEERING AND WEB ENGINEERING

Information technologies and the actual software applications are becoming increasingly important in business
management and product development, and today they are no longer auxiliary or peripheral aspects but key factors in companies’ competitiveness and the success of their products. The Software Engineering and Web Engineering research group focuses its research activity on two areas:

- Industrialisation of the software development process to reduce costs and improve the quality of software products. For this purpose, it focuses on software product lines and model-driven software development as development paradigms that provide numerous benefits regarding the development of traditional software, such as reduced development times, increased quality, validation from the initial stages of the development, etc.
- Web engineering: In this area, the group researches Semantic Web technologies and Linked data structures from the perspective of open systems (open source and open data) and the design and development of interoperable platforms based on web services and standards compliance, and the construction of Service-oriented architectures (SOA) to enable multi-platform and multi-device integration.

REAL-TIME EMBEDDED SYSTEMS

The EPS Real-Time Distributed Systems team focuses its research activity on two areas:

- Sensorisation, Learning and Reasoning: “Development of Systems which by using sensors (artificial vision, temperature, pressure, presence...) learn and adapt their behaviour to act autonomously”.
- Real-time Embedded Systems: “Optimisation of the development process of real-time embedded systems by introducing techniques that improve productivity and reliability”.

In order to tackle these two lines, the following knowledge areas have been defined:

- Learning, Deduction and Reasoning Models: Automatic Learning and Artificial Intelligence techniques (Data Mining, Case Based Reasoning, Fuzzy Logic, Neuronal Networks, Bayesian Networks, etc.)
- Distributed Systems, Communications, Middlewares: Standards such as CORBA and RMI to create distributed applications in different environments, etc.
- Concurrent Computing, Real-Time Panning: Real-Time Operating Systems for Built-in Systems with the aim of developing applications that control different critical processes.
- Design and development of Certifiable Embedded SW: Reduction of the costs of design and development of critical embedded systems using methodologies that are based on the re-usability of critical SW components.

TELEMATICS

The Telematics research group is a group of multidisciplinary scientists that works on various lines within EPS. It is an eminently cross-sector line that contributes to most of the research themes and actions envisaged by European and
national strategies in the fields of Energy, Transport, Climate Change, Intelligent Cities, Health and Information Society (the cloud, mobility, social media, data mining, etc.) It works on the following lines of research and knowledge areas:

- **Information Security**: The aim of this line of research is to tackle the new challenges that have arisen from the most recent developments and uses of information technologies, providing solutions to improve citizens’ confidence in the new CIT landscape through research in secure and reliable technologies. Our research group is contributing in areas such as the following: Security of social networks, security of embedded systems, SCADA security, security of critical infrastructures, security of industrial control systems, or security of mobile devices and networks.

- **Social Media**: The main objective of this line is the transfer of knowledge acquired in Digital Marketing, particularly Social Media, to companies in order to assist with better brand placement in national and international markets. As a result, work is carried out in the following areas: Brand monitoring, reputation management, reputation building, web placement, active listening, management of communities and social media metrics.

- **Data Mining**: This line of research focuses on applying the most advanced data-mining algorithms to various problems that we face in society and industry. More specifically, projects are developed for areas such as health, computer security, industrial processes, tourism, big data, linked data, etc. The knowledge areas covered by this lines are as follows: Data mining applications (classification, grouping, optimisation), opinion mining, content curation, emotion and sentiment mining.

**SIGNAL THEORY AND COMMUNICATIONS**

This research group is interested in applications that require signal treatment for communication, particularly wireless, image processing and systems and process monitoring. The results of this research are aimed at their incorporation in products and services.

The key technologies being researched in the field of local wireless communications are basically robust modulations for use in hostile environments. Within these technologies, the use of multiple sending and receiving antennas (MIMO) is one of the pillars of knowledge of the group. The group stands out due to the applied orientation that it has from its ability to implement these architectures in FPGA-SOPC and DSP.

The key technologies being researched in the image processing area are those geared to precision quality control, stereo vision and lasers in conjunction with other types of sensors (force, acoustic emissions), enabling overall control of the production systems.

The group also applies the techniques of signal processing in the area of identification, monitoring and inspection of component systems and processes. The advanced inspection systems developed are applied both in the industrial environment and in the field of biomedicine. Worthy of note are developments in inspection methods in the plant and the integration of sensors in components, usually operating in hostile conditions.
PUBLICATIONS

>> PUBLICATIONS IN INDEXED JOURNALS AND INTERNATIONAL CONFERENCES:

A new surgical drill bit concept for bone drilling operations

An extended elastic law to represent non-linear elastic

Analysis of residual stress and work-hardened profiles on Inconel 718 when face turning with large nose radius tools

Characterization of the linear viscoelastic region of magnetorheological elastomers

Computational Study of a Small Scale Vertical Axis Wind Turbine (VAWT): Comparative Study of Various Turbulence Models

Cutting process in glass peripheral milling

Determination of the molecular diffusion coefficients in ternary mixtures by the sliding symmetric tubes technique

Effectivity of fluoride treatment on hydrogen and corrosion products generation in temporal implants for different magnesium alloys

Effects of mesh refinement, time step size and numerical scheme on the computational modeling of temperature evolution during natural-convection heating

Effects of rotational speed, feed rate and tool type on temperatures and cutting forces when drilling bovine cortical

Effects of vacuum infusion processing parameters on the impact behavior of carbon fiber reinforced cyclic butylene terephthalate composites

Electrospinning of poly(lactic acid)/polyhedral oligomeric silsesquioxane nanocomposites and their potential in chondrogenic tissue regeneration

Embedded software product lines: domain and application engineering model based analysis processes

Experimental and numerical flow investigation of Stirling engine regenerator

Experimental characterization and computational simulations of the low-velocity impact behaviour of polypropylene

Finite element simulation of fretting wear and fatigue in thin steel wires

Finite element simulation of machining Inconel 718 alloy including microstructure changes

Impact characterization of thermoformable fibre metal laminates of 2024-T3 aluminium and AZ31B-H24 magnesium based on self-reinforced polypropylene

Impact damping in NiMnGa/Polymer

Impact velocity effect on the delamination of woven carbon–epoxy plates subjected to low-velocity equienergetic impact
Introduction to the thematic issue on challenges in engineering intelligent environments

Learning Frequent Behaviors of the users in Intelligent Environments

Numerical study of the heat transfer in wound woven wire matrix of a Stirling regenerator

On the machining induced residual stresses in IN718 Nickel-Based Alloy: experiments and prediction with finite element simulation

Polymerization and curing kinetics of furan resins under conventional: and microwave heating

Processing of magnesium porous structures by infiltration casting for biomedical applications

The modelling, simulation and experimental testing of the dynamic responses of an elevator system

Warm forming of Mg sheets: from incremental to electromagnetic forming


A Novel WINNER Based Model for Wireless Communications Inside Train Carriages

A study of energy conversion efficiency of a Savonius type wave energy converter system

An entrepreneurship roadmap for engineering degrees

Analysis of plastic behavior under cyclic loadings of advanced materials

Assessing industry-based problem-based learning with engineering students: lessons learned

Automatic impact analysis of software architecture migration on model driven software development

Business real market testing programme as an experimental methodology for entrepreneurial education in vocational training
Ceramic mould materials for Ti-6Al-4V alloy casting melted via cold crucible induction melting

Characterization of a dual phase steel using tensile and free bending tests

Classification of SSH anomalous connections

Comparative study of the decay of grid generated turbulence between experiments and rans simulations

Context-aware staged configuration of process variants@Runtime

Cross layer energy-efficiency optimization for cognitive radio

Development of degree skills in real environments. End-of-Course Project

Development of a new methodology to use recycled secondary aluminium substituting primary A365 aluminium alloy in safety components in low pressure technology

Effect of the surface topography generated by finish machining on the isothermal fatigue life behaviour of Inconel 718
Effect of thermophysical properties and morphology of the molecules in thermodiffusion coefficient of alkane-alkane and alkane-aromatic binary mixtures

Effectiwork: tool for the instantaneous visualization/monitorisation of how the worker performs
Eider Fortea Méndez, Migel Egaña, Jokin Rubio Botia. 16th QMOD Conference Quality Management and Organizational Development. Portorož, Slovenia, 4-6 September 2013

Effectiwork: a university, business and technology centre collaboration project

Evaluation of physical properties of sulfuric acid-water mixtures

Evolution of residual stresses induced by machining in a Nickel based alloy under static loading at room temperature

Experimental spur gear efficiency evaluation including bearing and lubrication losses

Experimental study of the influence of axial and tangential damping on brake squeal

Functionality and dependability assurance in massively networked scenarios

Heterogeneous redundancy analysis based on component dynamic fault trees

Implementation and evolution of the critical chain method: a case study

Influence of fluoride concentration in corrosion and tribocorrosion behaviour of Ti13Nb13Zr alloy in artificial saliva

Influence of material’s hardening law in the simulation of DP1000 deep drawing and subsequent springback
Imanol Gil, Lander Galdos, Rafael OrtuBay, Unai Ulibarri, Joseba Mendiguren, Elena Silvestre, Eneko Saenz de

Inventory routing problem with stochastic demand and lead time: state of the art

Iterative capacity estimation of LiFePO4 cell over the lifecycle based on SoC estimation correction

Lean Startup as a tool for fostering academic & industry collaborative entrepreneurship

Lean Startup as a tool for the generation of a business model based on digital asset management

Measurement and simulation of machine-borne vertical vibration in elevator systems

Methodology for thermal modeling of lithium-ion batteries

On the development of a simple model of a brake-clutch for squeal prediction

On the support of multi-perspective process models variability for smart environments

Passenger flow pattern learning based on trip counting in lift systems combined with real-time information

Performance-based selection of software and hardware features under parameter uncertainty

Ply orientation and laminate configuration effect on quasi-static crash crush energy absorption capability of E-glass/polyester and hybrid E-glass-Basalt/polyester composite structures
A. Esnaola, I. Ulacia, L. Aretxabaleta, J. Aurrekoetxea, I. Gallego. European Congress and Exhibition on Advanced
Simulation of springback and microstructure analysis of dual phase steels

Springback investigation in roll forming of a V-section

TECHNO-CUBE, development and results of new university-industry collaboration approach

TEKINLAB, promoting entrepreneurial culture within university students

The effect of process parameters on web-warping in the flexible roll forming of UHSS
J. Jiao, B. Rolfe, B. J. Mendiguren, L. Galdos, M. Weiss. TTP

The role of linked data and semantic-technologies for sustainability idea management

Three dimensional thermal model of large size Lithium-ion pouch cell based on experimental procedures

Ti-6Al-4V turbine blade investment casting melted in cold crucible induction melting

Topographic characterization of surface modification generated during dental implant insertion: Critical assessment of 3D topographic parameters

Towards a better understanding of the cognitive destination image of Euskadi-Basque Country based on the analysis of UGC
Ainhoa Serna, Jon Kepa Gerrikagoitia, Aurkene Alzua. ENTER. Dublin. 21-25 January, 2014

Vibro-acoustic finite element analysis of a Permanent Magnet Synchronous Machine

>> BOOK CHAPTERS:

An entrepreneurial collaborative approach
J. I. Igartua, N. Errasti, L. Markuerkiaga.

An industry-based problem-based learning approach
L. Markuerkiaga, N. Errasti, J. I. Igartua.
Meerman, A. (ed.) UIIN Good Practice Series 2014: Case
Studies on Engaged and Entrepreneurial Universities, University Industry Innovation Network, 2014

High-speed forming of Magnesium Alloy sheets. 
I. Ulica. 

Implementation Strategies for High-Performance Multiuser MIMO Precoders. 
Maitane Barrenechea, Mikel Mendicute, Andreas Burg, John Thompson. 
Virtanen, Seppo. Advancing Embedded Systems and Real-Time Communications with Emerging Technologies IGI Global, 2014

Properties and Control of a Doubly Fed Induction Machine Scientists 
Gonzalo Abad, Grzegorz Iwanski. 
GRANTED PATENTS:

Method for detecting and identifying errors in manufacturing processes
Nestor Arana, Eneko Saenz de Argandoña, Carlos García, Alberto Izagirre and Asier Aztiria
Patent No.: ES 2 424 808 B1

Assessment system for a grinding tool and method for assessing the condition of a grinding tool
Pablo Puerto, Jon Madariaga, Raúl Fernández and Iván Gallego
Patent No.: ES 2 423 240 B1

Shock absorbing system for a press and shock absorbing method
Rafa Ortubay, Eneko Saenz de Argandoña, Iñaki Gutierrez, José Angel Alberdi
Patent No.: ES 2 396 983 B1
MANAGEMENT AND SERVICES REPORT
### RELEVANT DATA

<table>
<thead>
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<th>Category</th>
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(1) Thousand Euros
GOVERNING AND SOCIAL BODIES

>> GENERAL ASSEMBLY

The General Assembly is held for the members to discuss and reach agreements on matters within their powers and it is chaired by the President of the Governing Board.

It is made up of 212 Working partners, 212 User partners (students) and 212 Collaborating partners (companies).

>> GOVERNING BOARD

The Governing Board is the collegiate body responsible for managing and representing the Cooperative.

President:
Juan Mª Palencia

Vice-President:
Joseba Edorta Zaldibia

Secretary:
Miren Biain

Spokespersons:
Xabier Arrasate
Irati Otamendi
Carmelo Cortabarria
Josexto De Frutos
Aurea Ifurritegi
Antonio Matilla
Mikel Muxika
Javier Oyarzun

>> GENERAL COORDINATION

This is the body responsible for coordinating the school’s activities and businesses, taking on leadership and responsibility for the MGEP project, and advising the Governing Board.

General Coordinator:
Vicente Atxa

Academic Coordinator:
Josu Galarza

Polytechnic Institute Coordinator:
Gorka Aretxaga

Research Coordinator:
Carlos García

Continuing Training Coordinator:
Gentzane Aldekoa

Electronics and IT Coordinator:
Xabier Sagarna

Mechanics and Industrial Production Coordinator:
Angel Oruna

Systems and Multi-disciplinary Services Coordinator:
José Luis Larrabe

Finance Coordinator:
Milagros Arregui
>> SUPERVISORY COMMISSION

The Supervisory Commission is the body responsible for the duties of review and control of the cooperative.

Belén Cortabarria
Fernando Murgiondo
Beñat Ochoa de Erive

>> SOCIAL COUNCIL

The Social Council is the body that represents the working partners and has information, advice and consultancy as its basic functions.

Gonzalo Abad
Andrea Aginagalde
Jone Arregui
Haritz Barrutia
Amaia Gomendio
Nagore Lauroba
Mikel Mendikute
Aitor Orue
Roberto Uribeetxeberria
Obdulia Vélez
Iñigo Zendegi
GENERAL AND MULTI-DISCIPLINARY SERVICES

Below are some of the projects carried out during the 2013-2014 academic year for the EPS and the University as a whole:

Computer application for Life Cycle of Qualifications (CVT): Application developed for the Academic Services of the MU faculties in order to assist in the management of documentation for accreditation of the Degree and Postgraduate qualifications offered at MU. The phases necessary for obtaining accreditation of a qualification were analysed and it was decided to develop this application as a repository of this documentation. This application will also be used to keep a record of the situation each qualification is in, with the possibility of searching, storing documentation and adding new qualifications for accreditation.

Computer application for the new assessment system: Over the last few years, the Higher Polytechnic School has been implementing various assessment methods. The method developed during the last academic year places skills at the centre of the assessment process and is perfectly suited to our educational model in order to facilitate the assessment process for teachers and students. During the 2013-2014 academic year we continued to develop the computer application focussed on the monitoring of skills acquisition.

1 student – 1 laptop project: continuing with this project which began in the 2010-2011 academic year, this year students were given virtual machines with the software necessary for teaching standard classes. In addition, to support those students that might have any type of incident with the virtual machines, the applications were virtualised. Work continues to improve this project, trying out new technologies and services that facilitate the integration of ICT and teaching.

KUDE IT programme. In collaboration with all faculties and the Vice-Chancellor’s office, during the 2013-2014 academic year work continued on the design and development of the KUDE application, which was created to give the Management System a manageable, efficient IT resource. Particular attention was given to matters related to the Standard University Education qualifications monitoring and accreditation report: indicators, proposed improvements and both quantitative and qualitative assessments.

Pay Per Use Printout System: In order to optimise, improve efficiency and contribute to environmental sustainability a new printing and reprographics system has been analysed and introduced. The new system includes the “Follow You” monitoring system which allows documents to be printed out on any MGEP printer on either campus (Arrasate or Donostialdea).
Electronic documents: in Administration work continues to facilitate completion of documents and management of administrative processes for users. This year forms were designed for settlement of travel expenses and orders for standard materials, which will be introduced at the start of the next academic year.

Adaptation to the SEPA (Single European Payments Area): adaptations have been made in order to meet the requirements set out in EU Regulation nº 260/2012, a European ruling for unifying and guaranteeing secure payments in euros. Payment formats and instruments have therefore been adapted to common standards for all transactions in the euro zone.

C.V. management platform: In order to facilitate management of research and academic management, a CRIS (Current Research Information System) was introduced throughout the entire University. This system has become a formal register of research and academic activity and contains administrative, academic and research data. The library has participated in its design and implementation and has developed tools that allow integrated services to be provided on this platform related to researchers and their scientific production.

Institutional Repository: In order to bring together, archive, protect, provide open access and increase the visibility of academic and research activity, the library has created the University’s own Institutional Repository. In this first part of the project, various open source platforms were analysed and Dspace was chosen. Work has taken place on tailoring the structure and defining information flows suited to the requirements of our institution.

Library, copyright and intellectual property: The library is the place where users can find information about the basic principles of copyright law. In this area this academic year the library has collaborated with the training activity for professionals in the development of the contents of 3 modules of teaching materials on the subject of copyright applied to the world of teaching and with the Vice-Chancellor’s Office in the development of the assignment of rights documents for editing, use and publication of books, conference proceedings, workshops, congresses, etc. organised by the various faculties of MU.

Maintenance management: the PRISMA computer programme was migrated from version II to III because version II did not have any new options. The new version also makes it possible to improve data processing and to generate notices, events, etc. The work mainly consisted of organising the information that was entered.

Infrastructure: This year saw the opening of the energy and combustion laboratories in the Fundación Orona building in Donostialdea for the Energy Engineering and Eco-technology in Industrial Processes degrees and the biomedical laboratory in Arrasate for the Biomedical Engineering degree.

Environment: As part of the process of continuous improvement in the environment, specific targets have been set, such as reducing the use of paper and recycling,
and reducing energy consumption. Work has also been in progress so that all of the above efforts could lead to the award of the EKOSCAN certificate.

**Quality:** After the approval in 2010 of the design for the University Education Quality Guarantee System under the AUDIT programme created by the ANECA (National Agency for Assessment of Quality and Accreditation), in 2013-2014 an audit team coordinated by UNIBASQ assessed the implementation and the System was awarded certification. Workers, students, former students and businesses were involved in this.

**Health and Safety at Work:** This academic year culminated in the implementation of occupational risk assessment in GICO commercial software program. This assessment covers equipment, workstations and workers. The system was also set up so that each person can see the relevant information online.

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**BITERI HIGHER COLLEGE**

In line with the Strategic Plan designed during 2012-2013 for Biteri higher College (CMB), the Management Plan defined for 2013-2014 includes refurbishment of the CMB rooms to meet the current needs of students. Students and their parents appreciated this change and rated it positively.

The 2013-2014 academic year began in September with a total of 94 college members, 69 of whom, including students from EPS, as well as HUHEZI and ENPRESAGINTZA, were just beginning their studies at the Higher College. In addition, the fact that 76 foreign students were staying at our College was an opportunity of cultural exchange that was recognised and appreciated by our college members. 12 of these students undertook degree, master’s or PhD studies for the entire academic year.

The CMB takes on meaning when its internal organisation is activated through the “batzordeak”, basic work teams where students take on different operating responsibilities that give rise to a comprehensive educational development of the individual.
WELCOME ACTIVITIES:
There are three main activities carried out at the start of the academic year: a get-together for first year students to get to know each other; a personal knowledge workshop through the use of a “clown” to facilitate integration and socialisation of those who make up the “batzordeak”; and, finally, the holding of the Official Opening of the Academic Year as the first structured experience organised jointly by all members of the college. Specifically, this took place on 31 October 2013 and Aitor Zuberogoitia, a lecturer from HUHEZI, gave a talk about the project entitled “sormen ekosistema bat euskerazko komunikazioarentzat”.

ACTIVITIES RELATING TO FORMAL EDUCATION:
The mechanics degree course offered the CMB the possibility of collaborating in the “oinarri metodologikoak” subject by designing a module for the development of team work. This module was taught to two groups on the Mondragón campus and one at Goierri. A second collaboration took place with the 1st year degree students with the organisation qualification in order to work the group and generate an initial level of mutual knowledge in order to be able to interact as equals in class.

In another area, through HAIMA (CMB charity committee) the Ethiopia Utopia Foundation and the industrial design department conducted a work shop that would lead to a class project to design the logo and image of the “FLAVORS “(a cookery school) project to be implemented in the city of Wucro in Ethiopia.

Finally, the launch of the extra-curricular activities area, with activities such as: batzordeak, cultural activities, charity work and cooperation has led to 85% of students that could obtain ECTS credits for extra-curricular activities doing so through the CMB.

ACTIVITIES RELATING TO NON-FORMAL EDUCATION:
The CMB has contributed with MUittu Bizitza Unibertsitarioa to the following activities:

- Charity Area:
  - Support for the elderly in the Arrasate Care Home as an activity integrated in the “sozialKlown” workshop, a clown and social skills workshop.
  - iBaiondo, charity five-a-side football team with boys from the Ibaiondo youth justice centre.
  - “baBy”, group of volunteers who run the “harrera gela” or reception room of Arrasate Herri Eskola.
  - “Haima”, faculty charity group that is re-focusing its work on Ethiopia with the Fundación Etiopia Utopía foundation.
Sports and Health Area:

- “B roller”, a group of rollerskaters that took part in 2 races: Donosti (15km) and Gasteiz (Marathon).
- “B tontor”, mountain group.
- “bBTt”, mountain bike group.
- “B ikeroak”, group working to assemble a drift trike.
- Paintball excursions.
- Sports competitions.
- “Yogalates” I and II. Year-long yoga and pilates course.
- Blood donor sessions. 3 sessions with a total of 92 donations.

Sociocultural Area:

- liTeratur, group interested in literature, cinema, etc.
- Wine and beer tasting.
- Organisation of 2 bertso afari-s.
- Book week.
- Visit and dinner at “sidra” or cider factory.
- Karaoke and self-defence sessions.
- Halloween party.
- Organisation of a fancy dress competition and excursion to the Tolosa carnival.
- Ski trip.

Discussion groups about:

- Andoni Luis Aduriz: “The secrets of good cooking”.
- Xanti Elola: “Natural bee-keeping”.
- Erasmus students from Honduras and El Salvador: “Our culture”.
- Arantxa González de Heredia: “The Australian aborigenes; quite an experience”.
- Aitor Zaldúa: “How a children’s home operates: Ibaiondo”.
- Fernando Murgiondo: “The economic crisis from a domestic point of view”.
- Lantbide: “The future of our jobs: uncertainty and proactivity”.

ACTIVITIES RELATING TO INFORMAL EDUCATION:

Everyday life at CMB is a fundamental area for vital personal development, where students receive support from three professionals. This area is also likely to be supervised by the college members through the batzordeak or commissions. Specifically, there are four areas that require their respective working teams: the dining room, the emergency team, the Network team and the College Council. All of them have been working correctly, helping the centre management with decision-making and internal operation.
EXTRA-CURRICULAR ACTIVITIES

The purpose of the sports department is to encourage an active way of life among students and staff working at the college, offering the facilities and the possibility of carrying out various physical and sports activities.

In addition to the activities themselves, the sports department works on various projects to achieve a better offer and communication with students and staff as a whole through a computer system that makes it easy to sign up for activities. The department enters into cooperation agreements with the various sports organisations in the area to facilitate access for students and staff to their facilities and programmes.

In 2013-2014, 637 students took part in the following activities:

>> COMPETITIONS

In the various competitions organised: at internal faculty, inter-faculty, regional and national level, 470 students took part. In addition, a total of 46 students took part in the various university competitions, such as: Go-karting, Surfing and Herri Kirolak.

>> PROMOTION OF SPORTS ACTIVITIES AND HEALTH

238 people took part in:

• A) COURSES AND TRIPS

Various courses and trips were offered in which students had the opportunity to try out new sports or practice the ones that they already knew.

Courses were organised in surfing, climbing, massage, canoeing, go-karting and ski trips with the participation of a total of 188 students.

• B) IMPROVING PHYSICAL FITNESS

This area included the offer from the Betiona gym exclusive to the entire EPS in which 50 students took part.

>> FACILITIES HIRE AND EQUIPMENT LOAN

This service, which allowed students and staff to carry out their favourite activity on their own account, was very popular, with 142 people reserving or hiring equipment.

>> SUPPLEMENTARY ACTIVITIES

This area covered all activities related to physical activity that did not involve a sport in itself, such as trips to the Laboral Kutxa Baskonia matches, organised talks, etc., in which 188 students took part. This area also included the activities on San Pancracio’s day when 103 people including students and staff took part in the various competitions that were organised.

>> WORKER PARTICIPATION

The sports department encouraged College workers to practice sports, adapting the activities to the times when they were available to do so. During the 2013-2014 academic year, there were therefore 90 members of staff who took part in the activities that were organised.
COLLABORATING COMPANIES AND INSTITUTIONS
COLLABORATING PARTNERS:
- ABEKI COMPOSITES, S. L.
- ALECOP, S. COOP
- ALEJANDRO ALTUNA, S. A.
- AUSOLAN, S. COOP.
- ASMOBI, S. L.
- CAJA LABORAL, S. COOP.
- COPRECI, S. COOP.
- EKIDE, S. L.
- ENERGÍA PORTÁTIL, S.A.
- FAGOR ARRASATE, S. COOP.
- FAGOR, S.COOP
- FAGOR AUTOMATION, S. COOP
- FAGOR EDERLAN, S. COOP
- FAGOR ELECTRÓNICA, S. COOP.
- FAGOR INDUSTRIAL, S. COOP.
- FUNDACIÓN GIZABIDEA
- GALLASTEGUI Y CIA, S. A.
- GOIZPER, S. COOP.
- IDEKO, S. COOP.
- IKERLAN, S. COOP.
- LANA, S.COOP.
- LKS, S. COOP.
- MONDRAGON CORPORACIÓN COOPERATIVA SOCIEDAD CIVIL
- MONDRAGON ASSEMBLY, S. COOP.
- ULMA AGRÍCOLA, S.COOP.
- ULMA CONVEYOR COMPONENTS, S.COOP.
- ULMA C Y E, S. COOP.
- ULMA EMBEDDED SOLUTIONS, S.COOP.
- ULMA FORJA, S. COOP.
- ULMA HORMIGÓN POLÍMERO, S. COOP.
- ULMA MANUTENCIÓN, S. COOP.
- ULMA PACKAGING, S.COOP.
- ULMA PACKAGING TECHNOLOGICAL CENTER, S.COOP.
- ULMA SAFE HANDLING EQUIPMENT, S.COOP.
- ULMA SERVISIOS DE MANUTENCIÓN, S.COOP.
- GRUPO ULMA

COLLABORATING PUBLIC ENTITIES:
- MONDRAGON TOWN COUNCIL
- GUIPUZCOA PROVINCIAL GOVERNMENT
- MONDRAGON TOWN COUNCIL
- GUIPUZCOA PROVINCIAL GOVERNMENT
- Department for the Environment and Planning.
- Department of Innovation, Rural Development and Tourism.
- BASQUE GOVERNMENT
- Department of the Presidency.
- Department of Education, Linguistic Policy and Culture.
- Department of Economic Development and Competition.
- Department of and Social Policies.
- CENTRAL GOVERNMENT
- Ministry of the Economy and Competition.
- Ministry of Education, Culture and Sport.
- Universities Council.
- CE: EUROPEAN COMMISSION
- Erasmus Plus.
- Seventh Framework Programme.
- European Regional Development Fund (ERDF).
- European Social Fund (ESF).
- ERANET
- CECA
- ARTEMISIA
- EUROSTARS
- ITEA2
- EUREKA