



**Mondragon
Unibertsitatea**

**Faculty of
Engineering**

MGEP

MONDRAGON GOI ESKOLA POLITEKNIKOA
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2017 / 2018

REPORT



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A photograph showing several students walking away from the camera through a dark doorway. They are wearing backpacks and casual clothing. The scene is brightly lit from the other side of the doorway.

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A group of approximately 15 students posing for a group photo in front of a building entrance. The building has a sign that says "ULMA". The students are wearing various jackets and hoodies.

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COLLABORATING COMPANIES AND INSTITUTIONS

- Collaborating partners
- Collaborating public institutions



A BRIEF HISTORY

The Mondragon Higher Polytechnic School was created in 1943 on the initiative of Father José María Arizmendiarieta, Founder of the Mondragon Cooperative Experience. It has not stopped growing since 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 Mondragon cooperative movement's first industrial cooperative society, ULGOR, S. Coop., by five of its technical engineers in 1956.

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.

The year 1974 marked the creation of the IKERLAN Research Centre, which is now one of Spain's most cutting-edge technology centres, employing over 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 the first university centre in Spain and one of the first in Europe to obtain the ISO ER353/1/95 Quality Certificate.

It should be noted the constitution of Mondragon Uniberstsitea (Mondragon University) in 1997, along with two other university centres in Alto Deba: ETEO



Mondragon Higher Polytechnic School was created



Creation ALECOP



Creation IKERLAN



Creation Diara



Creation CEI Saiolan



founding of the first industrial cooperative society ULGOR, S. COOP



internationalisation took place when the first university exchange programmes



Creation Gizabidea



Obtain the ISO ER353/1/95 Quality Certificate

Constitution of Mondragon Unibertsitatea



S. Coop., From Oñati, and Irakasle Eskola S. Coop., from Eskoriatza, currently ENPRESAGINTZA and HUHEZI, respectively.

In 2002, in collaboration with the Goierri Foundation, the MU-HPS campus was started in Ordizia.

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

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 MU-HPS, in alliance with Orona Ideo, opened the new campus in Donostialdea in the Orona Foundation building.

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

In 2014-2015, we celebrated the 100th anniversary of the birth of Jose Maria Arizmendiarieta.

In the academic year 2017-2018, we celebrate the 75th anniversary of the creation of the Higher Polytechnic School of Mondragon Unibertsitatea.

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MU-HPS campus was started in Ordizia

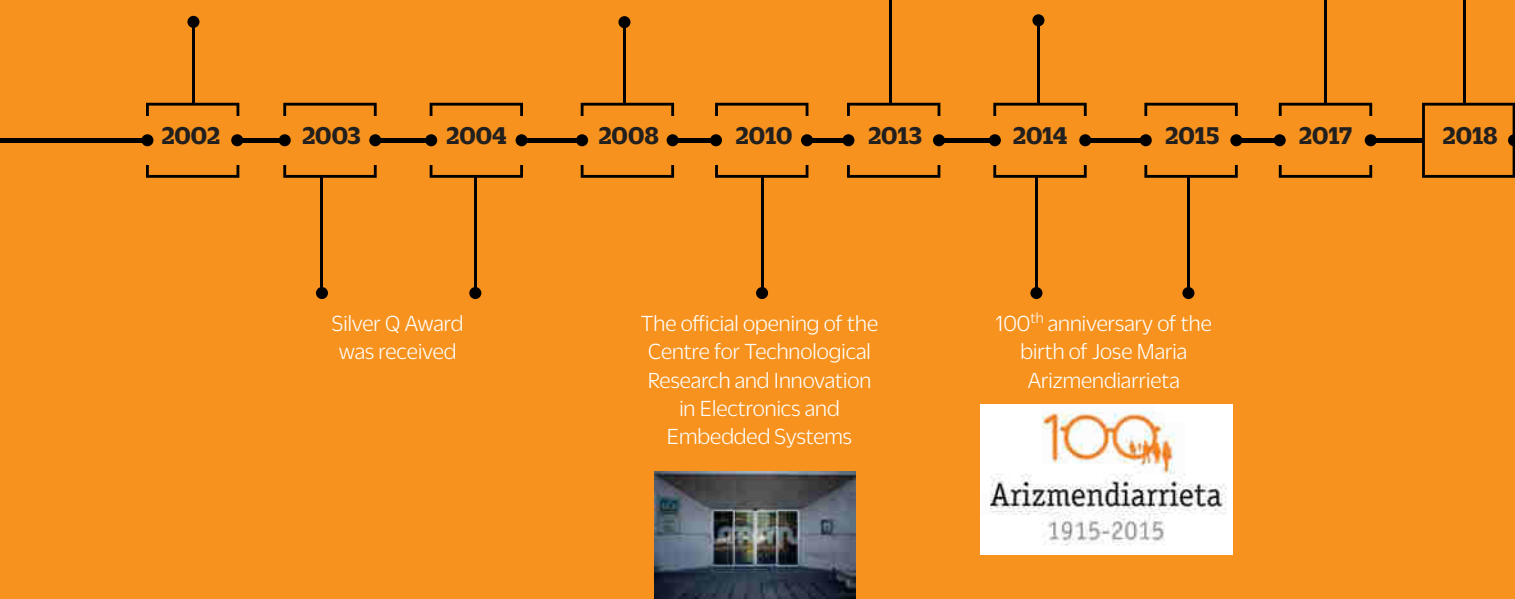


Opened the new campus Orona Ideo

Adapt its engineering studies to the new European Higher Education Area

AUDIT Certification was awarded

75th anniversary of the creation of the Higher Polytechnic School



COMPOSITION OF THE HIGHER POLYTECHNIC SCHOOL

The legal name of the Higher Polytechnic School of Mondragon Unibertsitatea (MU-HPS) is Mondragon Goi Eskola Politeknikoa (MGEP). It is a mixed cooperative with three types of members in equal numbers:

- Work partners.
- User members (Students).
- Collaborating partners (Companies and Government).

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.

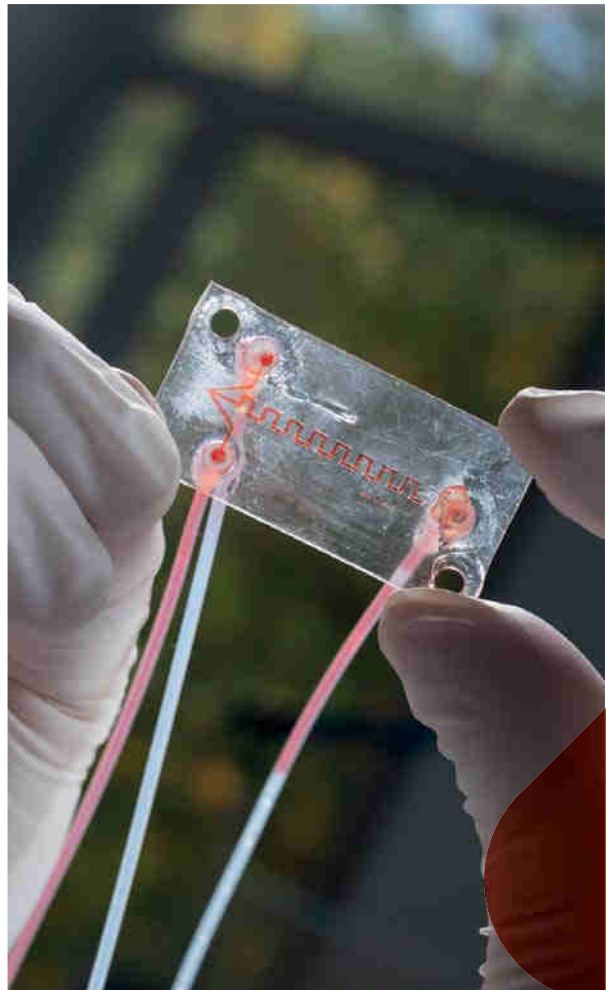
Bearing in mind that MU-HPS' main mission is to train students for a professional career in an industrial environment, the legal formula of the mixed cooperative, which has integrated to the business world and mainly

cooperative societies in our case, has been an essential factor in its constant evolution and adaptation to external demand.

Similarly, the real possibility for our students to complete a training in alternation (study-work) is a key added value throughout our development. As is the performance of the End-of-Degree and End-of-Master's projects in companies or in the MU-HPS itself under contract R&T projects with companies.

The employment status of the EPS-MU's 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 equal.

ANNUAL REPORT



We wish to compile in this report the most significant and relevant information on the activities developed at Mondragon Goi Eskola Politeknikoa (MGEP) throughout the academic year 17/18.

This report contains 3 main blocks, corresponding to the 3 management units in which we organise our action:

- Regulated Training, both in Engineering (Undergraduate, Master's and Doctorate) and Vocational Training.
- Training for Professionals.
- Research and Transfer.

Mr José María used to say that *“education is the natural and indispensable point of support for the promotion of a new social, human and just order.”* In the academic year 17/18, we have celebrated the 75th anniversary of the creation of the Professional School, using it to remember and reinforce the bases of what we have been and are: an educational project that contributes to building a better and fairer society based on its education, research and transfer activities.

With respect to the previous year, the overall dimension of MGEP (€33.2 million) was 8% higher in the academic year 17/18. This growth has taken place in all our fields of action: We have trained more engineers, technicians and professionals, researched more with better results, and transferred more knowledge to the industry and society in general.

With regard to the Regulated Training activities (whose direct clients are the students of the Undergraduate, Master's and Doctorate Degrees in Engineering, as well as the Higher Degree Training Cycles), we have maintained the offer of 9 undergraduate and 6 Master's degrees taught on the Arrasate, Goierri, and Orona-Ideo campuses in Galarreta. We have continued to renew our academic offer and launched this year the Degree in Mechatronics Engineering, a pioneer in the Basque Country in two ways, targeting especially students from Vocational Training and being fully integrated with Dual degrees. In the academic year 17/18, we also launched the Master's Degree in Biomedical Technologies, with 90 ECTS, offering specialisation and continuity to graduates from the Degree in Biomedical Engineering.



In Vocational Training (FP), we led, on behalf of the Vice-Ministry of Vocational Training, in conjunction with Tknika (Applied Research and Innovation Centre for Vocational Training of the Basque Country), the Digital and Connected Factory Node, which consists of guiding the FP Centres of the Basque Country at the time of responding to the challenges posed by Industry 4.0. Conversely, we have completed the deployment of the ETHAZI Model of active methodologies to all the qualifications of Higher Degree Training Cycles.

A good indicator of a job well done is given by the results of the two employability surveys conducted on the latest graduates of MGEP: The Lanbide survey, of December 2017, with interviews with 77% of the students, indicated that 5.4% were unemployed; the Ikerfel survey of June 2018, with 55% of the graduates, indicated that the percentage of unemployed graduates was 2%. With respect to Vocational Training graduates, the employment rate is 100%.

With regard to Non-Regulated Training activities (or for professionals), whose main clients are companies and institutions, the academic year 17/18 involved 2.892 professionals, 18% more than in the previous year, in

the more than 252 courses that we have taught. As important developments, this course has launched 3 new Master's Degrees, in Logistics and Purchasing, Industrial Automation and Cybersecurity. We also designed a fourth degree in Additive Manufacturing alongside Goierriko Eskola, which started in October 2018.

The Research and Transfer (R&T) activity increased by 13.5% in the academic year 17/18, reaching €14.2 million. At MGEP, each R&T Group starts up training and knowledge generation projects with the aim of anticipating, to a certain extent, the needs of our client companies, which we help improve their competitive position through transfer projects. The main proof of the value we bring to the company is that over 55% of the research activity financed by companies, mostly at the industrial level, is linked to the existence of a long-term collaborative research programme. We work with this model with leading technology companies in their sectors, such as AMPO, Arestant, Batz, CAF Group, Ederlan Group, Ekide, Fagor Arrasate, GH, Ingeteam, Aero ITP, Matrici Component Division, MSI, Orona, Sener, Shuton, Ulma Piping, Ulma Embedded Solutions, and Velatia Group.



The support of the institutions is essential for MGEF to continue developing its strategy. For this reason, we would like to thank the Basque Government for its support, in particular the Departments of Education (which manages the University Plan), Employment and Social Policies, and Economic Development and Infrastructure. It is worth highlighting the good adaptation of our R&T to the Elkartek Programme, managed by this Department. We have participated in 29 projects of this initiative, leading 2 strategic programmes (first university to do so). The support of the Department of Innovation, Rural Development and Tourism from the District Council of Guipuzkoa was also significant.

The programmes and competitive calls promoted by these institutions promote make it possible to develop and transfer knowledge and technologies to our industrial and service fabric. Secondly, it helps us to contribute, through lifelong learning, to the development of continuous training and to the renewal of the knowledge and skills of professionals with a technical profile. Finally, it contributes to improving the training of students in technical and engineering studies, so that young people can develop the

competencies that make them the engine of change in the companies in which they are integrated when they finish their studies, guiding them towards activities with an increasing added value.

Against popular belief, an approach geared towards business interests is compatible with scientific excellence, as seen in the following indicators.

In the academic year 17/18, 16 theses were defended, with an additional 95 theses underway, a large majority of which are financed entirely by companies. Regarding scientific production, in the academic year 17/18, we published 57 articles in publications included in the Journal Citation Report (JCR), 49% of which correspond to publications of the first quartile, which gives an idea of their quality. This academic year was especially positive in the European calls, in which we obtained 14.6% of the Research and Transfer funding, with a total of 30 active projects, 10 of which were started this academic year.

The following are some of the activities developed in Regulated Training, Continuous Training, and Research and Transfer.



ACADEMIC



REPORT

PROFESSIONAL TRAINING

>> DEVELOPMENT OF THE ACADEMIC ACTIVITY

Professional Training continues to be an important part of our academic activity. During the academic year 17-18, 227 students were trained in the following Higher Degree Training Cycles:

- Advanced Technician in Industrial Mechatronics.
- Advanced Technician in Mechanical Manufacturing Design.
- Advanced Technician in Mechanical Manufacturing Production Programming.
- Advanced Technician in Network Computer Systems Administration.
- Advanced Technician in Industrial Robotics and Automation.
- Advanced Technician in Electrotechnical and Automated Systems.

In collaboration with the MONDRAGON Corporation and the Deputy Council of Professional Training and Continued Learning of the Basque Government, we continue with the training in partial offer format in the Industrial Mechatronics qualification (combining studies with work) to respond to the training needs of the cooperative members of the MONDRAGON Corporation. In total, 60 workers are being trained in two promotions, with 30 workers in the first class who have completed their studies in this modality and another 30 lacking Training in Work Centres.

As part of the training, our students participated in the SCE – Industry Automation 2018 Contest, organised nationwide by Siemens, obtaining an outstanding fourth place among all the participants from all over the state.

A fundamental element of the courses is Workplace Training (WT), which enables both students and work experience tutors to work directly with companies. There have been 52 students who have conducted these practices and 30 companies that have hosted

them. In turn, in collaboration with HETEL (Social Initiative Vocational Training Centre Association), 5 have conducted internships in companies abroad through the ERASMUS+ programme in Italy, Czech Republic, Poland, Ireland, and Malta.

On the other hand, the study-work programme format (DUAL study-work programme promoted by the Basque Government) is a very enriching learning model based on the acquisition of skills in a working environment. There is a clear commitment by us to this programme, where the close relationship between MGEF, students and companies means that both our students and companies obtain a more than satisfactory result. This academic year, we have trained 39 students, and another 50 have started the programme at the end of the first year. There have been 25 companies that have welcomed our students in the DUAL training.

One highlight is the overall satisfaction of both our students and the companies that take part in the training of our students both in the academic part held at MGEF (particularly the group practices and projects) and the Work Centre Training and DUAL Training, being key indicators of our activity.

>> INNOVATION IN THE TEACHING-LEARNING PROCESS

During the academic year 17-18, we continued with the redesign of learning processes based on the achievement of learning outcomes.

This knowledge will be the professional competences which the students must achieve in order to participate in the work environments.

This redesigning and adaptation of the objectives for each qualification have set the foundations in the development of the educational model, progressing in the active methodologies and taking continuous assessment a step further. The introduction of practice-based learning, i.e. based on know-how, has meant the



transformation of the elements of the learning-teaching process. Practical learning and learning by doing put the focus on the student. Therefore, the teacher's and student's roles change in the new model.

The student adopts the role of a technician who performs projects in which they experiment and build situations that will arise in the near future in the labour market. For this purpose, the student must suggest what must be done and how to do it to resolve a problem or respond to a need.

In this academic year, all degrees implemented the new challenge-based learning methodology in the classroom, in addition to implementing a contrast with the companies of our environment to validate the professional competences to be acquired by our students.

>> TECHNOLOGY INNOVATION AND INVESTMENTS

The major technology evolution, particularly in technology connected with university-level courses in Higher Degree Training Cycles, has led us to an important investment effort in order to renew and adapt our laboratories and facilities. This was financed by Inter-Cooperative Education and Promotion Fund (FEPI) resources received from MONDRAGON and equipment subsidies from the Basque Government's Education Department, and, more specifically, the

Vocational Training Directorate. The investment was mainly made in the fields of Mechanics, Electronics, IT, and Manufacturing.

On the other hand, for an efficient use of these media, technological projects such as prototypes, models, manuals, etc. are developed to assist in the academic activity of both students and professors in the implementation the practices of workshops and laboratory practices.

In collaboration with the Deputy Council of Professional Training and Continued Learning of the Basque Government, through TKNIKA, we have participated in the following programmes:

- Tkgune Automotive programme.
- Digital and Connected Factory Node.
- Innovation projects:
 - Micromanufacturing, in collaboration with HETEL as a BETEKU project.
 - Set-up and monitoring of stamping dies in the Industry 4.0 era.
 - 3D Printed Materials
 - Plastics Injection in Industry 4.0
 - Monitoring and control of welding process
 - Design and manufacturing for lightening
 - Obtaining of UHSS steel metal pieces by hot stamping and laser cutting
 - Artificial vision training for industrial and collaborative robotics environments



>> ENTREPRENEURSHIP

This academic year, we continued our activity with the entrepreneurship working group, geared to motivating the entrepreneurial culture. In addition, our participation in TKNIKA's Urratsbat scheme enabled us to enhance this area through exchanges of experiences.

The following activities were developed:

- Awareness talks on entrepreneurship and intrapreneurship.
- Search for complementary training for the students' professional development.
- Search for employment opportunities in today's complex market.
- Empowerment for creation and launch of the students' own business ideas.

In the academic year 17-18, all Higher Degree Training Cycles participated in the IKASENPRESA project, which consists of a pedagogical 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 programme. The objectives pursued with the project are:

- To promote the development of entrepreneurial competition.
- To give students the opportunity to find out about local institutions, entities and companies and to contact them.

- To clarify misconceptions about the world of the company.

>> RELATIONSHIPS

As an associated centre, in addition to our relationship with the Deputy Council of Professional Training and Continued Learning of the Basque Government, we also participate in different programmes implemented by the Guipuzcoa and Lanbide Regional Government.

We maintain relations with educational centres and associations in our region and in other areas. This includes membership of HETEL, in its capacity as a member of the Association of Professional Training Centres created by the Social Initiative, which is present in numerous regions of the Basque Country.



ENGINEERING

During the academic year 17-18, 9 undergraduate Degrees, 6 Master's Degrees and one Doctorate degree, adapted to the European Higher Education Area (EHEA), were offered. The degrees offered were as follows:

- Degree in Mechanical Engineering
- Degree in Industrial Design and Product Development Engineering
- Degree in Industrial Organisation Engineering
- Degree in Industrial Electronics Engineering
- Degree in Computer Engineering
- Degree in Mechatronics Engineering
- Degree in Energy Engineering
- Degree in Industrial Process Ecotechnology Engineering
- Degree in Biomedical Engineering

- Master's Degree in Business Innovation and Project Management
- Master's Degree in Strategic Design of Products and Associated Services
- Master's Degree in Industrial Engineering
- Master's Degree in Energy and Power Electronics
- Master's Degree in Embedded Systems
- Master's Degree in Biomedical Technologies

- PhD in Mechanical and Electrical Engineering

In collaboration with UNIBASQ (Agency for the Evaluation of Quality and Accreditation of the Basque University

System), the evaluation of the implementation of the DOCENTIA programme in the Experimental Phase Year 1 was carried out. The DOCENTIA programme includes the assessment of the teaching activity of the Teaching and Research Staff (PDI), considering the criteria of attitude, initiative, relevance and level of responsibility. In this first experimental phase, a total of 55 PDIs have been evaluated, all of whom obtained a favourable evaluation.

During the academic year 17/18, we collaborated with the Vice-Ministry of Universities and Research of the Basque Government and UNIBASQ in the definition of a certification system for Dual University Training. This certification system has made it possible to obtain the seal that accredits Dual Training in all Bachelor's degrees in Engineering and in 5 of the 6 Master's Degrees. All of them refer to the existence of a Dual Training Itinerary, except in the case of the Degree in Mechatronics Engineering, which has achieved the Dual Degree badge.

On the other hand, in collaboration with ANECA (National Agency for the Evaluation of Quality and Accreditation) and continuing with the strategy of accrediting our Undergraduate and Master's degrees according to the International Seal of Quality, EUR-ACE®, which is a certificate granted by ANECA, as an authorised centre of the ENAEE (European Network for Accreditation of Engineering Education), during the academic year 17/18, we worked in the preparation of



the accreditation of the Master's degree in Industrial Engineering. This preparatory work was concluded in September 2018 with the visit of the evaluation panel to certify compliance with the defined standards, in accordance with the principles of quality, relevance, transparency, recognition and mobility contemplated in the European Higher Education Area.

>> ACADEMIC ACTIVITY

Throughout the academic year 17-18, the planned academic activities were carried out, fulfilling the development provided in the management plan.

In our work to train competent young people, 1,775 students developed their academic activity of Engineering at the Higher Polytechnic School, 1,379 of which were undergraduates, 298 were Master's degree students, and 98 were doctoral students. Of these, 232 were undergraduates, 133 were Master's degree students, and 19 were doctoral students.

From the qualitative standpoint, we highlight the work carried out within the framework of engineering degrees in the implementation of the modifications included in the 2017 plan for each of them, as an activity that leverages the strategic objective of achieving a coherent, unique and sustainable degree offering.

Furthermore, it is worth highlighting the design work of two new degrees that contribute to the expansion

of the academic offering: The Degree in Mechatronics Engineering and the Master's Degree in Biomedical Technologies. It is worth noting the innovative nature of the degree offering: the access profile, aiming to attract professional training students; and second, dual training as a main methodological option.

In both degrees, the first courses have been implemented with very good acceptance. In the Degree in Mechatronics Engineering, 36 students have started their studies, with 26 students coming from Vocational Training. In the case of the Master's Degree, 11 Biomedical Engineering graduates have chosen to continue their studies in this new Master's degree.

>> EDUCATIONAL MODEL

Our institution 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 is based on the following cornerstones:

- Intensive use of active methods in the teaching/ learning process.
- A model based on developing and acquiring skills and learning outcomes following a subject-based model.
- Continuous overall assessment of students as a key tool for assessment of competencies.
- Dual training through study-work programmes with the development of company internships.



- Internationalisation of studies and end-of-course projects.
- Teaching in three languages.
- A change in the role of the teaching staff and students.

Learning Methodologies

The EHEA (European Higher Education Area) advocates focusing the students' learning around the acquisition of competences (technical and cross-sectional), as opposed to learning focused on knowledge acquisition.

In this sense, during the academic year 17/18, work was carried out on the implementation of the redesigns of the degrees according to the 2017 plan. The most significant change is given by the unification of the first degree course, which has allowed the exchange and unification of ways of doing, good practices, etc. and thus concentrate efforts on the "how" rather than on "what". Although the level of fulfilment of planned objectives has varied among the degrees, the first step has already been taken, and we must now continue moving in this direction, making learning more meaningful for the students while encouraging their participation and motivation and allowing this to be translated into improving the skills of our graduates.

Conversely, and based on the pilot project developed in the academic year 2016/2017, the deployment of the tutoring and follow-up model in line with the differential

element defined in the strategic plan of closeness to the student and individualised follow-up has been carried out. Based on the analysis of the experience of the pilot project, the model suitable to the particularities of our educational model was adapted. The implementation was carried out in all the first degree courses, and in some higher courses.

To contribute to the dissemination and implementation of these initiatives, two training sessions were held including professionals from outside MGEP in some cases, and internal professionals in others, to provide dissemination and training for the PDI.

Skills Development and Assessment.....

The fact of focusing the learning on the acquisition of competencies has required that the evaluation system be necessarily adapted, so that the evaluation system contemplates the continuous evaluation, feedback, and global assessment.

The assessment system that leverages the development and assessment of competencies has evolved since its first design in 2008, where the maturity of the system was evident in each of the proposed changes. The last of the changes was caused by a demand from teachers. This change implemented during the academic year 17-18 meant the elimination of one of the existing restrictions, to enable passing the course with competencies not yet completed.



Linguistic model.....

The redesign of the aforementioned degrees has been a lever for the restructuring of the linguistic offer in the degrees.

In this sense, in the second year of the degree, optional subjects in Basque and technical English are offered. The first one aims contribute to the number of ECTS (European Credit Transfer System) necessary for obtaining the C1 mastery certificate in Basque. The second is intended to help students in third year to be fully integrated in a semester given in English.

In addition, the bid for the offer of an entire semester in English in the 3rd year for all the degrees has been confirmed, allowing the integration of incoming students in our degrees while leveraging the strategy of Internationalisation at home defined in 2014.

Nevertheless, the policy that states that approximately 60% of ECTS will be taught in Basque, 20% in English and 20% in Spanish is maintained.

Dual training.....

The definition of the Dual training system in the hands of UNIBASQ has allowed us to strengthen our Study-Work Programme (AET) model, obtaining the recognition of a story of more than 50 years and

promoting the coordination of training activities in the classroom and in the company.

Within the framework of the dual training programme, the activities of the AET were integrated, such as the development of the End-of-Course and End-of-Master's projects, establishing the requirements for obtaining the seal of recognition for this training.

In this sense, the "50 Scholarships" campaign was launched for the Master's degree, based on the pilot that was developed during 2016/2017, through which an amount of 50 Study-Work Scholarships was granted to the applicants of the Master's degree. At the undergraduate level, two guidance sessions were held in the first years in order to promote the option of Dual training among students.

Consequently, a significant number of students of the Polytechnic School combined studies with dual training, either in the facilities of the Polytechnic School itself, as assistants in departments and research laboratories, as well as in other companies and technology centres of the environment.

The total number of engineering students who combined study and work in the academic year 17-18 was 389. 27.36% of the total number of students of the 2nd year and 44.48% of the students of the 3rd year of the undergraduate course, similar to the numbers obtained in 16/17, and 66% of the students of

the Master's degree course, a 16% increase compared to the previous year.

>> END-OF-COURSE AND END-OF-MASTER'S PROJECT

The main objective of the End-of-Course or End-of-Master's project is the development of an autonomous work by the student, which serves to demonstrate the acquisition of skills associated with each degree and, thus comprising the culmination of their undergraduate or Master's degree studies.

In this sense, we worked to obtain project requests from quality companies, which are appropriate to the students' professional profile, with well-defined objectives, an adequate dimension according to the length of the project, and with the highest possible technological level to meet their needs.

As significant data, the total number of students who have completed the End-of-Course Project during the academic year 17-18 was 295, with a total of 434 project applications received. Some of them developed their End-of-Course or End-of-Master's Project through the ERASMUS+ mobility programme, bilateral mobility agreements, or university business agreements. Some of the destination countries for these students included Slovakia and the Czech Republic.

>> DOCTORATE

Throughout the academic year 17-18, we have continued with an intense training activity in the third cycle. Consequently, the student body enrolled during the academic year was composed of 94 Doctorate students, and 23 theses were defended, 9 of which obtained the International Doctor Mention, while 18 obtained the CUM LAUDE mention.

The doctoral theses read during the academic year were as follows:

Doctoral Programme in Mechanical and Electrical Engineering

- **Agirre Olabide, Iker**
Analysis of the magneto-thermo-dynamic behaviour of magnetorheological elastomers.
- **Alberdi Aramendi, Ane**
Early diagnosis of disorders based on behavioural shifts and biomedical signals.
- **Amorrortu Gervasio, Itxaso**
The crew scheduling problem of an interurban public transport bus company.
- **Armentia Cerio, Sergio**
Design of gearless motors without neodymium for

elevator applications.

- **Arrieta Galdos, Iñaki Mirena**
Study of microstructural aspects when broaching ferritic-pearlitic steels: influence on cutting mechanisms, tribological and material properties.
- **Arrieta Marcos, Aitor**
Simulation-Based Testing of Highly Configurable Cyber-Physical Systems: Automation, Optimization and Debugging.
- **Baskaran Razkin, Maider**
Optimisation of the Compression Resin Transfer Moulding (CRTM) process by experimental techniques and simulation.
- **Gil Acedo, Imanol**
Analysis of stresses generated in the deep-drawing brakes and development of a semi-analytical prediction model of the interlocking efforts.
- **Gomez Serna, Iratxo**
Design Methodology for Achieving Reliable Permanent Magnet Synchronous Machines.
- **Irazu Echeverria, Leire**
Dynamics of viscoelastic-magnetorheological sandwich structures: multiphysics analysis.
- **Izquierdo Ortiz De Landaluce, Mikel**
Wheel track variation mechanism comprising inertial dampers to enhance the dynamic performance of an electric three-wheeler.
- **Lapeira Azcue, Estela**
Analysis of transport phenomena in multicomponent mixtures in terrestrial conditions by convective and non-convective techniques.
- **Lizeaga Goikoetxea, Aitor**
Filtered Multi-Carrier Modulations for Industrial Wireless Communications based on Cognitive Radio.
- **Medina Clavijo, Bentejui**
Microstructural analysis of atomic mechanisms of metal plasticity under machining conditions: case study of AISI 1045 steel and 7475 aluminum.
- **Oyanguren Garcia, Aitor**
Effect of temperature on the preload variation of double nut ball screws.
- **Ruiz Amurrio, Maria**
Understanding of the behaviour of organisational commitment using a system dynamics model.
- **Ruiz De Argandoña Arzallus, Ismael**
Development of a high torque density and efficiency axial flux switched reluctance motor for electric vehicle.
- **Saez De Buruaga Echeandia, Mikel**
A novel procedure based on 2D finite element modeling and orthogonal cutting tests to predict machinability and tool wear evolution considering the microstructure effect of lamellar ferrite-pearlite steels.

- **Soto Ruiz De Gordo, Myriam**
Applicability of observational design statistical analyses based on process indicators and budget impact analysis for the evaluation of integrated health interventions.
- **Ulibarri Hernandez, Unai**
Analysis of spring-back and conformability of inconel 718 in deep-drawing processes at room temperature.
- **Unamuno Ruiz, Eneko**
Control and Stability of AC/DC Microgrids.
- **Vasquez Obando, Pablo Jose**
Ultrasound Image Processing in the Evaluation of Labor Induction Failure Risk.

>> INTERNATIONAL RELATIONS

The International Relations activity in the academic year 17-18 continues the development of the actions initiated in the previous years, emphasising not only those related to external mobility, but also the internationalisation of students who do not have that experience. This is the concept "internationalisation at home". The actions were, specifically:

- To ensure that approximately one third of the students from the Undergraduate and Master's Degree courses have an international experience of at least one semester during their period of study.
- To promote "internationalisation at home" via the inclusion of contents in the study plans, inclusion of incoming students in the activity and university life, and the consolidation of a semester completely in English in each Degree course.
- To reach a number of national and international exchange students in accordance with the size of MU-HPS, so that they may contribute to the Internationalisation of the campus while performing a sustainable activity.
- To renew and activate collaboration agreements with foreign universities within the new European strategy Horizon 2020. In particular, to work on the participation of networks and strategic alliances with other institutions which, in some cases, may lead to joint qualifications.
- To boost the participation of MU-HPS in the internationalisation process of local companies, both via its assistance in training a qualified workforce and by taking part in joint initiatives with foreign companies and/or institutions.

Another axis that has been affected was the mobility of the PDI, at both the internal (local) and external (international) levels, through the different existing programmes. Fundamentally, these mobilities have

been developed within the Staff Mobility programme, in its Training and Teaching mode.

The following is a quantitative demonstration of some of the actions materialised in the academic year 17/18:

a. Actions aimed at promoting the mobility of students from MU-HPS.

- Monitoring and strengthening of the current double degree courses:
 - NSA Toulouse (France): Master's Degree in Industrial Engineering.
 - ENSEEIHT Toulouse (France): Master's Degree in Energy and Power Electronics.
 - ECN Nantes (France): Master's Degree in Industrial Engineering.
- Academic stay management (4th year of the Degree, 2nd year of the Master's Degree, and Doctoral Programme).

Of the 153 people who submitted applications in the academic year 17/18, 123 students who developed mobility actions in the programmes below were selected, based on their academic record and foreign language level:

-- Study Mobility:	87
-- Project Mobility:	29
-- Doctoral Mobility:	7

The countries in which our students were able to carry out a study stay are Germany, Austria, Belgium, Denmark, Slovakia, Spain, Estonia, Finland, France, India, Ireland, Italy, Mexico, Norway, the Netherlands, Poland, Sweden, Switzerland, and Thailand.

- Mobility management of 5 MGEP PDIs abroad under the Staff Mobility for Training programme.

b. Actions aimed at improving internationalisation at home.

- 51 foreign students and from the rest of the country are studying at MU-HPS, within the ERASMUS+ and SICUE programmes and through INTER-UNIVERSITY AGREEMENTS. The visiting students came from: Germany, Belgium, Finland, France, Italy, Mexico, and Turkey.
- 6 students from abroad have developed their professional training practices with us.
- 1 doctoral student has developed a stay at MGEP within the framework of their research work.
- We have had PDI members from foreign universities, 4 in the Staff Mobility for Training mode and 3 in the Staff Mobility for Teaching mode.
- To organise welcome and integration activities



through the Buddies programme, for the fourth consecutive year. It is of great interest to strengthen this programme.

c. Actions aimed at assisting the internationalisation of companies and society.

- In the frame work of participation in the process of internationalisation of Basque companies, 4 students carried out their End-of-Course in Engineering and End-of-Course in Basque in Implementations at Basque companies abroad: 1 in Slovakia and 3 in the Czech Republic.

TRAINING FOR PROFESSIONALS

In the academic year 17/18, 2,892 professionals participated in the 252 training programmes carried out, totalling 12,360 hours of training; record numbers in the School.

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. Throughout this year, 220 companies relied on us. 129 professors from the University and 38 external experts accompanied these professionals in the learning process, and the average satisfaction score was 8.53.

During the academic year 17/18, in the calls published by Lanbide, three courses associated with professional certificates were taught: Auxiliary operations in mechanical manufacturing, Machining by shavings removal and Maintenance and mechanical assembly of industrial equipment. These three courses add up to a total of 1,650 hours of training, in which 33 people have participated.

In the field of Industrial Organisation, in 17/18, the second edition of the Executive Master's Degree in Integral Logistics and Purchasing took place in Bilbao in collaboration with the Chamber of Commerce of Bilbao and the ICIL Foundation, as well as the 25th edition of the Professional Master's Degree in Production Management in Mondragon. A total of 16 companies participate and train their professionals in these training programmes. During this academic year, three editions of the Advanced Course in Industrial Management were given, in addition to more than 20 courses in which the experts presented different tools, methodologies and good practices of industrial organisation. A unique example was the conference in which a New Method for Supply Chain Management, Demand-Driven MRP, was presented.

At the Higher Polytechnic School, we understand that project management is a key competency for the development of our companies, as it is an essential part of their change and innovation projects.



During the academic year 17/18, two editions of the PMP (Project Manager Professional) Certification Programme were held. There are already more than 190 certified professionals, and 84.6% of the certificates in the PMP programme of the Basque Country carried out their training with us. In addition, during the academic year, two Advanced courses in project management were given, one at the Chamber of Commerce of Bilbao and one at Orna-Ideo, as well as different open training sessions and seminars. More and more companies are carrying out these tailored training courses and include an implementation and support phase as part of the training.

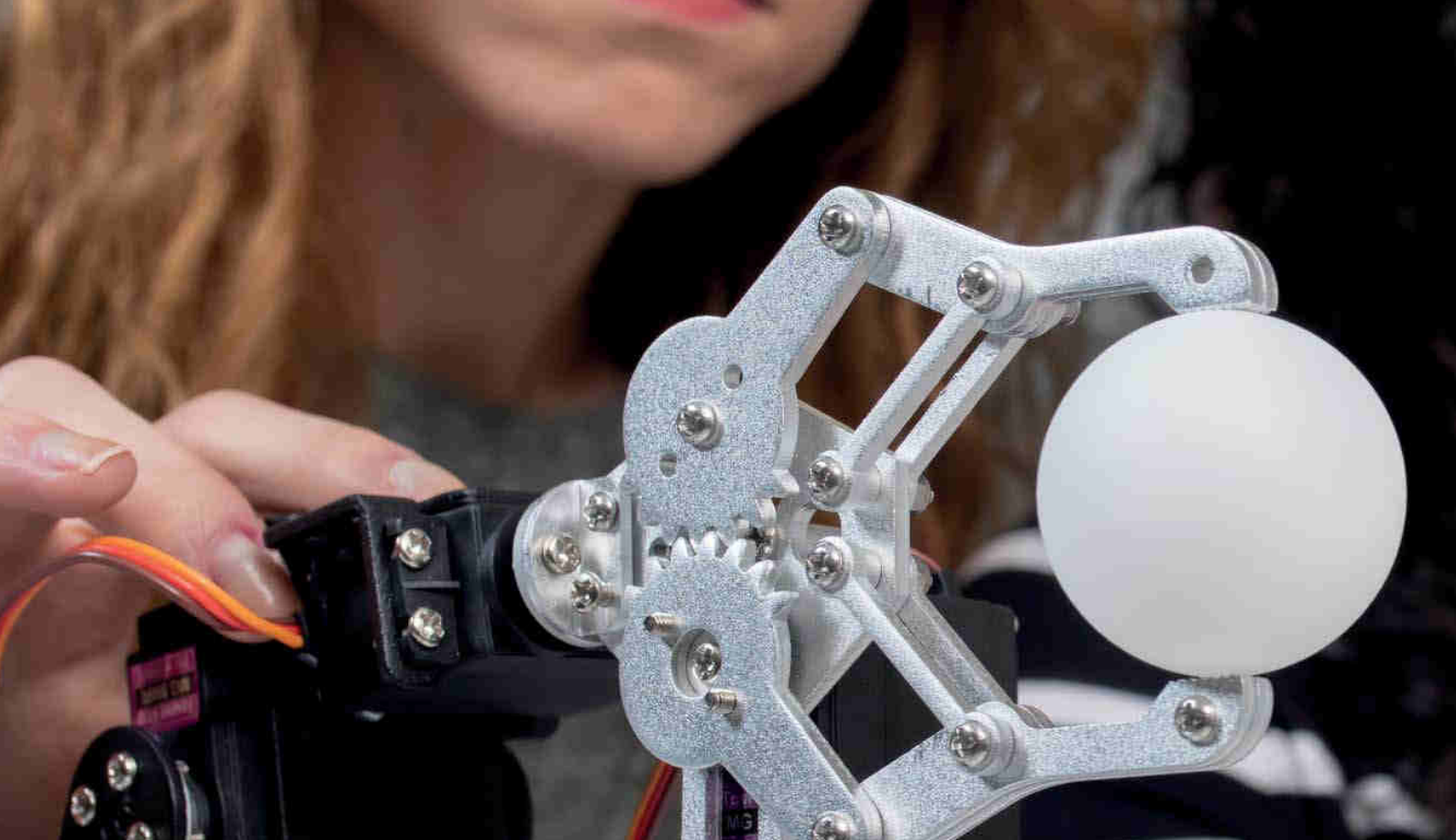
Within the field of knowledge of Mechanical Engineering, over 19 open courses were given on the topics of Industrial Design and Product Development, Materials, Manufacturing Processes, Maintenance, and others. During the academic year 17/18, 32 in-company courses were held in this area, and the geographical scope of action was extended by carrying out these types of courses in locations such as Zaragoza, Madrid, Cádiz, and Huelva.

In the field of Industrial Design, this year was marked by the 7th edition of the "Design Konferentziak", in which participants met with the aim of creating a space for reflection on design as a business strategy and its applications in the world of sport.

Throughout the academic year 17/18, in collaboration with IK4-Lortek and Goierriko Eskola, a new Master's degree in Industrial Additive Manufacturing was designed. The first edition began in October 2018. In this area, the Advanced Course in Additive Manufacturing in Metals and the Advanced Course in Additive Manufacturing in Plastics and Composites were also designed.

In September 2017, the first edition of the Master's Degree in Industrial Automation began with 24 participants and 7 collaborating companies. This new Master's Degree has a very practical orientation, and participants develop practices in collaborating companies from its beginning. 95% of the students continue in the same company after finishing the Master's degree.

One more year, the ICT team of the Higher Polytechnic School organised and gave over 80 conferences within the framework of Enpresa Digitala initiative on the subjects of Digital Marketing. It has participated in the Rioja Alavesa Wine Tourism Forum, in the Tourism conferences of Urdaibai, Gipuzkoa Encounter, Araba Encounter, Euskal Encounter, Digital Transformation for the Mondragón ICT Committee, CRO at Bilbao Tech Week, and the ICT Week of Hernani, Bergara, and Tolosaldea. The Indusmedia, Interdigitala, KaixoWorld and WP Euskadi congresses were held, as well as 22 Technological Barnetegis organised in the fields of



Industry 4.0, Tourism, and ICTs. As a complement to the training, the team of ICT professors has provided support to a number of companies in the application of these Digital Marketing tools, methodologies and strategies in their companies. During the academic year 17-18, two editions of the Big Data Course were held, with two new editions planned for the academic year 18-19.

The Department for Data Protection (DPO) is a key figure in the new General Data Protection Regulation (RGPD) that began to be applied on 25 May 2018. Companies that handle a large amount of personal data or sensitive data they should integrate the DPO figure in their organisations. To respond to these needs, the ICT team has designed and taught two courses in this field. One of the most important challenges for the ICT team was to design, alongside the Provincial Council of Gipuzkoa, a Master's Degree in Industrial Cybersecurity, which began in October 2017 with 14 participants, including students who have finished their university studies recently as with active professionals. This has been one of the first experiences in which professionals with more than 3 years of experience and a Higher Level Training Degree have been able to access the Master's degree and have obtained the Master's degree.

There is a growing number of professionals who, with the aim of developing their qualifications, select new training formats that enable them to combine their training and their professional career. With the aim of

responding to this need, during the academic year 17/18, several online courses were given, including Lean Manufacturing, Integral Logistics, Fundamentals of project management, Agile Project Management using Scrum, Quality tools for project management, and the key course for the development of a Work Breakdown Structure.

To cater to the demand arising from the implementation of the new undergraduate degrees, a new edition of the online courses for adaptation to the Degree in Mechanical Engineering and Degree in Industrial Electronic Industrial Engineering has been launched, in which 29 professionals participated.

Within the European project AS FABRIK, led by the City Council of Bilbao, which aims to improve the competitiveness of local companies and the consolidation of Zorrozaurre as an innovative, referential ecosystem in the field of advanced services for the Industry 4.0 and the digital economy, three advanced courses were taught. A total of 55 professionals participated in the Advanced courses: Design of Advanced Services, Data Science, and Embedded Systems.

Finally, during the academic year 17/18, new training courses were designed for the academic year 18/19. This information can be consulted in the new web platform www.mondragon.edu/profesionales.



RESEARCH AND TRANSFER

Last year was also the second year ended with an increase in R&D spending, after three decreases. The growth of public funding (+4.96%, 453 million) was greater for the second consecutive year than that experienced by business spending on R&D (+1.69%, 731 million). Given that the behaviour of corporate spending was positive, it seemed that investment in innovation would recover in relation to GDP. Nevertheless, that was not the case, and in 2017, expectations for R&D expenditure were not met either, and values on the GDP decreased for the fifth consecutive year according to the report prepared by the research firm Bantec. Regarding the Public Administration, the Basque Government is one of those that receive most financing in business innovation in the Basque Country, whose growth was 50% in the last 10 years, compared to the 63% decrease experienced by the country's contribution. The business reality of our environment requires major efforts to survive and even more to invest in R&D. Nevertheless, it has been shown that the most innovative countries are those that invest the most in R&D. For that reason, the objective of reaching 3% of GDP in investment in R&D should not be neglected.

In this sense, we believe that the Higher Polytechnic School of Mondragon Unibertsitatea (MU-HPS) plays a key role due to its research capacity and knowledge transfer model. Even within this context, MU-HPS was able to continue strengthening its research and

knowledge transfer activity also during the academic year 17/18. This was, on the one hand, thanks to the support of the companies that have relied on us to conduct research with them, and on the other hand, thanks to our success in the various calls for research projects, especially in Europe.

Thus, in this activity, we grew by almost 13.5% compared to the previous year, reaching €14.2 million aimed at research and transfer. It should be noted that 55% of this amount comes from private investments, which have grown by 23.8%, and the remaining portion is due to a 3% growth in revenues obtained from competitive R&D calls, which thanks to our transfer model, also aims at the application of the knowledge acquired in our collaborating companies. This growth in revenues has meant a growth in R&T investments, in which we dedicated 87.2 EJC (full-time investment) of the PDI, representing a 28% increase.

These numbers make us the university with the greatest relationship with companies (% of company-funded research) and several studies attest to us being the most highly valued in terms of Innovation and Technology Transfer. For example, U-Multirank (2018) qualifies us as "excellent" in parameters such as: Research income from private sources or external financing for research. One of the keys has been, once again, the success of MU-HPS researchers in aligning their technological capabilities with the needs of the company. The main proof of the value that MU-HPS brings to the company

is that 50% of this research financed by companies, mostly at the industrial level, is linked to the existence of a long-term collaborative research programme. The projects undertaken within the framework of these collaborative research and transfer programmes range from oriented basic research to industrial research and experimental development projects, which eventually lead to innovative products, processes, and services. Additionally, a long-term relationship allows us to align our basic research with the company strategy and train the talent they require. This results in a model with proven efficiency in the provision of a comprehensive, multidisciplinary solution to business requirements by an effectively coordination between the generation and transfer of knowledge. We work with this model alongside leading companies in their sectors such as AMPO (Energy), Arestant (Storage Solutions), Batz (Capital Goods), CAF Group (Rail), Ederlan Group (Automotive), Ekide (Engineering), Fagor Arrasate (Capital Goods), GH (Cranes and Components), Ingeteam (Energy), ITP AERO (Aeronautics), Matrici (Capital Goods), Components Division (Appliances), MSI (Automation), Orona (Vertical Transport), Sener (Engineering), Shuton (Capital Goods), Ulma Embedded Solutions (Embedded Systems) and Velatia Group (Energy), but also closer SMEs, which have fewer resources and demand customised care.

Regarding the funding of research in competitive calls, the CRUE R&T report indicates that MU-HPS triples the average funding by university PDIs. In this sense, the academic year 17/18 was very positive in the European calls, in which we obtained almost 14.6% of the external revenue collected for the research and transfer activity with a total of 30 active projects, with MU-HPS standing out as a leader in one of them. In the academic year 17-18, ten new concessions were awarded for European projects, representing an income of roughly €1,8 million for three years. Also worth noting is the financing obtained in competitions by the Provincial Council of Gipuzkoa, amounting to 6.5% of the research and transfer budget, with 31 active projects from their various competitions. In the calls of the Basque Government, 4 IBA and 1 EU projects of the Department of Education of the Basque Government were obtained. We are also present in a total of 45 Hazitek projects and 29 Elkartek projects in the 2018 call of the Basque Government's Competitiveness Department, leading one of them.

Regarding scientific production, the academic year 17/18 had a remarkable increase, with 57 articles in journals indexed in the Journal Citation Report (JCR), 49% of which correspond to publications of the first

quartile while another 28% correspond to publications of the second quartile, which gives an idea of their quality. Our publications stand out (U-Multirank, 2018) for their impact index, number of joint publications with foreign universities, and co-authorships with industrial partners.

The majority of these results are related to the theses under way and are indicators of the excellent work performed by the research staff of the Higher Polytechnic School. It is also worth mentioning the 16 doctoral theses defended and the 95 theses underway, a large majority of which are financed by private entities.

Another essential instrument, which allows our Research and Transfer Groups to remain at the forefront of knowledge, is the Specialisation Plan, financed by the Department of Education of the Basque Government, and which we managed to maintain during the last academic year. One of the most relevant actions implemented during the academic year 16/17 is the Doctors' Plan, whose purpose is to improve significantly the qualification of the MU-HPS PDI through the completion of doctoral theses. Thus, during the academic year 17/18, 17 theses were financed within this plan. It is expected that, in the medium term, this measure will involve a qualitative leap, in a phased manner over time, of the following indicators: the improvement of the research and teaching quality, the international dimension of the MU-EPS PDI, the number of high-impact publications (collected in the JCR) by PDI and by course, the dimension of the research activity, and the dimension of the transfer activity. This programme provides researchers with attractive working conditions to carry out their doctoral theses, which should result in the researchers' growth aspects, the teaching quality, the R&T Group and the strengthening of alliances.

Finally, 9 of the research groups of MU-HPS have been recognised by the Basque Government as Excellent Research Groups of the Basque University System, five of which in Category A – the highest recognition – and another four in Category B. We should note these achievements are the merit of the researchers that make up the 17 Research and Transfer Groups grouped in the following Scientific and Technological Units:

SCIENCE, TECHNOLOGY AND MATERIAL TRANSFORMATION PROCESSES

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

MECHANICAL BEHAVIOUR AND PRODUCT DESIGN

4. Structural Mechanics and Design
5. Acoustics and Vibrations
6. Fluid Mechanics
7. Surface Technologies

ELECTRICAL ENERGY

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

INDUSTRIAL MANAGEMENT AND DESIGN PROCESSES

11. Innovation – management – organisation
12. Diseinu Berrikuntza zentroa
13. Productive Logistics Operations Management

EMBEDDED SYSTEMS AND SMART SYSTEMS FOR INDUSTRIAL SYSTEMS

14. Software and Systems Engineering
15. Robotics and Automation
16. Data Analysis and Cybersecurity
17. Signal Theory and Communications

>> SCIENCE, TECHNOLOGY AND MATERIAL TRANSFORMATION PROCESSES

Plastics and composites technology

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

- Advanced resin transfer processes (RTM); RTM for thermoplastics (TP-RTM), RTM-Compression (CRTM), RTM for hybrid materials (FML-RTM).
- Ultraviolet curing technology applied to: Pultrusion (3D Pultrusion), automatic fibre placement (AFP), filament winding.
- Rapid prototyping based on advanced 3D printing technologies: Manufacture of moulds, structural elements, complex cores, local reinforcements, and non-conventional orientations.

Additionally, aspects such as the deformation and fracture of polymers and composites, stamping/thermoforming, impact/damage simulation and morphing are being addressed.

Among the industrial partners are companies in the machine tool (Fagor Arrasate), rail (CAF) and civil engineering (Acciona Infraestructuras, Iruena) sectors.

High-performance machining

The main objectives of the research group are the improvement of production processes by machining in different industrial sectors (automotive, aeronautics, machine tools, moulds and stamps, health, etc.) and the generation of ideas to manufacture innovative products or enter into new businesses and markets.

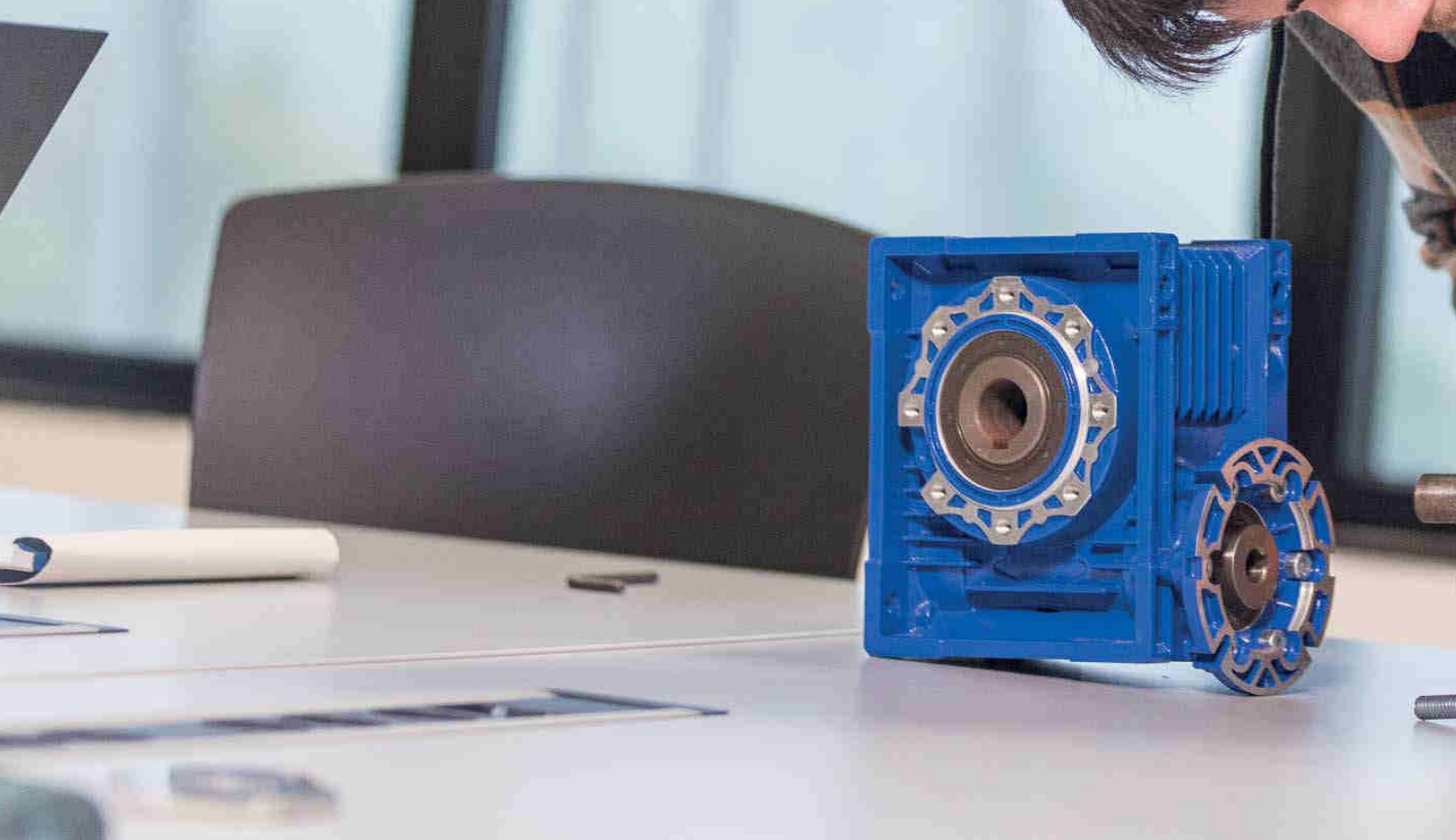
The general strategy followed is to create, alongside other research groups of MU-HPS, multidisciplinary teams including company personnel, research centres and universities, in order to give an advanced scientific response to industrial problems, for the subsequent transfer of knowledge directly or through highly qualified young people.

We work on (I) the definition of machining processes including the optimised selection of working conditions, tools and fastening tools, (II) approval of machining processes based on customer requirements, and (III) the development and pre-industrial evaluation of new machining technologies and products.

The group has extensive experience in simulation of machining processes, providing cutting-edge machining for milling, turning, broaching and grinding processes, as well as advanced experimental machining analysis techniques: high-speed filming, temperature measurement by thermography, electron microscopy, etc.

The main work areas are machinability of materials, study of the cutting and modelling process, design of machining processes, high-speed machining, micro-machining, grinding, smart machining, and biomachining.

In addition, this year, ENAC, the National Accreditation Entity, has awarded the Materials Laboratory of the Mechanical and Industrial Production Department of Mondragon Goi Eskola Politeknikoa the accreditation according to the UNE-EN ISO 17025:2005 standard for the performance of metallographic tests in the determination of particle size, determination of percentage of phases by automatic image analysis, and measurement of surface defects in metallic materials. This accreditation will enable the High-Performance



Machining research group to become a reference in the measurement of the damage generated in the material in manufacturing processes, including machining.

Advanced material forming processes.....

The activities of this research group began in 1993. During the first years, the focus was the improvement of forming processes by means of the use of sensors, artificial vision and advanced control strategies. At the same time, the research group started to specialize in the numerical modelling of the processes themselves, as a tool for improving the process itself. In this way, the Higher Polytechnic School of Mondragon Unibertsitatea was the first entity in Spain to use the AutoForm software and one of the first to use Deform.

Between 1999 and 2001, forming processes in semi-solid state and metallic smelting were developed. Since then, the group has been working on the development and optimisation of foundry, forging and thixoforming processes and the metallic forming of sheets and tubes. In 2000, the new experimental facilities were created (approximately 500 square meters for industrial machinery and prototypes and 100 for material laboratories). In 2008, a new laboratory was opened at the Uribarri building (approximately 800 square meters for full-size experimental prototypes), and the first large European servo press (4000 kN) was installed.

In the last decade, the group: a) has developed several forming, forging and casting processes; b) has specialised in the simulation of those processes using advanced finite element models which are fed using advanced material and contact characterisation techniques; and c) has worked in the digitalisation of processes aiming to increase the machines' availability and help process designers understand the phenomena that affect material transformation processes.

The research group studies the transformation of metallic materials, with the following processes in which they are investigated:

- Smelting
- Forging and thixoforming or semi-solid forging
- Sheet metal and tube forming
- Forming and joining of hybrid materials
- Process digitalisation and the Industry 4.0.

In research and teaching, we thoroughly study the material behaviour and microscopic phenomena, develop numerical simulation models to prove the initial concept, and produce tooling and components at laboratory scale using industrial machines. Simultaneously, we relate the experimental observations with fundamental research. To do this, we develop new material and tribological characterisation techniques and use state-of-the-art scientific equipment. Examples of projects include: the equipment for melting of metals by induction in cold crucible, construction of a new forging simulator capable of operating at



high temperatures and at high deformation speeds, manufacture of a new biaxial machine, and new bank of tests for tribological studies based on coils.

>> MECHANICAL BEHAVIOUR AND PRODUCT DESIGN

Structural mechanics and design.....

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

The objective of this group is to contribute to the launch of robust products while providing material behaviour models and techniques/tools for numerical simulation, which allow the evaluation and optimisation of their behaviour before their production begins.

To this end, the group addresses the following lines of research:

- Thermomechanical fatigue and residual stress management: improvement of the mechanical behaviour of the product before cyclic loads and control of residual tensions, by means of the modification of design variables, process variables, or application of thermal treatments.

- Development and optimisation of prototypes, assemblies, and mechanical components: optimisation of transmission elements (gears, ball screws, universal joints), characterisation of systems and mechanical assemblies (braking systems, brake-clutches, suspension systems), and development of prototypes and sensorised test benches.
- Advanced multiphase modelling: coupled analysis of the different physical phenomena that affect products, machines and processes (mechanical, fluidic, thermal, electromagnetic, chemical, etc.). The analysis of each phenomenon separately does not guarantee an in-depth study due to the interaction between them. The group has worked in sectors as diverse as mining (sludge transport), energy (Stirling engine, thermal management of batteries, heat pump), and glass (generation of residual stress in glass blowing).
- Agile product development (CAx automation): automation of tools for the transfer and implementation of the knowledge developed in a productive way in the company. The group has experience in both the development of customised tools and automation of commercial CAD/CAE/CAM software programs (SolidWorks, Unigraphics, ABAQUS, ANSYS, etc.).

Acoustics and vibration

The main objective of the group is to optimise the



vibroacoustic behaviour of structures and components, to reduce problems associated with vibrations and unwanted noise. For this, the activity focuses on the characterisation of materials, characterisation of components, as well as numerical simulation with the aim of predicting behaviour. The three main fields in which you work are the following:

- Characterisation of materials. Characterisation of mechanical and acoustic properties of variable materials in frequency, such as composite materials, sandwich materials, magnetorheological materials, elastomers. The group has a characterisation methodology, which has been validated through scientific articles.
- Identification of noise and optimisation of industrial components. Experimental measurements with the aim of identifying the different sources of noise. Subsequently, through updating and optimisation techniques, the final design of the product is addressed. Examples: Electric machines, brake-clutch (squeal problems), etc.
- Monitoring and diagnosis of failures in electromechanical systems. Modelling of the system and identification of different indicators that allow us to know the diagnosis of components.

Fluid mechanics

The Fluid Mechanics group of Mondragon Unibertsitatea was created in 2004. This group is currently involved in

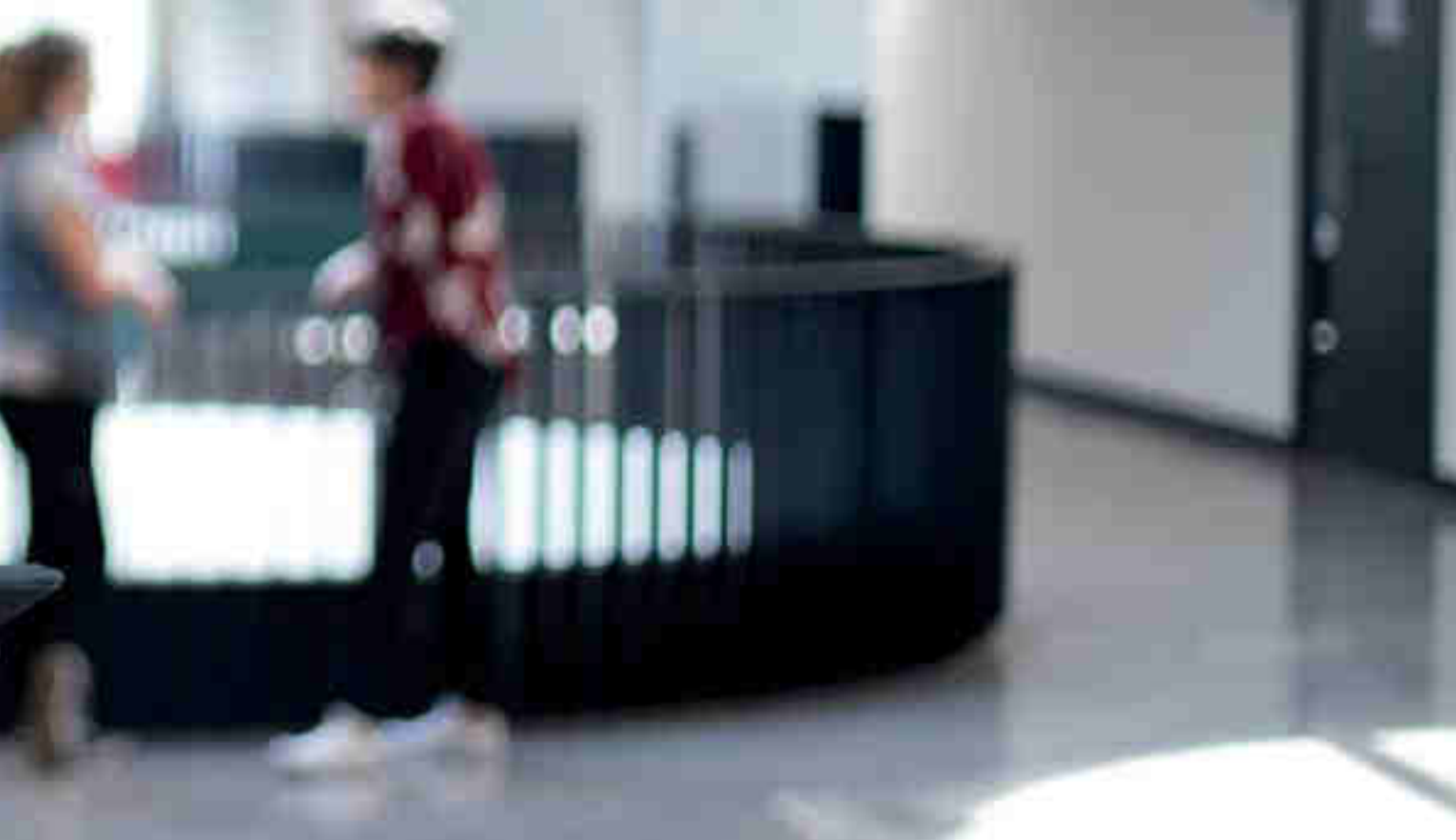
three lines of research: Thermofluidics; Complex Fluids and Magnetorheological Materials and is classified as a type A excellence group by the Department of Education, University and Research of the Basque Government.

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 research and transfer projects of the Surface Technologies research group are focused on the optimisation of components through the development of innovative tools, measurement methods, characterisation and knowledge that support the design



and implementation of reliable surfaces to improve the service life and performance of the components. To achieve this objective, the group is based on its skills and experience in advanced methods of characterisation and modelling with both numerical and experimental approaches. Thus, the Surface Technologies research group develops research activities in:

- Tribology
- Surface functionalisation, generation of innovative surfaces
- Surface metrology
- Fretting fatigue and fretting wear
- Corrosion and tribocorrosion
- Simulation of contact and wear phenomena
- Tissue engineering and regenerative medicine

All research areas are applied to a wide range of industries, including: Additive Manufacturing, Aeronautics, Automotive, Machine Components, and the Health Industry.

>> ELECTRICAL ENERGY

The future points towards a continuous increase of our society's energy consumption. With a horizon set in 2050, governments are promoting policies to improve energy efficiency, diversify energy sources, and reduce emissions of gases into the environment. One of the key vectors for achieving these goals is Electrical Energy.

The research group addresses the knowledge and improvement of the use and transformation of Electrical Energy for applications related to transport networks and electricity distribution (distributed generation, integration of renewable generation systems, smart networks, active energy management, electricity quality, etc.), traction (railway, marine, and electric vehicles), and industrial goods (industrial process control, machine tools, lifting).

The specialisation lines are related to the field of power electronics, storage systems, and electrical machines. 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 electricity generation...

The aim of this research group is to develop the knowledge required for designing, modelling, simulating and controlling devices whose principle of operation is electromagnetism.

For the specific case of electrical machines, actuators and sensors, the aim is to master the process, which 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 vector, direct torque and power controls specific to each type of machine, as well as status observers, design of sensorless systems, adaptation of online and offline parameters, and automatic tuning of regulators.
- Design of Electrical Machines: design tools for electrical machines and actuators, and analysis of their behaviour using advanced analytical models and finite element techniques.
- Protection and Diagnosis in Electrical Drives: Implementation of offline and online algorithms for protecting the drive and early detection of failures at 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 electricity control.....

This research group develops scientific and technological knowledge about systems based on Power Electronics, applied to the control of electrical energy. Advances in the manufacture of high-power semiconductors and the

development of new conversion topologies currently allow us to address applications for the integration of Distributed Energy Resources in the electrical distribution network: microsystems for electricity generation, electricity storage technologies, devices based on power electronics for the improvement of supply quality, and resources that control 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 smarter, more reliable and more flexible, as well as the development of concepts of distributed generation and active distribution.

The research group develops research activities in:

- Integration of new power electronic components such as semiconductors based on silicon carbide or gallium nitride.
- Development of electronic power converters for different applications:
 - Electrothermal and mechanical design, along with its refrigeration systems.
 - Modelling, simulation and control based on the application requirements.
 - Development of new converter topologies: multi-level, matrix, multi-pulse, etc.
- Devices connected to the transport and distribution network to improve supply quality: FACTS, Custom Power, Medium-Voltage Switches, new protection



systems for electricity distribution networks.

- Energy management and coordination of electrical and electronic parts as part of smart networks for the integration of distributed generation systems based mainly on renewable energies.

Energy storage systems

The research carried out by the group focuses on the development of scientific and technological knowledge of electricity storage systems. The electrochemical systems were based mainly on technologies such as batteries and supercapacitors, ranging from cells to modules and large storage systems.

The group participates actively in collaboration projects with Universities, Technology Centres and Companies of the environment, developing its activities in two MU-HPS Campi, located in Arrasate and Galarreta.

The Energy Storage Systems research group develops research activities in:

- Complete electrical, thermal and mechanical design of storage systems based on electrochemical cells.
- Electrochemical and thermal modelling of cells and battery modules and super capacitors.
- Algorithms and electronics for management and protection of storage systems.
- Sizing of storage systems with an emphasis on

application, such as electric traction, integration of renewable energies, and autonomous systems.

- Electrochemical storage system feature analysis and experimentation.

>> INDUSTRIAL MANAGEMENT AND DESIGN PROCESSES

Innovation – management – organisation.....

The main mission of the research group is to generate new knowledge to improve the implementation of innovation and entrepreneurial processes in companies and the strategic management of organisations. This knowledge is generated through three ways:

- Innovation: development and implementation of innovation and entrepreneurship management techniques and tools, encompassing the entire life cycle process of innovation.
- Modelling of Complex Systems: analysis and modelling of management systems and strategic processes.
- Organisation of work contexts that favour the alignment of people with the Strategy.

Thus, the Entrepreneurship and Innovation research group develops research activities in:

- Innovation and Technology Management: it focuses on the research on innovation processes and projects,



portfolios, research in innovation management tools and techniques (IMTs) and research in business models and innovation networks. This research aims to enable SMEs to develop more efficient innovation processes and to convert their business models into proposals of greater added value (individually or in networks). This is achieved through the systematisation of innovation activities, portfolio management, development of new business models, configuration of value constellations and collaborative models, as well as the use of techniques and tools adapted to the characteristics, sectors and specific innovation objectives of organisations.

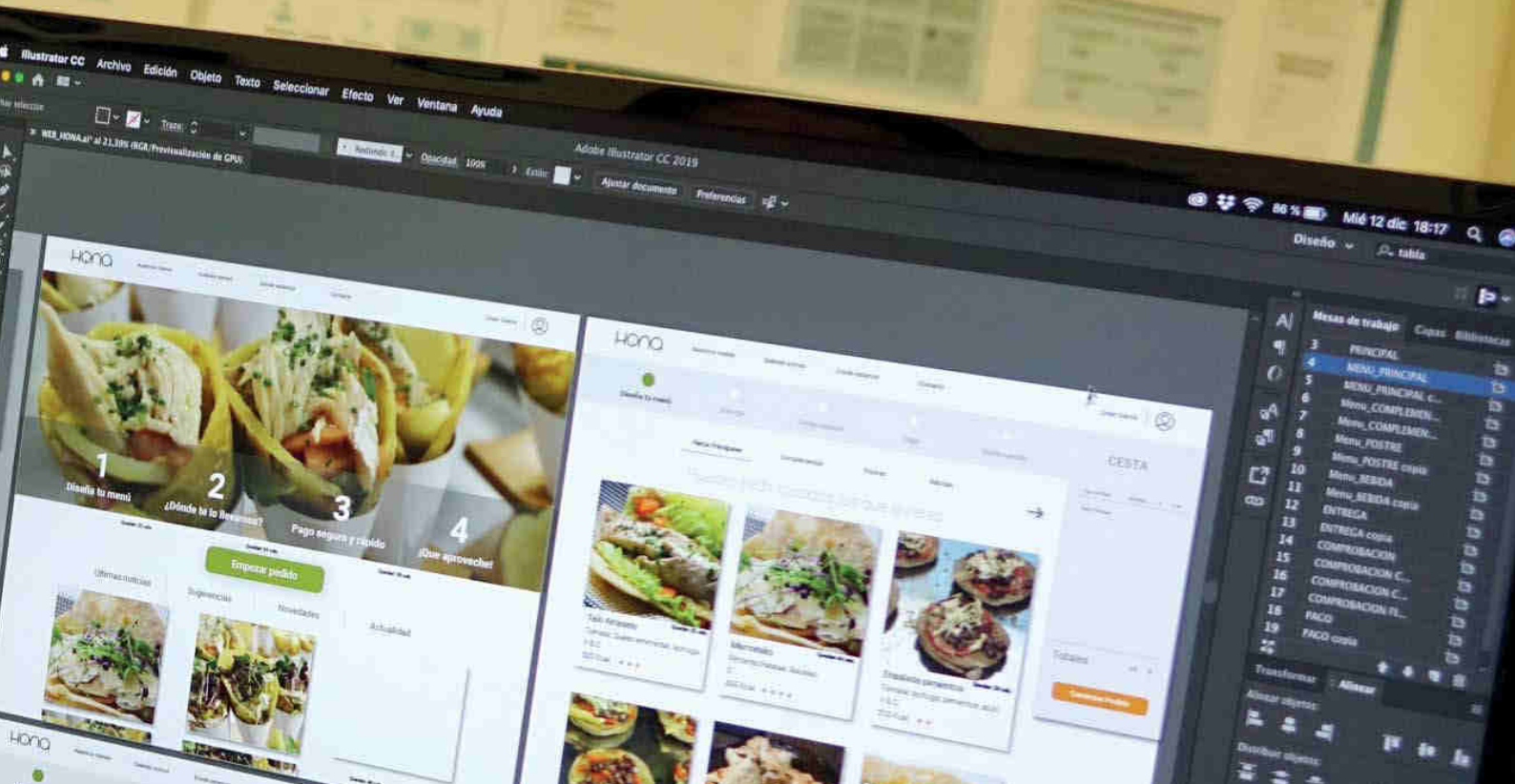
- **Entrepreneurship:** based on the phenomenon of the Entrepreneurial University, this area focuses its research on the entrepreneurial processes in organisations (their models, objectives and processes to be implemented), as well as on the university-company collaboration, which helps companies, universities and other agents in the development of entrepreneurial activities within an ecosystem of innovation (Triple Helix).
- **Industrial Organisation:** The objective of this area is to respond to the challenge of “liberating” and aligning the potential of people for the benefit of a common project, with the aim of contributing to the sustainability/competitiveness of organisations. The research is based on an internationally contrasted model and has a database of 72,000 surveys of 510 organisations from various sectors (industry, education, services, etc.) that enables

us to understand, among other aspects: (i) how to create work/organisational contexts that favour the alignment of people with the organisation’s challenges, and (ii) the extent to which people influence organisational performance.

Modelling of complex management systems: This scope of research seeks the modelling of complex management processes from a systemic vision. To do this, different simulation techniques are used (discrete event simulation, system dynamics-based simulation and agent-based models). The current areas of application focus on the management of people in organisations, business models, innovation networks, socio-technical systems, and corporate entrepreneurship systems.

Diseinu berrikuntza zentroa

The Diseinu Berrikuntza Zentroa (DBZ) of MU-HPS brings together research and development activities related to the field of People-Centred Design. The DBZ aims to integrate human factors in the innovation and development processes, such as behaviour, needs, aspirations, and skills of people. Thus, the DBZ has developed its own people-centred innovation methodology, which allows the participation of different agents (users, customers, suppliers) in all phases of the innovation process. To do this, the methodology provides a series of specific tools for each phase of the process.



The main activities of the DBZ are based on:

- Designing and implementing processes of innovation and development of products and services based on People-Centred Design, which allow the incorporation of the human factor in processes of innovation with a strong technological approach.
- Carrying out user studies, characterising and segmenting beyond the demographic characteristics, based on new variables such as attitudes, habits or behaviours.
- Understanding and integrating diversity as an opportunity in the processes of innovation and development of inclusive products and services, with a special focus on the aging of the population.
- Understanding the human factors that impact on human-machine interaction and usability, with a clear focus on industrial contexts.
- Understanding the factors that influence the acceptance of new technologies.
- Supporting companies in servitisation processes, providing tools and methodologies and generating service concepts that add value to existing products.
- Supporting companies, organisations and institutions in the processes of co-creation and participatory design, providing tools and methodologies adapted to each case.
- Evaluating the user experience of products and services.
- Evaluating the brand experience, integrating brand characteristics through the design process, throughout the experience.

- Designing and developing products and services with lower environmental impact from a life-cycle standpoint, focusing on eco-efficiency, eco-design, circular economy, and remanufacturing.
- Fostering entrepreneurial attitudes in the field of STEAMs through design in the educational field.

Productive logistics operations management

The increasing competitiveness forces companies to search for distinctive elements that provide them with competitive advantages at the product service level and from the standpoint of management. Framed in the Business Strategy, Operations Management is critical in this context, when responding to the needs of the client. Defined as the company function that plans, manages and controls the organisation's resources in order to ensure its correct working order in accordance with the Service Strategy, it implies the coherent integration of the information and material flows through the entire productive and distribution system.

- Project Management: The study and improvement of project management in different contexts are addressed through the main existing approaches, mainly PMBOK®, Critical Chain, and Agile Project Management.
- Manufacturing Engineering: it focuses on industrial processes, through the study of the design of plant distributions, which is aimed at Lean Production by



means of related techniques, such as VSM, OEE, cell design, SMED, 5S, Smart Manufacturing, etc.

- Industrial Asset Management: starting from the premise that the state and conservation of industrial means and facilities are a strategic activity to support a competitive production system, the main lines of action are the design and optimisation of operational techniques (Corrective, Preventive and Autonomous Maintenance, etc.), organisational aspects in Maintenance Management, TPM, or RCM.
- Robust Industrialisation: the industrialisation of processes in the service life is addressed based on the conception of the product until the end of its service life. The most frequently addressed key aspects are product reliability, reduction of variability through the 6-sigma method, modelling and optimisation, and data processing. The process for obtaining the CE marking, both in machines and in sanitary products, highlighting the design and development of a risk assessment system for the product or machine (ISO 14971, ISO 12100) and the implementation of a management system for quality (ISO 9001, ISO 13485), occupational safety (ISO 45001) or the environment (ISO 14001) are complementary aspects of special interest that are part of this area.
- Supply Chain Management: The main objective is to identify, visualise and study the key agents of the supply chain, in order to improve the flow of materials and information. The subjects addressed

in this area are the following: Lean Logistics, process simulation, distribution network design, Demand-Driven MRP, and TOC-DBR.

>> EMBEDDED SYSTEMS AND SMART SYSTEMS FOR INDUSTRIAL SYSTEMS

Software and systems engineering.....

Cyber-physical systems are complex systems, with computing and communication capabilities related to physical objects, being able to work together to form distributed and fully autonomous ecosystems. These types of systems are allowing innovation in many sectors such as Smart Cities, Smart Buildings, Smart Homes, and Smart Factories. Our research focuses on different aspects of software development and systems, from the initial stages of development to operation and maintenance. We apply our knowledge in the development and methodologies of software and systems in complex, distributed and highly configurable cyber-physical systems that require a multidisciplinary approach and interoperability in development and operation.

- The Software and Systems Engineering research group focuses its research activity in three areas:
- Development industrialisation: We address variability and configurability in highly configurable systems, integration of development tools and co-simulation for multidisciplinary systems and development



methodologies, with a special emphasis on validation throughout the development.

- **Web engineering:** This area investigates the Semantic Web technologies and the linked data structures from the standpoint of open systems (open source and open data) as well as in the design, development of interoperable platforms based on Web services and compliance with standards, and the construction of SOA architectures, which make possible complex and heterogeneous integration, multiplatform and multi-device systems.
- **Real-time distributed systems:** We specialise in reliability, predictability, and control optimisation. This research takes into account all components of a distributed system such as communications, middleware, and the operating system.

Robotics and automation

The Robotics and Automation research group investigates theories and techniques applied to adaptive, flexible, scalable and efficient production systems, in terms of both costs and energy consumption. The know-how of the team is articulated in three key technologies: Robotics and Artificial Vision:

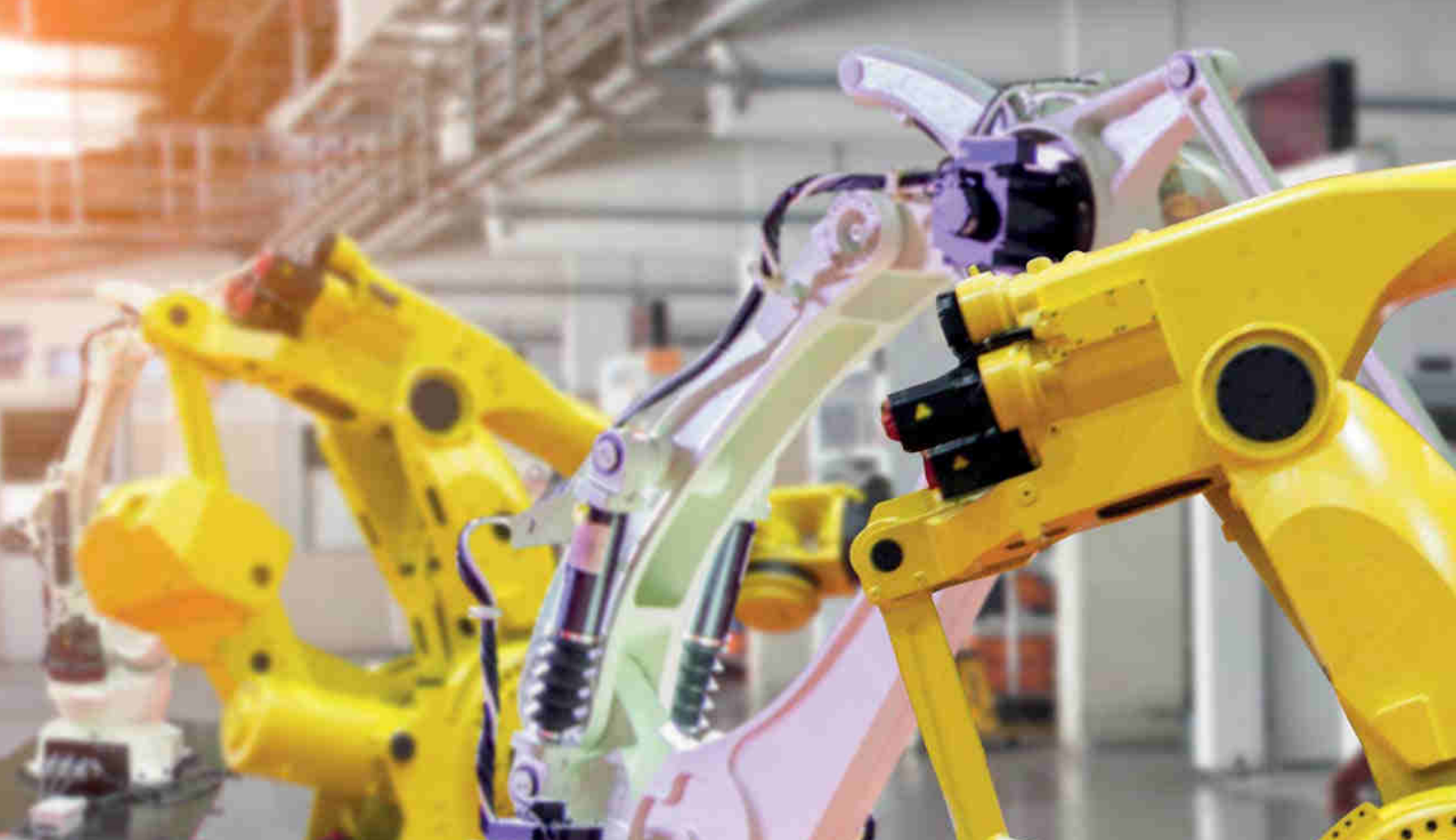
- **Flexible and Collaborative Robotics:** This term defines a new generation of industrial robots with cognitive capacity to make decisions and provide the robot with flexibility in its operation and is able to cooperate with humans by sharing physical

space, without the security restrictions required in typical industrial robotics applications. In summary, the new robotics is characterised, among other things, by its flexibility, accessibility, and relative ease of programming.

- **Artificial vision:** Due to its cross-sectional nature, artificial vision, or image processing, is a key technology for the development of Industry 4.0. As a “production eye”, artificial vision enables a more flexible production, enabling the control of the production flow through the inspection of the piece. This, in turn, allows for rapid production changes even in small production batches. Techniques such as pairing and 3D vision allow for more flexible gripping and assembly processes or rapid 3D models for additive manufacturing processes. In turn, identification technologies (e.g. barcode and data reading, OCR) help control production processes more flexibly. Vision is also essential for a secure interaction between collaborative and human robots. The 3D technologies allow robots to “see” their human co-worker. To conclude, we highlight that the image processing makes it possible to add visual information to augmented or virtual reality devices.

Data analysis and cybersecurity

The digitisation of the plant, both in the manufacturing and production processes, as well as of other auxiliaries



(maintenance, procurement, logistics, etc.) aims at greater automation and optimisation based on the management and exploitation of the data. The aim of the research group is to generate knowledge related to smart processes, learning algorithms, optimisation of industrial processes, and information security, and to transfer it to the industrial fabric.

It works on the following lines of research and knowledge areas:

- **Cybersecurity:** The objective of this line of research is to face the new challenges posed in the most recent developments and uses of information technologies, providing solutions to improve the confidence of companies and citizens in the new information and communication technologies through research in attack detection systems. Our research group contributes to areas such as: security in Industrial Control Systems (SCADA, critical infrastructures), security (and privacy) in the cloud, security in social networks, security of embedded systems, or security in mobile devices and networks.
- **Data analysis:** This line of research focuses on designing, adapting and applying the most advanced learning algorithms to diverse problems found in the industry and in society. More specifically, projects are developed for areas such as advanced manufacturing, industrial processes, computer security, and health.

Signal theory and communications.....

The research and transfer projects of this research group focus on the design and implementation of signal processing systems applied to the following areas: communications, both wireless and wired; monitoring and inspection of industrial processes; reliability and useful life analysis of industrial systems; and implementation of real-time signal processing systems.

- **Communications:** The key technologies that are being investigated in wireless communications are robust multi-carrier and MAC modulation techniques for use in industrial and vehicular environments, one highlight being the group's participation in the European SCOTT project. The group's results stand out due to their practical approach and, especially, their ability to implement these structures in FPGA-SOC and DSP. As a practical application of wireless communications to industrial environments, we have worked on the design and implementation of monitoring systems based on passive wireless sensors and design of antennas for industrial and logistics applications.
- **Monitoring and inspection:** The group also applies signal processing techniques in the field of identification, monitoring, and inspection of component systems and processes. The advanced inspection systems developed are applied in both the industrial and biomedical field. Highlights include the developments in in-factory inspection methods



and the integration of sensors in components, operating generally in hostile environments.

- **Reliability and service life analysis:** Analysis and simulation of reliability in critical industrial systems have been enhanced. As an example, a doctoral thesis was developed focusing on the estimation of the service life of underground cables using accelerated simulations in a custom FPGA-SoC implementation.
- **Real-time implementation of signal processing systems:** Thanks to the group's broad experience in implementing algorithms and complex systems in microprocessors and FPGAs, the group has specialised in the design and implementation of real-time systems for the fields of communications, energy, sensorisation, and process control. These implementations are tackled from low-level to high-level tools based on graphic tools.

SCIENTIFIC PUBLICATIONS

>> ARTICLES PUBLISHED IN JOURNALS INDEXED IN THE JOURNAL CITATION REPORT (JCR):

- **A case study on the use of machine learning techniques for supporting technology**
Alain Perez, Rosa Basagoiti, Ronny Adalberto Cortez, Felix Larrinaga, Ekaitz Barrasa, Ainara Urrutia
Data and Knowledge Engineering. Available online 4 August, 2018
- **A Multistage Algorithm for ECG Rhythm Analysis during Piston Driven Mechanical Chest Compressions**
Elraia Isasi, Unai Irusta, Elisabete Aramendi, Unai Ayala, Erik Alonso, J Kramer-Johansen, Trygve Eftestol
IEEE Transactions on Biomedical Engineering. IEEE. 16 April, 2018
<http://dx.doi.org/10.1109/TBME.2018.2827304>
- **A new magneto-dynamic compression technique for magnetorheological elastomers at high frequencies**
Iker Agirre-Olabide, María Jesús Elejabarrieta
Polymer Testing. Vol. 66. Pp. 114-121. April, 2018
<https://doi.org/10.1016/j.polymertesting.2018.01.011>
- **A novel hybrid sandwich structure: Viscoelastic and eddy current damping**
Leire Irazu, Maria Jesús Elejabarrieta
Materials & Design. Vol. 140. Pp. 460-472. 15 February, 2018
<https://doi.org/10.1016/j.matdes.2017.11.070>
- **A novel soft tissue prediction methodology for orthognathic surgery based on probabilistic finite element modelling**
Paul G. M. Knoop, Alessandro Borghi, Federica Ruggiero, Giovanni Badiali, Alberto Bianchi, Claudio Marchetti, Naiara Rodriguez-Florez, Richard W. F. Breakey, Owase Jeelani, David J. Dunaway, Silvia Schievano
PLoS ONE. Vol. 13. Nº. 5. May, 2018
<http://hdl.handle.net/20.500.11984/1101>
- **A performance-based taxonomy of entrepreneurial universities**
Leire Markuerkiaga, Juan Ignacio Igartua, Nekane Errasti

- International Journal of Technology Management. Vol. 77. Nº. 1-3, 2017
<https://doi.org/10.1504/IJTM.2018.091713>
- **A survey on the inventory routing problem with stochastic lead times and demands**
 Raul F. Roldan, Rosa Basagoiti, Leandro C. Coelho
 Journal of Applied Logic. Vol. 24. Part A. Pp. 15-24. November, 2017
<http://dx.doi.org/10.1016/j.jal.2016.11.010>
 - **An efficient procedure for the calculation of the stress distribution in a wind turbine blade under aerodynamic loads**
 Garbiñe Fernandez, Hodei Usabiaga, Dirk Vandepitte
 Journal of Wind Engineering and Industrial Aerodynamics. Vol. 172. Pp. 42-54. January, 2018
<https://doi.org/10.1016/j.jweia.2017.11.003>
 - **Analytical calculation of vibrations of electromagnetic origin in electrical machines**
 Alex McCloskey, Xabier Arrasate, Xabier Hernández, Iratxo Gómez, Gaizka Almandoz
 Mechanical Systems and Signal Processing. Vol. 98. Pp. 557-569. 1 January, 2018
<https://doi.org/10.1016/j.ymssp.2017.04>
 - **Analytical Modeling Approach to Study Harmonic Mitigation in AC Grids with Active Impedance at Selective Frequencies**
 Gonzalo Abad, Aitor Laka, Gabriel Saavedra, Jon Andoni Barrena
 Energies. Vol. 11. Nº 6. 1337,2018
<http://hdl.handle.net/20.500.11984/1099>
 - **Assessment of spring cranioplasty biomechanics in sagittal craniosynostosis patients**
 A. Borghi, S. Schievano, N. Rodriguez-Florez, R. McNicolas, W. Rodgers, A. Ponniah, G. James, Hayward, D. Dunaway, N.U.O. Jeelani,
 Journal of neurosurgery. Pediatrics. Vol. 20. Nº. 5. Pp. 400-409. November,2017
<http://dx.doi.org/10.3171/2017.1.PEDS16475>
 - **Contact angle measurement for LiBr aqueous solutions on different surface materials used in absorption systems**
 A. Martinez Urrutia, P. Fernandez Arroiabé, M. Ramírez, M. Martinez-Agirre, M. M. Bou-Ali
 International Journal of Refrigeration. Online 6 June, 2018
<https://doi.org/10.1016/j.jirefrig.2018.05.041>
 - **Cost-effectiveness and budget impact analyses of a colorectal cancer screening programme in a high adenoma prevalence scenario using MISCAN-Colon microsimulation model**
 Arantzazu Arrospide, Isabel Idigoras, Javier Mar, Harry de Koning, Miriam van der Meulen, Myriam Soto-Gordoa, Jose Miguel Martinez-Llorente, Isabel Portillo, Eunat Arana-Arri, Oliver Ibarrondo, Iris Lansdorp-Vogelaar
 BMC Cancer. Vol. 18. Nº 464. Published 25 April, 2018
<http://hdl.handle.net/20.500.11984/1105>
 - **Cranial bone structure in children with sagittal craniosynostosis : relationship with surgical outcomes**
 N. Rodriguez-Florez, A. Ibrahim, J.C. Hutchinson, A. Borghi, G. James, O.J. Arthurs, P. Ferretti, D.J. Dunaway, S. Schievano, N.U.O. Jeelani
 Journal of Plastic, Reconstructive and Aesthetic Surgery. Vol. 70. Nº 11. Pp. 1589-1597. November,2017
<https://doi.org/10.1016/j.bjps.2017.06.017>
 - **DC-Link Voltage and Catenary Current Sensors Fault Reconstruction for Railway Traction Drives**
 Fernando Garramiola, Jon del Olmo, Javier Poza, Patxi Madina, Gaizka Almandoz
 Sensors. Vol. 18. Nº 7. Special Issue: Sensors for Fault Detection. 22 June,2018
<http://hdl.handle.net/20.500.11984/1094>
 - **Design methodology of a reduced-scale test bench for fault detection and diagnosis.**
 E. Esteban, O. Salgado, A. Iturrospe, I. Isasa
 Mechatronics. Vol. 47. Pp. 14-23. November, 2017
<https://doi.org/10.1016/j.mechatronics.2017.08.005>
 - **Digital Interferometry Applied to Thermogravimetal Technique**
 E. Lapeira, A. Mialdun, V. Yasnou, P. Aristimuño, V. Shevtsova, M. M. Bou-Ali
 Microgravity Science and Technology. Pp 1-7. First Online 14 June, 2018
<https://doi.org/10.1007/s12217-018-9632-7>
 - **Effect of synthesis variables on viscoelastic properties of elastomers filled with carbonyl iron powder**
 Iker Agirre-Olabide, María Jesús Elejabarrieta
 Journal of Polymer Research. Vol. 24. Nº 9. September 2017
<https://doi.org/10.1007/s10965-017-1299-z>
 - **Effect of the manufacturing process on the energy absorption capability of GFRP crush structures**
 A. Esnaola, I. Tena, Saenz-Dominguez, J. Aurrekoetxea, I. Gallego, I. Ulacia
 Composite Structures. Vol. 187. Pp. 316-324. March, 2018
<https://doi.org/10.1016/j.compstruct.2017.12.079>
 - **Effect of ultraviolet curing kinetics on the mechanical properties of out of die pultruded vinyl ester composites**
 I. Sáenz-Domínguez, I. Tena, M. Sarrionandia, J. Torre, J. Aurrekoetxea
 Composites Part A: Applied Science and Manufacturing. Available online 9 March, 2018
<https://doi.org/10.1016/j.compositesa.2018.03.015>
 - **Employing Multi-Objective Search to Enhance Reactive Test Case Generation and Prioritization for Testing Industrial Cyber-Physical Systems**
 Aitor Arrieta, Shuai Wang, Urtzi Markiegi, Goiuria

- Sagardui and Leire Etxeberria
IEEE Transactions on Industrial Informatics. Vol. 14. Nº. 3. Pp. 1055-1066. March,2018
<http://dx.doi.org/10.1109/TII.2017.2788019>
- **Evaluation of the colorectal cancer screening Programme in the Basque Country (Spain) and its effectiveness based on the Miscan-colon model**
I. Idigoras, A. Arrospide, I. Portillo, E. Arana-Arri, L. Martínez-Indart, J. Mar, H. J. de Koning, R. Lastra, M. Soto-Gordoa, M. van der Meulen, I. Lansdorp-Vogelaar
BMC Public Health. Nº 18. 78, 2018
<https://doi.org/10.1186/s12889-017-4639-3>
 - **Fe nanoparticles produced by electric explosion of wire for new generation of magneto-rheological fluids**
Joanes Berasategi, Ainara Gomez, M Mounir Bou-Ali, Jon Gutiérrez, Jose Manuel Barandiarán, Igor V Beketov, Aleksander P Safronov, Galina V Kurlyandskaya
Smart Materials and Structures. Vol. 27. Nº 4. IOP Publishing Ltd,2018
<https://doi.org/10.1088/1361-665X/aaaded>
 - **Field Weakening Characteristics Computed with FEM-Coupled Algorithms for Brushless AC Motors**
Christian A. Rivera, Javier Poza, Gaizka Ugalde, Gaizka Almandoz
Energies. Vol. 11. Nº 5, 2018
<http://hdl.handle.net/20.500.11984/1100>
 - **Digital Image Correlation technique**
Julen Agirre, Lander Galdos Eneko Saenz de Argandoña, Joseba Mendiguren
Mechanics of Materials. Vol. 124. Pp. 71-79. September, 2018
<https://doi.org/10.1016/j.mechmat.2018.05.007>
 - **Impacto de la identificación de pacientes en un programa de cuidados paliativos del País Vasco/The impact of patient identification on an integrated program of palliative care in Basque Country**
Igor Larrañaga, Jesús Millas, Myria Soto-Gordo, Arantzazu Arrospide, Ricardo San Vicente, Marisa Irizar, Itziar Lanzeta, Javier Mar
Atención Primaria. In press, corrected proof. Disponible online 6 December, 2017
<https://doi.org/10.1016/j.aprim.2017.05.017>
 - **Influence of the contact angle on the wettability of horizontal-tube falling films in the droplet and jet flow modes**
P. Fernandez Arroiabe, A. Martinez Urrutia, X. Peña, M. Martinez-Agirre, M. M. Bou-Ali
International Journal of Refrigeration. Vol. 90. Pp. 12-21. June, 2018
<https://doi.org/10.1016/j.ijrefrig.2018.04.003>
 - **Integral Sensor Fault Detection and Isolation for Railway Traction Drive**
Fernando Garramiola, Jon del Olmo, Javier Poza, Patxi Madina, Gaizka Almandoz
Sensors. Vol. 18. Nº 5. 1543. Special Issue: Sensors for Fault Detection), 2018
<http://hdl.handle.net/20.500.11984/1104>
 - **Intracranial Volume Measurement : a Systematic Review and Comparison of Different Techniques**
W. Breakey, P.G.M. Knoop, A. Borghi, N. Rodriguez-Florez, D.J. Dunaway, S. Schievano, N.U.O. Jeelani
Journal of Craniofacial Surgery. Vol. 28. Nº. 7. Pp. 1746-1751. October, 2017
<https://doi.org/10.1097/SCS.0000000000003929>
 - **Linear magneto-viscoelastic model based on magnetic permeability components for anisotropic magnetorheological elastomers**
Iker Agirre-Olabide, P. Kuzhir, María Jesús Elejabarrieta
Journal of Magnetism and Magnetic Materials. Vol. 446. Pp. 155-161. 15 January, 2018
<https://doi.org/10.1016/j.jmmm.2017.09.017>
 - **Low Cost Photonic Sensor for in-Line Oil Quality Monitoring: Methodological Development Process towards Uncertainty Mitigation**
P. Lopez, J. Mabe, G. Miró, L. Etxeberria
Sensors (Basel). Vol. 18. Nº 7. 22 June,2018
<http://dx.doi.org/10.3390/s18072015>
 - **Membrane-containing virus particle exhibits mechanics of a composite material for genome protection**
S. Azinas, F. Bano, I. Torca, D. H. Bamford, G. A. Schwartz, J. Esnaola, H. M. Oksanen, R. P. Richter, N. G Abrescia
Nanoscale. Vol. 10. Nº 16. Pp. 7769-7779. Nanoscale. Published online April 16, 2018
<http://dx.doi.org/10.1039/c8nr00196k>
 - **Microfluidic separation processes using the thermodiffusion effect**
Alain Martin, M. Mounir Bou-Ali, Maialen Aginagalde, Pedro Urteaga
International Journal of Thermal Sciences. Vol. 124. Pp. 279-287. February, 2018
<https://doi.org/10.1016/j.ijthermalsci.2017.10.024>
 - **Microstructural aspects of the transition between two regimes in orthogonal cutting of AISI 1045 steel**
Bentejui Medina-Clavijo, Mikel Saez-de-Buruaga, Christian Motz, Daniel Soler, Andrey Chuvilin, Pedro J. Arrazola
Journal of Materials Processing Technology. Vol. 260. Pp. 87–96. October,2018
<https://doi.org/10.1016/j.jmatprotec.2018.05.016>
 - **New battery model considering thermal transport and partial charge stationary effects in photovoltaic off-grid applications**
Iván Sanz-Gorrachategui, Carlos Bernal, Estanis Oyarbide, Erik Garayalde, Iosu Aizpuru, Jose María Canales, Antonio Bono-Nuez
Journal of Power Sources. Vol. 378. Pp. 311-321. 28 February, 2018

<https://doi.org/10.1016/j.jpowsour.2017.12.058>

- **New Calibration method to measure Rake Face Temperature of the tool during Dry Orthogonal Cutting using Thermography**
D. Soler, P.X. Aristimuño, M. Saez de Buruaga, A. Garay, P.J. Arrazola
Applied Thermal Engineering. Vol. 137. Pp. 74-82. 5 June, 2018
<https://doi.org/10.1016/j.applthermaleng.2018.03.056>
- **Nuevas metodologías centradas en el usuario para la creación de software en la industria 4.0**
Erik Aranburu Zabalo, Ganix Lasa Erle, Daniel Reguera, Jon Kepa Gerrikagoitia, Garikoitz Iruretagoiena
Dyna. Vol. 92. Nº 5. P. 492. Septiembre, 2017
<http://dx.doi.org/10.6036/8447>
- **Press hardening of alternative materials: conventional high-strength steels**
Joseba Mendiguren, Nuria Herrero-Dorca, Eneko Sáenz de Argandoña, Lander Galdós
International Journal of Material Forming. Vol. 11. Nº. 5. Pp 663–670. September, 2017
<https://doi.org/10.1007/s12289-017-1379-y>
- **Reduction of distortions in large aluminium parts by controlling machining-induced residual stresses**
A. Madariaga, I. Perez, P. J. Arrazola, R. Sanchez, J. J. Ruiz, F. J. Rubio
The International Journal of Advanced Manufacturing Technology. Vol. 97. Nº. 1-4. Pp. 967-978. Springer. July, 2018
<https://doi.org/10.1007/s00170-018-1965-2>
- **Service design visualization tools for supporting servitization in a machine tool manufacturer**
Ion Iriarte, Maya Hoveskog, Daniel Justel, Ester Val, Fawzi Halila
Industrial Marketing Management. Vol. 71. Pp. 189-202. May, 2018
<https://doi.org/10.1016/j.indmarman.2018.01.003>
- **Short Messages Spam Filtering Combining Personality Recognition and Sentiment Analysis**
Enaitz Ezpeleta, Inaki Garitano, José Maria Gómez, Urko Zurutuza
International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems. Vol. 25. Nº. Suppl. 2. December, 2017
<https://doi.org/10.1142/S0218488517400177>
- **Simple voltage balancing method to protect series-connected devices experimentally verified in a 5L-MPC converter**
Mikel Mazuela, Igor Baraia, Alain Sanchez-Ruiz, Ivan Echeverria, Iñigo Torre, Iñigo Atutxa
Transactions on Industrial Electronics. Vol. 65. Nº 5. Pp. 3699-3707 May, 2018
<http://dx.doi.org/10.1109/TIE.2017.2760843>
- **Smart home-based prediction of multi-domain symptoms related to Alzheimer's Disease**
Ane Alberdi, Alyssa Weakley, Maureen Schmitter-Edgecombe, Diane J. Cook, Asier Aztiria, Adrian Basarab and Maitane Barrenechea
IEEE Journal of Biomedical and Health Informatics. IEEE. 25 January, 2018
<http://dx.doi.org/10.1109/JBHI.2018.2798062>
- **Spectrum-based fault localization in software product lines**
Aitor Arrieta, Sergio Segura, Urtzi Markiegi, Goiuria Sagardui and Leire Etxeberria
Information and Software Technology. Vol. 100. Pp. 18-31. August, 2018:
<https://doi.org/10.1016/j.infsof.2018.03.008>
- **Spring assisted cranioplasty : a patient specific computational model**
A. Borghi, N. Rodriguez-Florez, W. Rodgers, G. James, R. Hayward, D. Dunaway, O. Jeelani, S. Schievano
Medical Engineering and Physics. 19 January 2018
<https://doi.org/10.1016/j.medengphy.2018.01.001>
- **Statistical shape modelling to aid surgical planning: associations between surgical parameters and head shapes following spring-assisted cranioplasty,**
N. Rodriguez-Florez, J.L. Bruse, A. Borghi, H. Vercruysse, J. Ong, G. James, X. Pennec, D.J. Dunaway, N.U.O. Jeelani, S. Schievano
International Journal for Computer Assisted Radiology and Surgery (IJCARs). Vol. 12. Nº. 10. Pp. 1739-1749, October, 2017
<https://dx.doi.org/10.1007/s11548-017-1614-5>
- **Subcomponent development for sandwich composite wind turbine blade bonded joints analysis**
Garbiñe Fernandez, Hodei Usabiaga, Dirk Vandepitte
Composite Structures. Vol. 180. Pp. 41-62. Elsevier. 15 November, 2018
<https://doi.org/10.1016/j.compstruct.2017.07.098>
- **The effect of the viscoelastic film and metallic skin on the dynamic properties of thin sandwich structures**
Leire Irazu, Maria Jesús Elejabarrieta
Composite Structures. Vol. 176. Pp. 407-419. September, 2017
<https://doi.org/10.1016/j.compstruct.2017.05.038>
- **Thermodiffusion in Ternary Mixtures of Water/Ethanol/Triethylene Glycol: First Report on the DCMIX3-Experiments Performed on the International Space Station**
T. Triller, H. Bataller, M. M. Bou-Ali, M. Braibanti, F. Croccolo, J. M. Ezquerro, Q. Galand, Jna. Gavalda, E. Lapeira, A. Laverón-Simavilla, T. Lyubimova, A. Mialdun, J. M. Ortiz de Zárate, J. Rodríguez, X. Ruiz, I. I. Ryzhkov, V. Shevtsova, S. Van Vaerenbergh, W. Köhler
Microgravity Science and Technology. Vol. 30. Nº. 3. Pp 295–308. Springer. May, 2018
<https://doi.org/10.1007/s12217-018-9598-5>

- **Ti6Al4V metal cutting chip formation experiments and modeling over a wide range of cutting speeds**
Thomas H.C. Childs, Pedro-J. Arrazola, P. Aristimuno, Ainhara Garay, Irantzu Sacristan
Journal of Materials Processing Technology. Vol. 255. Pp. 898-913. May, 2018
<https://doi.org/10.1016/j.jmatprotec.2018.01.026>
- **Three-dimensional surface scanners compared with standard anthropometric measurements for head shape**
Caroline A. A. Beaumont, Paul G.M.Knoops, Alessandro Borghi, N.U. OwaseJeelani, Maarten J.Koudstaal, Silvia Schievano, David J.Dunaway, Naiara Rodriguez-Florez
Journal of Cranio-Maxillofacial Surgery. Vol. 45. Nº. 6. Pp. 921-927. June 2018
<https://doi.org/10.1016/j.jcms.2017.03.003>
- **Towards Large-Scale, Heterogeneous Anomaly Detection Systems in Industrial Networks: A Survey of Current Trends**
Mikel Iturbe, Iñaki Garitano, Urko Zurutuza, Roberto Uribeetxeberria
Security and Communication Networks. Vol. 2017. Article ID 9150965. November, 2017
<http://hdl.handle.net/20.500.11984/1111>
- **Using smart offices to predict occupational stress**
Ane Alberdi, Asier Aztiria, Adrian Basarab, Diane J. Cook
International Journal of Industrial Ergonomics. Vol. 67. Pp. 13-26. September, 2018
<https://doi.org/10.1016/j.ergon.2018.04.005>

>> BOOKS

- **La formación profesional de Navarra. Hacia un nuevo modelo de centro y el reto de la FP dual**
Coordinated by Mónica Moso Díez; study prepared by the Basque Competitiveness Institute - Orkestra (University of Deusto), directed by Mikel Navarro Arancegui; collaborators: Mikel Albizu Echevarria, Joxean Egaña Ajuria, Ixaka Egurbide Lekube, Jabier Retegi Albisua, Rakel Vázquez Salazar
Madrid: Bankia Foundation through Dual Training, 2018
- **Measurable and composable security, privacy, and dependability for cyberphysical: The SHIELD Methodology**
Edited by Andrea Fiaschetti, Josef Noll, Paolo Azzoni, Roberto Uribeetxeberria
Boca Raton : CRC Press , 2018
- **Power electronic converter design handbook**
Manex Barrenetxea Iñarra, Igor Baraia Zubiaurre, Igor Larrazabal Bengoetxea, Ignacio Zubimendi Azaceta

Arrasate-Mondragon: Mondragon Unibertsitateko Zerbitzu Editoriala
<http://hdl.handle.net/20.500.11984/1090>

>> BOOK CHAPTERS

- **Application of innovation management techniques in SMEs: a process based method**
J. I. Igartua, L. Markuerkiaga
EN Closing the Gap Between Practice and Research in Industrial Engineering. Editors: Elisabeth Viles, Marta Ormazábal, Alvaro Lleó. Pp. 67-74. Springer International Publishing, 2018
<http://dx.doi.org/10.1007/978-3-319-58409-6>
- **Big Data and service quality: Barcelona´s Hospitality and Tourism Industry**
Ainhoa Serna, Antònia Casellas, Grant Saff, and Jon Kepa Gerrikagoitia
EN Quality Services and Experiences in Hospitality and Tourism. Vol. 9. Liping A. Cai, Pooya Alaedini. Emerald, 2018
- **Electric Propulsion Case Studies**
Iñigo Atutxa, Gonzalo Abad, John Carlton
EN Encyclopedia of Maritime and Offshore Engineering. Wiley, 2018
<http://dx.doi.org/10.1002/9781118476406.emoe587>
- **Fretting : review on the numerical simulation and modelling of wear, fatigue and fracture**
Iñigo Llavori, Jon Ander Esnaola, Aitz Zabala, Miren Larrañaga, Xabier Gómez
EN Contact and Fracture Mechanics. Pranav H. Darji. Intech, 2018
<http://dx.doi.org/10.5772/intechopen.72675>
- **Model-Based Fault Analysis for Railway Traction Systems**
Jon del Olmo, Fernando Garramiola, Javier Poza, Gaizka Almandoz
EN Modern Railway Engineering. edited by Ali Hessami. In-Tech, 2018
<https://www.intechopen.com/books/modern-railway-engineering/model-based-fault-analysis-for-railway-traction-systems>
- **Perspectives in secure SMART environments**
Josef Noll, Iñaki Garitano, Christian Johansen, Javier del Ser, and Ignacio Arenaza-Nuño
EN Measurable and Composable Security, Privacy, and Dependability for Cyberphysical Systems: The SHIELD Methodology. Edited by Andrea Fiaschetti, Josef Noll, Paolo Azzoni and Roberto Uribeetxeberria. CRC Press, 2018
- **Project Management Success Factors in Basque Companies**
Noemi Zabaleta, Unai Elorza, Maria Ruiz

EN Closing the Gap Between Practice and Research in Industrial Engineering. Editors: Elisabeth Viles, Marta Ormazábal, Alvaro Lleó. Pp. 305-3011. Springer International Publishing, 2018
<http://dx.doi.org/10.1007/978-3-319-58409-6>

- **Residual Stress Pattern Prediction in Spray Transfer Multipass Welding by Means of Numerical Simulation**
Jon Ander Esnaola, Ibai Ulacia, Arkaitz Lopez-Jauregi and Done Ugarte
EN Residual Stress Analysis on Welded Joints by Means of Numerical Simulation and Experiments. Intech, 2018
- **Roll Levelling**
L. Galdos, E. Silvestre
EN CIRP Encyclopedia of Production Engineering. Living Edition. Editors, S. Chatti, L. Laperrière, G. Reinhart, T. Tolio, The International Academy for Production. Springer, 2018
<https://doi.org/10.1007/978-3-642-35950-7>
- **Security, Privacy and Dependability Concepts**
Andrea Fiaschetti, Josef Noll, Paolo Azzoni, Roberto Uribeetxeberria, John Gialelis, Kyriakos Stefanidis, Dimitrios Serpanos, and Andreas Papalambrou
EN Measurable and Composable Security, Privacy, and Dependability for Cyberphysical Systems: The SHIELD Methodology. Edited by Andrea Fiaschetti, Josef Noll, Paolo Azzoni and Roberto Uribeetxeberria. CRC Press, 2018
- **Security, Privacy and Dependability Metrics**
Andrea Morgagni, Andrea Fiaschetti, Josef Noll, Ignacio Arenaza-Nuño, Javier Del Ser
Measurable and Composable Security, Privacy, and Dependability for Cyberphysical Systems: The SHIELD Methodology. Edited by Andrea Fiaschetti, Josef Noll, Paolo Azzoni and Roberto Uribeetxeberria. CRC Press, 2018
- **The SHIELD approach**
Andrea Fiaschetti, Paolo Azzoni, Josef Noll, Roberto Uribeetxeberria, Antonio Pietrabissa, Francesco Delli Priscoli, Vincenzo Suraci, Silvano Mignanti, Francesco Liberati, Martina Panfili, Alessandro Di Giorgio, and Andrea Morgagni
EN Measurable and Composable Security, Privacy, and Dependability for Cyberphysical Systems: The SHIELD Methodology. Edited by Andrea Fiaschetti, Josef Noll, Paolo Azzoni and Roberto Uribeetxeberria. CRC Press, 2018



MANAGEMENT AND SERVICES REPORT



RELEVANT DATA

Academic Year 17/18

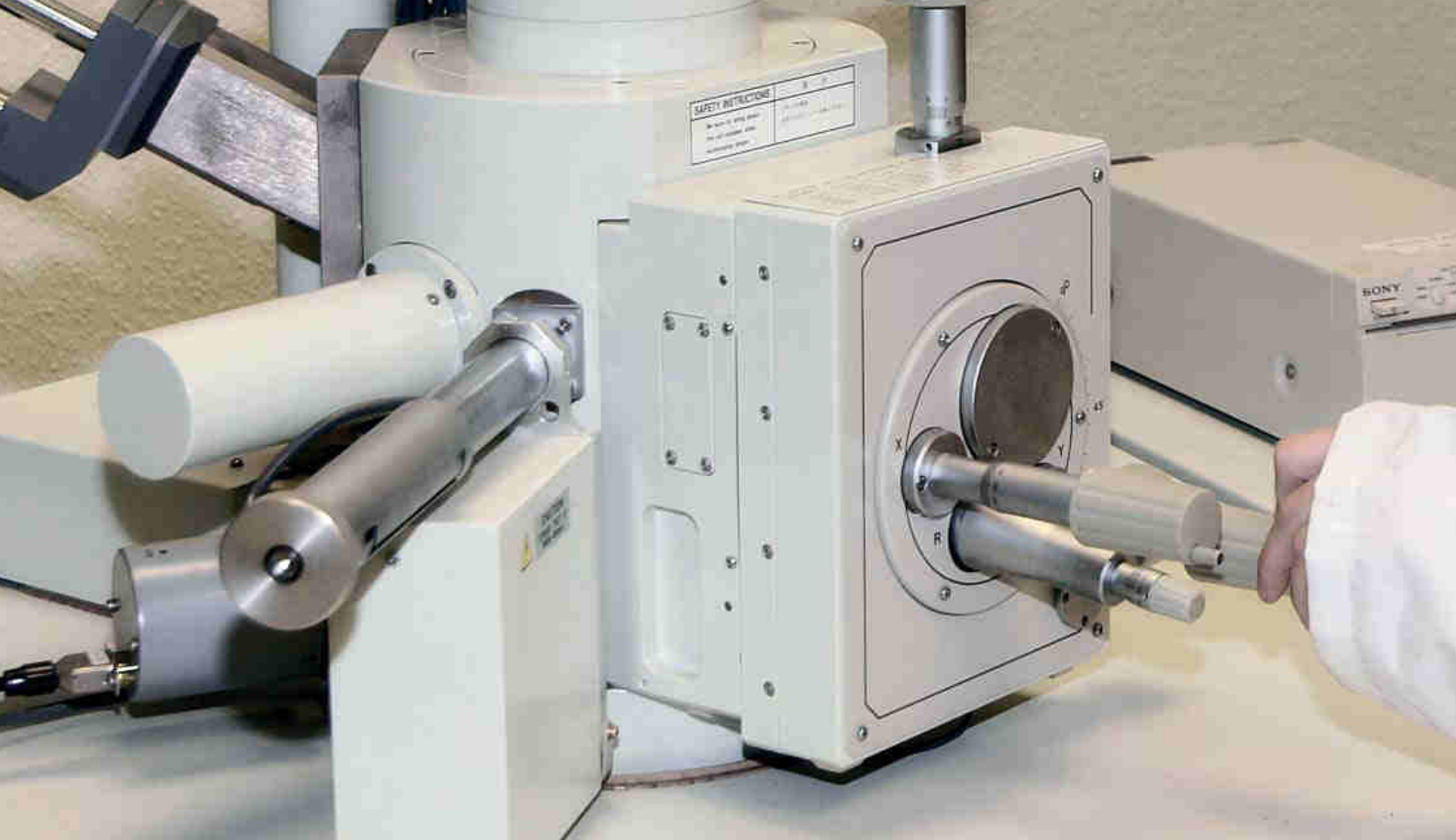
Students of Training Courses in Higher Education.....	227
Undergraduate Students.....	1,379
Master's Degree Students.....	298
Doctorate students	98
International mobility students (incoming + outgoing).....	181
Hours of Continuous Training	12,360
R&TD Budget (1)	14,218
Support Budget (1)	32,793
Ordinary Investment (1).....	1,659
Staff	530

(1) Thousand Euro

GENERAL AND MULTI-DISCIPLINARY SERVICES

One of MGEP's current challenges is the efficient and sustainable management of the services we offer the community, mostly related to teaching, research and continuous training throughout people's lives. To achieve sustainable services, which meet the needs and expectations of different users, we implemented strategies and proposals during the academic year 17/18 through the following projects:

- **Dissemination and promotion of open access:** the library collaborates in the development of institutional policies that promote Open Access. This year, it has worked on
 - Adapting the metadata of its institutional repository to the new standards promoted by the European Union.
 - Expanding the volume of data of the scientific publications of the School included in the repository.
 - Developing a specific web section dedicated to Open Access.
 - Preparing materials to promote open access among researchers.
 - Promoting Open Access for End-of-Degree Projects (TFG) and End-of-Master's Project (TFM) of the School: a procedure for open publication of TFG and TFM in the institutional repository has been developed alongside the academic coordination.
- **Research support:** the Library collaborates with the research staff in different areas. This year the objective has been to collaborate in that top-ranking publications and obtain the greatest possible impact. To do this, in addition to attending each of the consultations carried out, materials were developed with recommendations for publication, and training modules were organised on how and where to publish.
- **Development of digital competencies:** The library supports teaching in the development of digital skills



of students. In this academic year, it worked on the development of these competencies through modules designed and organised by academic coordination for undergraduate degrees and for doctorate.

- **Collaboration with the academic coordination:** To establish the management process of the recommended bibliography for undergraduate and all Master's degrees, all the recommended bibliography was updated, and the links for each subject were provided. The procedure was specified to have a unique and dynamic information that can be included in the different work platforms (MUdle, Web, etc.).
- **Project IKT2020:** In the strategic reflection carried out by Mondragon Unibertsitatea, a strategic line related to digitalisation was identified. In the academic year 17-18, this reflection was answered by developing projects such as:
 - Implementing the digital signature in services offered to students.
 - Practice Management Project, End-of-Degree Project, and End-of-Master's Project.
 - A new website for Mondragon Unibertsitatea, as well as for the schools, including Mondragon Goi Eskola Politeknikoa.
 - Structure of the information in the Document Manager.
- **ISO 27001** with the aim of ensuring the security of the information systems, the Information Systems area prepared an adaptation plan for the ISO27001 standard, in which existing processes will be reviewed and adapted, and those required by the standard and not yet available will be developed.
- **Adaptation to the European Data Protection Regulation:** Mondragon Goi Eskola Politeknikoa has adapted its systems to the new European Regulation on data protection. In addition, it has assigned a DPO (Data Protection Delegate), as required by said Regulation.
- **Mobile application of Mondragon Unibertsitatea Konet:** All cross-sectional services are collaborating in the Campus M project and in the implementation of new services in the Konet app. In the academic year 17-18, the material reservation feature and an animation plan were added to encourage the use of the app.
- **New ERP (Enterprise Resource Planning):** In order to optimise business processes, improve access to information and the possibility of sharing information among all the working staff of the organisation, the tool change analysis was implemented. The new ERP will be Dynamics NAV from Microsoft, with the established goal of carrying out the Management Plan for 19/20 in the new system and replace the current ERP starting in the academic year 19/20.



- **Computer infrastructure improvement plan:** In the financial year 17/18, major economic efforts were made to adapt and modernise the computer equipment of classrooms, laboratories, and departments of Mondragon Goi Eskola Politeknikoa.
- **Adaptation of buildings:** with the collaboration of the Building Management area, the operating licence of building 2 was updated. In addition, the necessary steps to achieve the update of the operating licence of building 5 were started, and the internal works of building 10 for the high-performance machining zone were initiated.
- **Special Plan Gautxori:** During the academic year 17/18, the special plan of the Gautxori area was prepared. In addition, the work involving the urban action plan (PAU) based on the Special Plan was carried out.
- **Implementation of the UNIFIKAS computer application:** For the management of occupational risk prevention, work was carried out on the implementation of the UNIFIKAS computer application. Additionally, work is being carried out on the integration with other management applications such as personnel, machines and access to living quarters and laboratories.
- **ISO 9001 in Vocational Training:** The necessary redesign of the Management System to obtain the ISO 9001:2015 certificate was initiated.

BITERI HALL OF RESIDENCE (CMB)

The Higher Polytechnic School of Mondragon offers its accommodation and maintenance service to the students of Mondragon Unibertsitatea. During the academic year 2017/2018, a total of 119 students enrolled in this institution.

We should highlight the importance of the groups of foreign students who choose Mondragon Unibertsitatea to complete their corresponding studies since their stay at the Hall of Residence enriches coexistence and represents an opportunity to open up about other realities and cultures for the native university students. During the academic year 2017/2018, the following groups visited us:

- **September-October:** 28 students from Mexico for a 3-week stay.
- **September-January:** 8 students from Mexico for a 5-month stay.
- **September-October:** 22 students from France for a 1-month stay.
- **May:** 19 students from Central America for a 3-week stay.
- **June-July:** 35 students from Mexico for a 3-week stay.

The mission of the Hall of Residence focuses on complementing the academic training of students in search of their integrity as a person, assisting in their housing and maintenance needs in an effective manner,



and generating a climate of coexistence in which they can enjoy a rewarding university experience.

For this purpose, the Hall of Residence is organised in work groups, with responsibilities being shared among the students. The monitoring of these responsibilities is carried out by the staff of the centre through group and individual tutoring.

>> ACTIVITIES RELATED TO NON-FORMAL EDUCATION:

The space for extra-academic activities is progressively gaining strength as a valid, fun and efficient training environment. 85% of the total credits requested by the students were accredited by the Biteri Hall (of Residence 72 of 85). In this sense, it should be noted that 7 non-collegiate students have applied for and obtained their respective credits.

The list of extra-academic activities is as follows:

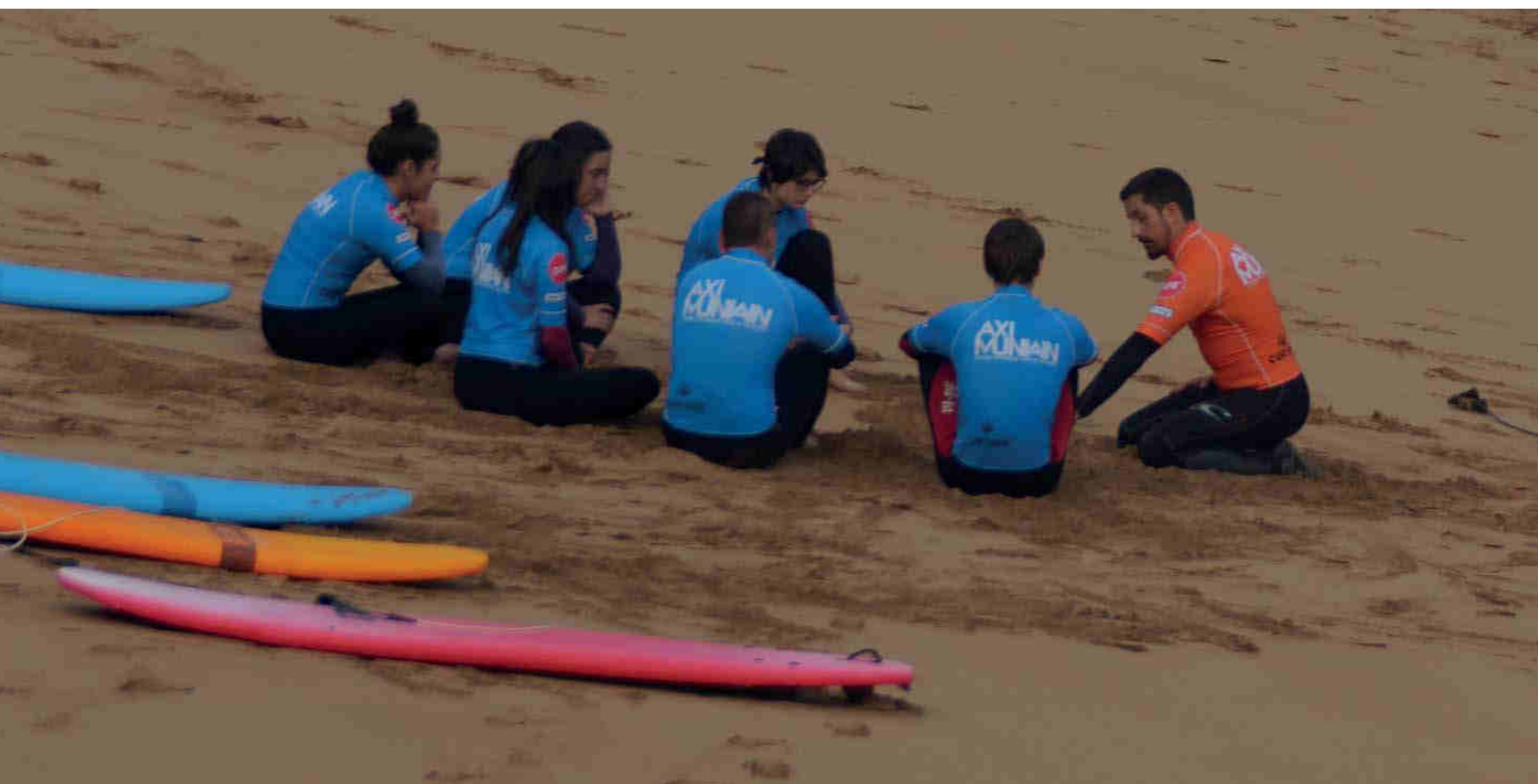
Charity Area.....

- Charity football at the Ibaiondo educational centre. 3 annual visits.
- Volunteer work at the Harrera Gela of the Arrasate Public School. 2 times per week.
- Haima: direct solidarity action in the Urgatzi centre for minors. 2 times per week.

- Haima txiki: school reinforcement for children from migrant families. 1 time per week.
- Collaboration with the San Juan de Dios Hospital. Concrete activities.
- Three blood donation sessions.
- Volunteer work in Elkarheitzzen. 1 time per week.

Sociocultural Area.....

- Course start field trip in Beizama.
- Sports meeting between the State Halls of Residence in Madrid.
- Leisure and sport outings: skiing, paintball.
- Organisation of fancy dress competition and outing to the Tolosa carnivals.
- Cultural visit at Astarbe Sagardotegi.
- Talks:
 - "Bizikletan: beste mundu hori ezagutzera", Maddi Urizar .
 - "Goienerr", Sehila Lizardi-Garazi Zuazu.
 - "La ingeniería y la magia", Unai García Amaro.
 - "Salhaketa", Amaia Campos.
 - "México, desde una perspectiva socioeconómica", alumno mexicano.
 - "Ipui kontalaria", Jon Urmeneta and Iker Zarrabeitia.
 - "Euskaldun bat Senegal-en", Maddi Tolosa.
 - ACABE, Miren Caballero.
- Development of technology projects in a multidisciplinary way from the commission "Makers".
- Drawing workshop.



Student representation A.....

- Coordination of the operation and activities of the Hall of Resident.
- Representatives of the different committees take part in the decision-making alongside the director of the Hall of Residence through the College Council.
- Organisation of the Academic Year Closing Ceremony.

Sport and Healthcare Area.....

- Training and participation in half-marathon races.
- Integral personal care and health.
- Internal sport championships.
- Mus championship between CCMM of the Basque Country.
- Coordination with those responsible for the restoration service in order to improve the students' diet and the service.
- Internal organisation of the emergencies team.

>> ACTIVITIES RELATED TO INFORMAL EDUCATION:

To grow, taking responsibility, is what makes a person feel an active part of and owner of their personal development. There is, however, another equally important component, which has to do with the bonds established by people. In this sense, the Biteri Hall of Residence aspires to build a university community where students feel accompanied first, and an active part of

it later. The aim is to ensure that each member of the university, working as a team and assuming cooperative values, becomes a player in said community.

EXTRACURRICULAR ACTIVITIES

The aim of the sport service is to promote an active lifestyle among students and the staff, providing facilities and offering the possibility of performing various physical and sport activities. In addition to the activities themselves, the sport department works on various projects to provide a better product and communication with the entire group of students and staff via a computer system that facilitates their enrolment in activities.

It sets up collaboration agreements with the various sport organisations in the area to provide access for the students and staff to their facilities and programmes.

During the academic year 2017/2018, 744 students participated in the following activities (without taking into account the 300 participants of the health week activities, in which there were no registrations):

>> COMPETITIONS

In the various official championships organised: internally at the School, inter-school, in the Basque Country and at the state level, the participation was of 464 students. Similarly, a total of 53 students



competed in other tournaments and international championships such as: Karting, Surf, Herri Kirolak and Zabalki (international pelota match).

>> PROMOTION OF SPORT ACTIVITIES AND HEALTH

304 people participated in:

A) COURSES AND OUTINGS

Different courses and outings were proposed in which the students had the opportunity to learn new sports or practice the known ones. Courses such as surfing, rock climbing, canoeing, karting and skiing were organised with the participation of a total of 227 students.

B) IMPROVING PHYSICAL FITNESS

In this section, students enrolled in gyms, both public and private, were taken into account to carry out physical activities whilst taking advantage of our agreements with these centres, with a total of 77 students enrolled.

>> RENTING FACILITIES AND BORROWING EQUIPMENT

This service, which allows students and staff to carry out their preferred activities at their own pace, was widely accepted, with 78 people making a reservation or borrowing equipment.

>> ADDITIONAL ACTIVITIES

This section includes all activities related to physical activity that do not involve a practice itself, such as the visit to the sport teams Baskonia, Eibar SD, and Real Sociedad, various photography and jersey design contests, etc. in which 159 students participated.

It should be noted that more than 300 students participated in the activities that were organised for health week, an amount that has not been added to the overall indicators for the service due to the fact that registration in the sports department for these activities was not necessary, thus making it impossible to tell if these people participated in other activities or not.

>> WORKER PARTICIPATION

The sport service has encouraged workers in the School to practice sport, adapting activities to the available time in their timetables. Thus, during the academic year 2017/2018, 89 workers participated in the activities organised.

SOCIAL AND MANAGEMENT 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 constituted by 289 labour partners, 289 user partners (students), and 289 collaborating partners (companies).

>> GOVERNING BOARD

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

- **President:** Juan M^a Palencia
- **Vice-President:** M^a Asunción Sarrionandia
- **Secretary:** Idoia Irazabal
- **Spokespersons:**
 - José Antonio Alustiza
 - Enrique Zarate
 - Erik Aranguiz
 - Iker Zarrabeitia
 - Carmelo Cortabarría
 - José Antonio De Frutos
 - Mikel Mendikute
 - Imanol Andrés Bustillo
 - Amaya San Martín

>> 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:**
 - Carlos García
- **Academic Coordinator:**
 - Nekane Errasti
- **Professional Training Coordinator:**
 - Gorka Aretxaga
- **Research Coordinator:**
 - Roberto Uribeetxeberia
- **Continued Training Coordinator:**
 - Gentzane Aldekoa
- **Electronics and Computing Coordinator:**
 - Xabier Sagarna
- **Mechanics and Industrial Production Coordinator:**
 - Xabier Arrasate
- **Cross-Sectional Systems and Services Coordinator:**
 - José Luis Larrabe
- **Financial Coordinator:**
 - Milagros Arregui

>> SUPERVISORY COMMISSION

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

- Germán Albistegui
- Belén Cortabarría
- Aitzol Pico

>> SOCIAL COUNCIL

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

- Ibon Ajuria
- Patxi Aristimuño
- Igor Azkarate
- Itsaso Buruaga
- Nagore Elexpuru
- Leire Etxebarria
- Arkaitz Garate
- Mikel García
- Ander Goikoetxea
- Urtzi Uribeetxebarria
- Elisabeth Urrutia



COLLABORATING PARTNERS:

- ABEKI COMPOSITES, S. L.
- ALECOP, S. COOP
- ALEJANDRO ALTUNA, S. A.
- AUSOLAN, S. COOP.
- COPRECI, S. COOP.
- EKIDE, S. L.
- ENERGÍA PORTÁTIL, S.A.
- FAGOR AOTEK, S.COOP.
- 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.
- LABORAL KUTXA, S. COOP.
- LANA, S. COOP.
- LKS, S. COOP.
- LKS INGENIERIA, S. COOP.
- MONDRAGON, S. COOP.
- 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 SERVICIOS DE MANUTENCIÓN, S. COOP.
- ULMA GROUP

COLLABORATING PUBLIC INSTITUTIONS:

- MONDRAGON TOWN HALL
- GUIPUZCOA DISTRICT COUNCIL
 - Department of Innovation, Rural Development and Tourism.
- BASQUE GOVERNMENT
 - Department of Education.
 - Department of Economic Development and Infrastructure.
 - Department of Employment and Social Policies.
- CENTRAL GOVERNMENT
 - Ministry of Economy, Industry and Competitiveness.
- EC: EUROPEAN COMMISSION



**Mondragon
Unibertsitatea**

**Faculty of
Engineering**

MGEP

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