

SPECIAL EDITION

Empresa

XXI

July, 2025

Hi-Tech BasqueCountry

INDUSTRIAL TERRITORY
DIGITAL TERRITORY

2025
EDITION


EMO
HANNOVER
22-26/09/2025



Published by
INDUSTRIA Y COMUNICACIÓN SA

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Production
**GRUPO XXI DE COMUNICACIÓN
EMPRESARIAL**

Printed by
GRÁFICAS EUJOA SA



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The exhibitors, coming from 40 countries, are international leaders in the metalworking sector.

TRADE FAIR | REINVENTING MANUFACTURING

MANUFACTURING REIMAGINED IN HANNOVER

EMO HANNOVER RETURNS FROM SEPTEMBER 22 TO 26 WITH INNOVATION AT ITS CORE AND 1,400 EXHIBITORS FROM 40 COUNTRIES – INCLUDING 32 FROM THE BASQUE COUNTRY

EMO, the world's leading trade fair for production technology, will celebrate its 50th anniversary this year in Hannover, running from September 22 to 26. Under the banner "Innovate Manufacturing," the event reaffirms itself — five decades on — as the hub where the future of manufacturing is forged and the key players in the metalworking value chain come together.

"For half a century, EMO has brought the right people to the right place at the right time," emphasized Dr. Markus Heering, Managing Director of VDW, the German Machine Tool Builders' Association, during the fair's preview event at Bilbao Exhibition Centre (BEC). "It is the most important event of 2025 for the global metalworking community," he stated.

The components on display at the second German edition of EMO back in 1977 have little in common with the innovations that will be showcased this year — all centered around the smart factory. Automation, sustainability, artificial intelligence, and digitalization will take center stage once again, as EMO mirrors the latest production technology trends and serves as a guidepost for the future of industrial manufacturing.

Over 1,400 exhibitors from more than 40 countries are expected to participate.

Among them, 44 companies will represent Spain — 32 from the Basque Country — bringing their expertise to inspire visitors from 140 nations. Notable names include Danobat, Soraluce, and Ibarmia, along with Fagor Automation, Zayer, MTE, and Nicolás Correa.

The EMO startup zone is jointly organized by VDW and VDMA Startup-Machine Services, providing a vital platform for entrepreneurs shaping the future of manufacturing — from robotics and automation to predictive maintenance and additive manufacturing, as well as mixed reality and the Internet of Things (IoT).

The additive manufacturing area will feature breakthrough concepts in direct and indirect 3D printing, new materials, and rapid product development. Meanwhile, the Cobot zone will showcase collaborative robot automation solutions, including grippers, machine vision, metrology, software, industrial electronics, and feeding systems.

The digitalization area will focus on automation processes, smart production,

predictive maintenance, and Industrial IoT (IIoT). The sustainability zone will highlight cutting-edge solutions for green production of the future.

EMO stands as the largest showcase and meeting point for the metalworking industry, spanning machine tools, manufacturing systems, precision tools, material flow, IT technology, industrial electronics, and accessories. As the key interface between industry and production technology, EMO represents innovation, internationality, inspiration — and the future of metalworking.

CELEBRATING 50 YEARS AS THE WORLD'S LEADING MANUFACTURING FAIR

EMO 2023 Participation

The 2023 edition of EMO Hannover brought together 1,838 exhibitors from 45 countries and drew nearly 92,159 trade visitors from 136 nations. Attendees represented key industrial sectors including machinery manufacturing, automotive and its suppliers, aerospace, precision mechanics and optics, shipbuilding, medical technology, tool and mold making, steel production, and lightweight construction.

EUROPEAN UNION | DIGITALIZATION

A DIGITAL UNION OF ITS OWN

THE COMMISSION NOTES THERE IS STILL A LONG WAY TO GO TO MEET THE 2030 TARGETS

DIVERSE USE OF TECHNOLOGY IN INDUSTRY

The use of digital technologies varies among European industrial SMEs. In 2024, 8.9% used AI, 56.7% had internet access, and 11.4% conducted electronic sales

	AI USE		INTERNET ACCESS		E-COMMERCE SALES	
	2024	%24/23	2024	%24/23	2024	%24/23
EU-27	8.9%	+62%	56.7%	+5%	11.4%	+9%
Germany	13.7%	+83%	62.7%	+9%	10.1%	+12%
Austria	15.4%	+80%	64.5%	+6%	17.5%	+56%
Belgium	18.5%	+69%	66.5%	+1%	17.7%	+9%
Bulgaria	3.5%	+57%	28.7%	+8%	5.7%	-7%
Czech Republic	7.3%	+57%	50.2%	+4%	12.8%	-5%
Cyprus	2.6%	+2%	36.7%	-8%	6.7%	-19%
Croatia	7.6%	+44%	44.4%	-2%	18.9%	+7%
Denmark	17.3%	+79%	73.2%	+1%	13.7%	+12%
Slovakia	7.7%	+39%	45.7%	+3%	7.1%	-23%
Slovenia	17.9%	+100%	55.6%	+8%	8.4%	+12%
Spain	7.9%	+8%	52.1%	+3%	18.2%	-8%
Catalonia	11.0%	+4%	57.8%	+4%	18.6%	-9%
Valencian Com.	9.0%	+19%	47.6%	+2%	21.0%	+6%
Madrid Com.	7.4%	+19%	58.7%	+2%	12.2%	-43%
Navarre	10.8%	+47%	51.5%	+7%	13.9%	-31%
Basque Country	8.9%	+37%	56.1%	+5%	15.3%	-14%
Estonia	9.2%	+172%	49.8%	+5%	12.5%	+16%
Finland	17.3%	+73%	81.9%	+3%	17.2%	+43%
France	5.3%	+52%	62.4%	+2%	8.2%	+17%
Greece	7.4%	+53%	47.0%	+4%	12.2%	+0%
Hungary	4.7%	+40%	52.1%	+4%	10.5%	-20%
Ireland	11.9%	+76%	66.1%	+3%	24.7%	+66%
Italy	7.3%	+66%	55.7%	+6%	9.9%	+25%
Latvia	7.1%	+132%	49.6%	+0%	9.1%	+2%
Lithuania	6.5%	+72%	49.2%	-5%	32.7%	+14%
Luxembourg	20.7%	+79%	55.0%	+3%	2.8%	-11%
Malta	12.4%	+20%	49.6%	-2%	17.1%	+15%
Netherlands	14.7%	+58%	74.3%	+0%	16.8%	-0%
Poland	4.0%	+71%	45.9%	+6%	8.8%	+4%
Portugal	5.4%	-20%	38.5%	+3%	6.9%	+41%
Romania	0.9%	+5%	31.7%	+8%	6.6%	+22%
Sweden	16.4%	+221%	87.8%	+4%	13.5%	-10%

Percentage of industrial companies with 10 or more employees using these digital tools.
Source: Eurostat.

The digital transformation of companies is one of the main pillars of the EU's strategy to shape a sovereign and competitive Europe in the coming years. The Commission has set a target for 2030: for 75 percent of companies in the Union to adopt technologies such as cloud computing, Artificial Intelligence (AI), or Big Data, and for more than 90% of SMEs to reach at least a basic level of digital intensity.

The 2030 goals for business digital transformation also include increasing the number of large-scale firms and boosting funding in order to double the number of so-called 'unicorns' (tech companies less than ten years old valued at over one billion dollars without having gone public) within the European Union.

The other three pillars

Improving the digital skills of the population (reaching 20 million ICT specialists in the EU and ensuring 80% of the population has basic skills), as well as implementing secure and sustainable digital infrastructure (providing gigabit internet connectivity to all citizens and businesses, doubling the EU's share of global se-

TARGET 2030: 75% OF EU FIRMS USING IA, CLOUD OR BIG DATA

miconductor production, and reaching 10,000 high-security, climate-neutral edge nodes—servers), and extending digitalization to public services are the other three pillars around which the EU's 'Digital Decade' policy programme revolves.

Countries such as Australia, China, Israel, Japan,

South Korea, the United Kingdom, and the United States are currently the most advanced in terms of digitalization. According to the European Commission, the main challenges facing the EU in comparison with these benchmark nations



DC STUDIOS/FREPIK

The EU aims to reach 10,000 high-security, climate-neutral edge nodes by 2030.

relate precisely to advanced digital skills (measured by the proportion of ICT graduates), digital infrastructure including 5G coverage, high-speed broadband adoption, market share in semiconductors and quantum patents, and business digitalization, particularly the number of unicorns per capita, low levels of venture capital for AI, and limited adoption of emerging technologies.

Greater ambition

The Commission itself, in its 2024 report on the state of the 'Digital Decade', acknowledges that "under current conditions, the collective efforts of Member States will fall short of the EU targets" and calls for "more ambitious" reinforced action.

But what is the current status of corporate digital transformation indicators? According to Eurostat data, European companies still have a long way to go in adopting these emerging technologies. In the specific case of AI, only 13% of companies used it in 2024.

This represented a significant year-on-year increase—five percentage points compared to 2023—but remains far below the 75% target set for 2030. Usage was more common among large companies (41%) than SMEs (13%), and the most frequently used AI technology was written language analysis (7% of companies), followed by written or spoken language generation (5%) and conversion of spoken language into machine-readable format (5%).

By country, AI technology use was highest in Denmark (28%), followed by Sweden and Belgium (25% in both cases). The lowest levels were recorded in Romania (3%), Poland, and Bulgaria (both at 6%).

Industrial SMEs

As for industrial companies with 10 or more employees, AI usage statistics were even lower, with an EU average of 8.9%, despite a 62% increase compa-

red to 2023. Companies in Luxembourg (20.7%), Slovenia (17.9%), and Denmark and Finland (17.3%) showed the highest usage rates in 2024, while 13.7% of German industrial firms with 10 or more workers used this technology.

Among this group of companies, internet use was much more widespread (56.7% of the total in the EU), rising 5% from 2023, while only 11.4% made electronic sales, a 9% increase from the previous year.

Higher digital intensity

In 2024, 74% of EU companies reached a basic level of digital intensity (use of at least four digital technologies). Among SMEs, the proportion was 73%, still 20 points below the 2030 target, while for large companies the rate stood at 98%. Large firms showed a higher proportion of very high digital intensity (41%) and high intensity (46%), compared to only 6% of SMEs with a very high level and almost 27% with a high level.

Focusing specifically on manufacturing SMEs, only 5.1% across the EU reached a very high level, a 7% increase year-on-year.

DIGITAL INTENSITY ON THE RISE

Digital intensity among EU manufacturing SMEs is improving, but only 5.1% reached a very high level in 2024.

	2024	%24/22	2022
EU-27	5,1%	+7%	4,8%
Germany	7,6%	+30%	5,8%
Austria	9,6%	+17%	8,2%
Belgium	12,3%	+4%	11,9%
Bulgaria	0,7%	-24%	0,9%
Czech Republic	5,4%	-5%	5,7%
Cyprus	1,2%	+53%	0,8%
Croatia	3,5%	-32%	5,2%
Denmark	12,9%	-21%	16,2%
Slovakia	2,8%	-39%	4,6%
Slovenia	5,6%	-29%	7,8%
Spain	4,2%	+20%	3,5%
Estonia	4,9%	+13%	4,3%
Finland	16,4%	+18%	13,9%
France	4,1%	-14%	4,7%
Greece	2,0%	-4%	2,1%
Hungary	2,5%	-39%	4,0%
Ireland	12,9%	+90%	6,8%
Italy	3,1%	-1%	3,2%
Latvia	3,1%	+73%	1,8%
Lithuania	3,4%	+41%	2,4%
Luxembourg	9,1%	+14%	8,0%
Malta	6,0%	-6%	6,3%
Netherlands	8,8%	+14%	7,8%
Poland	4,1%	+9%	3,8%
Portugal	3,9%	-5%	4,1%
Romania	1,0%	+28%	0,8%
Sweden	13,0%	-4%	13,5%

Percentage of industrial enterprises with 10 or more employees using these digital tools. Source: Eurostat.



**GROWTH
IN AI USAGE
AMONG
INDUSTRIAL
SMES**



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MACROECONOMICS | FOREIGN TRADE

CAUGHT IN THE CROSSFIRE

VALUE OF EU GOODS EXPORTS FELL
BY 1% IN 2024, EXPORTS GREW BY 2%
GLOBALLY AND IN THE U.S.
ASIA SOARED BY 5%

The European Union’s goods exports have long struggled to keep pace with the surge in international trade from Asian countries, particularly China.

CHINA
IMPROVED
EXPORTS BY 6%
OVER THE PAST
YEAR

Meanwhile, trade tensions with the United States intensified during Donald Trump’s first term and

CHINA GAINS 11 PERCENTAGE POINTS IN GLOBAL MARKET SHARE

Between 2000 and 2024, the countries in this group that saw the largest increases in export value were China (+1,335%), the UAE (+1,111%), and Poland (+1,097%). The EU as a whole grew by 229%, Germany by 205%, and Spain by 268%.

	2024		2019		2008		2000	
	VALUE	%WORLD	VALUE	%WORLD	VALUE	%WORLD	VALUE	%WORLD
Asia	8,983	37%	6,773	36%	4,725	29%	1,835	28%
Europe	8,648	35%	6,980	37%	6,598	41%	2,647	41%
EU	7,150	29%	5,825	31%	5,496	34%	2,172	34%
EU (intra-EU)	4,355	18%	3,439	18%	3,402	21%	1,314	20%
China	3,577	15%	2,499	13%	1,431	9%	249	4%
North America	3,250	13%	2,553	13%	2,035	13%	1,225	19%
EU (non-EU)	2,796	11%	2,386	13%	2,093	13%	858	13%
U.S.A.	2,065	8%	1,643	9%	1,287	8%	782	12%
Germany	1,683	7%	1,489	8%	1,446	9%	552	9%
Netherlands	921	4%	709	4%	638	4%	233	4%
Japan	707	3%	706	4%	781	5%	479	7%
South Korea	684	3%	542	3%	422	3%	172	3%
Italy	674	3%	538	3%	543	3%	241	4%
France	640	3%	571	3%	616	4%	328	5%
Africa	627	3%	481	3%	548	3%	145	2%
United Arab Emirates	603	2%	389	2%	239	1%	50	1%
United Kingdom	513	2%	460	2%	477	3%	283	4%
Singapore	506	2%	391	2%	338	2%	138	2%
Switzerland	447	2%	314	2%	236	1%	81	1%
India	443	2%	324	2%	195	1%	42	1%
Spain	424	2%	334	2%	281	2%	115	2%
Russia	417	2%	420	2%	472	3%	105	2%
Australia and New Zealand	384	2%	311	2%	218	1%	77	1%
Poland	380	2%	267	1%	170	1%	32	0%
Brazil	337	1%	221	1%	196	1%	55	1%
Saudi Arabia	305	1%	262	1%	313	2%	78	1%
WORLD	24,431	100%	19,008	100%	16,192	100%	6,452	100%

Data in billions of US dollars. Source: World Trade Organisation.

risk flaring up again now that he's returned to the White House. The tariff war waged by the former president continues to cast a shadow over global merchandise trade — and while his policies target the en-

GERMANY AND THE BASQUE COUNTRY LOWER FOREIGN SALES IN 2024

tire world, the EU has become one of his primary adversaries.

Against this backdrop of uncertainty, the latest full-year figures, corresponding to 2024, show that the EU27 saw a 1 percent year-on-year drop in goods exports, down to \$7.15 trillion, according to data from the World Trade Organization. In contrast, the WTO estimates global exports grew by 2% over the same period.

EXTRA-EU SALES GROW FASTER IN GERMANY AND BASQUE COUNTRY

In recent years, exports to non-EU countries have shown stronger growth in Germany and the Basque Country than in Spain as a whole.

YEAR	GERMANY			SPAIN			BASQUE COUNTRY		
	TOTAL	%EU	%REST/WLD	TOTAL	%EU	%REST/WLD	TOTAL	%EU	%REST/WLD
2024	1,548	54%	46%	384	62%	38%	31	61%	39%
2023	1,575	55%	45%	384	63%	37%	33	62%	38%
2022	1,594	55%	45%	388	63%	37%	33	64%	36%
2021	1,371	54%	46%	315	61%	39%	26	64%	36%
2020	1,207	53%	47%	264	61%	39%	21	57%	43%
2019	1,328	59%	41%	291	59%	41%	25	68%	32%
2018	1,317	59%	41%	285	59%	41%	26	66%	34%
2017	1,279	59%	41%	276	59%	41%	24	65%	35%
2016	1,204	59%	41%	256	59%	41%	22	66%	34%
2015	1,194	58%	42%	250	57%	43%	22	64%	36%
2014	1,124	58%	42%	241	57%	43%	23	63%	37%
2013	1,088	57%	43%	236	56%	44%	21	61%	39%
2012	1,093	57%	43%	226	57%	43%	21	63%	37%
2011	1,061	59%	41%	215	60%	40%	20	64%	36%
2010	952	60%	40%	187	62%	38%	18	62%	38%
2009	803	63%	37%	160	63%	37%	15	61%	39%
2008	984	64%	36%	189	62%	38%	20	67%	33%
2007	965	65%	35%	185	63%	37%	19	68%	32%
2006	893	64%	36%	170	63%	37%	17	70%	30%
2005	786	65%	35%	155	64%	36%	14	70%	30%

Data in billions of euros. Data for 2024 are provisional. Sources: German Federal Statistical Office, Spanish Institute for Foreign Trade (Icex) and the Basque Statistical Institute (Eustat).

Asia outperformed, with a 5% rise in exports, while China posted an even greater increase (+6%). Other regional heavyweights such as Japan, South Korea, and Singapore held steady compared to 2023. Meanwhile, the United States boosted its overseas merchandise sales by 2%.

Better beyond EU borders

In 2024, EU exports performed better outside the Union (+1%) than within it (-2%), although intra-community trade still accounted for a larger absolute value.

Germany remained the EU's economic engine in terms of foreign trade. According to its Federal Statistical Office, the country exported nearly 1.55 trillion in 2024, with 54 percent of that figure going to fellow EU member states.

Spanish exports held steady at 384 billion, according to Icex, while Basque exports declined to 31 billion, according to Eustat.



Trade fairs, a meeting point for world trade

AGEX

EMPRESA XXI

Container terminal at Bilbao Port.

TOP GLOBAL GDP GROWERS SINCE 2000

Romania, Bulgaria, Lithuania, and Ireland are among the 30 fastest-growing economies globally in the 21st century. Ethiopia, Ghana, and China top the ranking.

	2023	%23/22	%23/00		2023	%23/22	%23/00
Ethiopia	164	+29%	>999%	Hungary	212	+20%	+350%
Ghana	76	+3%	>999%	Kuwait	164	-11%	+334%
China	17,795	-0%	>999%	Chile	336	+11%	+328%
Kazakhstan	263	+16%	>999%	Malaysia	400	-2%	+326%
Vietnam	430	+5%	>999%	Australia	1,728	+2%	+315%
Qatar	213	-10%	>999%	Türkiye	1,118	+23%	+308%
Serbia	81	+22%	>999%	Thailand	515	+4%	+307%
Romania	351	+18%	+842%	Luxembourg	86	+5%	+304%
Angola	85	-19%	+829%	Egypt	396	-17%	+297%
Sudan	109	+111%	+791%	Croatia	84	+19%	+281%
Kenya	108	-6%	+750%	Israel	514	-2%	+277%
Indonesia	1,371	+4%	+731%	Iran	405	+3%	+269%
Bangladesh	437	-5%	+720%	Colombia	363	+5%	+264%
Russia	2,021	-11%	+678%	Pakistan	338	-10%	+240%
Bulgaria	102	+13%	+673%	Uruguay	77	+10%	+238%
India	3,568	+6%	+662%	Morocco	144	+10%	+236%
Uzbekistan	102	+13%	+638%	Brazil	2,174	+11%	+232%
Panama	83	+9%	+596%	Switzerland	885	+8%	+217%
Lithuania	80	+12%	+591%	World	106,172	+4%	+214%
Ecuador	119	+2%	+578%	South Korea	1,713	+2%	+197%
Tanzania	79	+4%	+491%	Canada	2,142	-1%	+188%
Costa Rica	86	+25%	+476%	Norway	485	-18%	+183%
Saudi Arabia	1,068	-4%	+463%	Netherlands	1,154	+10%	+176%
Ukraine	179	+10%	+452%	Belgium	645	+9%	+172%
Czech Rep.	343	+14%	+452%	Spain	1,620	+12%	+171%
Ireland	551	+1%	+450%	U.S.A.	27,721	+7%	+170%
Guatemala	104	+9%	+442%	Austria	512	+8%	+161%
Nigeria	364	-24%	+426%	South Africa	381	-6%	+151%
Philippines	437	+8%	+422%	Denmark	407	+1%	+148%
Singapore	501	+1%	+422%	Portugal	289	+13%	+144%
Iraq	251	-12%	+419%	Mexico	1,789	+22%	+141%
Peru	268	+9%	+417%	Finland	296	+5%	+135%
Sri Lanka	84	+14%	+417%	Germany	4,526	+9%	+130%
Dominican Rep.	121	+7%	+400%	Argentina	646	+2%	+127%
E.A.U.	514	+2%	+393%	France	3,052	+9%	+124%
Oman	109	-3%	+389%	Sweden	585	+1%	+122%
New Zealand	252	+2%	+379%	Hong Kong	381	+6%	+122%
Ivory Coast	79	+12%	+376%	United Kingdom	3,381	+9%	+103%
Poland	809	+16%	+368%	Italy	2,301	+9%	+100%
Slovakia	133	+15%	+355%	Greece	243	+11%	+94%
Algeria	248	+10%	+352%	Puerto Rico	118	+4%	+91%

Data in billions of US dollars at current prices. Countries with GDP above USD 75 billion in 2023.
Source: World Bank (updated 25-04-2025).



The automotive sector plays a major role in European employment and GDP.

MACROECONOMICS | GROSS DOMESTIC PRODUCT

SHRINKING SHARE

DESPITE A STRONG PERFORMANCE IN 2023, THE EU'S AGGREGATE ECONOMY HAS UNDERPERFORMED GLOBAL AVERAGE, THE U.S., OR CHINA IN RECENT YEARS

World Bank statistics reveal a gradual loss of momentum in the European Union's (EU) Gross Domestic Product (GDP) growth compared to the world's major economies over the past several years. While 2023 was a particularly positive year for the EU27 — with their combined GDP rising by 9% year-on-year, outpacing global growth (+4%) and that of the U.S. (+7%) and China (0%) — the truth is that since the outbreak of the last major global financial crisis, the economies of the Old Continent have lost ground to the world's two largest economic powers.

Between 2008 and 2023, the U.S. grew its GDP by 88%, while the EU posted a modest 14% increase (with one fewer member state since 2020). This figure also

compares poorly with global growth over the same period (+65%), and especially with China's astonishing expansion of +287%.

Looking at the broader trend since the start of the 21st century, the pattern holds: both the global economy and those of China and the U.S. have advanced far more significantly. As a result, the EU's share of global GDP has dropped from just over one-fifth (22%) at the beginning of the century to 18% in 2023. The U.S. also lost four points in that time (from 30% to 26%), while China surged by 13 points (from 4% to 17%).

Over the same 24-year period, Germany lost two points (from 6% to 4%), and Japan a staggering eleven (from 15% to 4%). In fact, by

**EU GDP
RISES 14%
SINCE 2008,
CHINA'S
287%**

GERMANY POWERS THE EU

Germany remained the EU's largest economy in 2024, despite slower growth than France or Spain.

	2024	%24/23	%24/15	2023
Germany	4,305	+3%	+40%	4,186
France	2,921	+4%	+33%	2,822
Italy	2,192	+3%	+32%	2,131
Spain	1,592	+6%	+46%	1,498
Netherlands	1,134	+6%	+62%	1,068
Poland	846	+12%	+96%	752
Belgium	614	+3%	+48%	596
Sweden	564	+4%	+25%	541
Ireland	533	+5%	+96%	510
Austria	482	+2%	+41%	473
Denmark	397	+5%	+46%	376
Romania	354	+9%	+121%	324
Czech Republic	319	+0%	+87%	317
Portugal	285	+6%	+59%	268
Finland	276	+1%	+31%	273
Greece	238	+5%	+35%	225
Hungary	206	+4%	+83%	198
Slovakia	131	+6%	+63%	124
Bulgaria	104	+10%	+126%	95
Luxembourg	86	+6%	+59%	81
Croatia	86	+10%	+88%	78
Lithuania	78	+6%	+109%	74
Slovenia	67	+5%	+74%	64
Letonia	40	+2%	+69%	39
Estonia	40	+3%	+88%	38
Cyprus	34	+7%	+87%	31
Malta	22	+9%	+120%	21
EU 27	17,945	+4%	+46%	17,204

GDP data in billions of euros at current prices.
Source: Eurostat updated to 23 May 25.

2023, Germany's GDP had overtaken Japan's. Spain, for its part, managed to maintain a steady 2% share during the period under review.

EU's economic engine

According to the latest figures published by Eurostat, Germany's GDP rose by 3 percent in 2023, reaching 4.3 trillion — the highest in the EU. However, among the bloc's largest economies, France (+4%), Spain (+6%), the Netherlands (+6%), and Poland (+12%) posted stronger growth.

Poland's performance is particularly noteworthy, having boosted its GDP by 96% over the past nine years. This trend is common among Eastern EU countries, clearly bolstered by increased inflows of EU resources. Bulgaria (+126%), Romania (+121%), and Lithuania (+109%) posted the most significant gains.

4.3

TRILLION
GERMANY'S
GDP IN 2024

U.S. LOSES GROUND AS CHINA CLIMBS FAST

The U.S. remains the world's largest economy, but its share of global GDP has declined since 2000. China, by contrast, has skyrocketed.

	2023	%23/22	%23/08	%23/00	%TOT 23	%TOT00
U.S.A.	27.72	+7%	+88%	+170%	26%	30%
China	17.79	-0%	+287%	>999%	17%	4%
Germany	4.53	+9%	+19%	+130%	4%	6%
Japan	4.20	-1%	-18%	-15%	4%	15%
India	3.57	+6%	+198%	+662%	3%	1%
United Kingdom	3.38	+9%	+15%	+103%	3%	5%
France	3.05	+9%	+4%	+124%	3%	4%
Italy	2.30	+9%	-5%	+100%	2%	3%
Brazil	2.17	+11%	+28%	+232%	2%	2%
Canada	2.14	-1%	+38%	+188%	2%	2%
Russia	2.02	-11%	+22%	+678%	2%	1%
Mexico	1.79	+22%	+54%	+141%	2%	2%
Australia	1.73	+2%	+64%	+315%	2%	1%
South Korea	1.71	+2%	+64%	+197%	2%	2%
Spain	1.62	+12%	-1%	+171%	2%	2%
Indonesia	1.37	+4%	+169%	+731%	1%	0%
Netherlands	1.15	+10%	+21%	+176%	1%	1%
Türkiye	1.12	+23%	+45%	+308%	1%	1%
Saudi Arabia	1.07	-4%	+105%	+463%	1%	1%
North America	29.87	+6%	+83%	+172%	28%	32%
EU	18.59	+9%	+14%	+155%	18%	22%
WORLD	106.17	+4%	+65%	+214%	100%	100%

GDP in trillions of European dollars updated to 15 April 2025.
Countries with more than USD 1 trillion GDP in 2023. Source: World Bank.



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Basque Country

IRELAND LEADS IN GDP PER CAPITA RELATIVE TO THE EU AVERAGE

Several Irish regions, along with some French and Danish ones, top the list of those with the highest GDP per capita compared to the EU average.

	2023	%23/22	%23/19	%23/14		2023	%23/22	%23/19	%23/14
Dublin	434	-3%	+14%	+41%	Prov. Vlaams-Brabant	153	+1%	+7%	+6%
South-West	427	-20%	+11%	+167%	Bavaria	152	-1%	-4%	-4%
Paris	364	+4%	+1%	+2%	Bremen	152	-2%	-3%	-10%
Hauts de Seine	320	+2%	-13%	-14%	West	152	-2%	+35%	+31%
Luxembourg	311	-5%	-2%	-11%	Zuid-Nederland	152	+2%	+3%	+6%
Groot-Amsterdam	299	+1%	+1%	+9%	Rhône	149	+3%	-4%	-7%
Eastern and Midland	290	-6%	+8%	+37%	Zuid-Holland	149	-1%	+1%	+0%
Københavns omegn	266	-3%	+2%	-1%	Agglomeratie's-Gravenhage	148	+0%	+1%	-6%
Southern	266	-16%	+6%	+106%	West-Noord-Brabant	148	+1%	-1%	-2%
Byen København	246	-23%	+5%	-3%	Syddanmark	147	-1%	-1%	-8%
Hovedstaden	222	-13%	+3%	-2%	Arr. Mechelen	146	+0%	-1%	+0%
Brussels capital	215	-2%	-5%	-11%	Hessen	146	+0%	-4%	-7%
Hamburg	211	-6%	-4%	-5%	Westösterreich	146	-2%	-3%	-5%
Noord-Holland	205	+1%	+2%	+6%	Groningen	145	-11%	+3%	-20%
Zuidoost-Noord-Brabant	194	+4%	+10%	+18%	Zuidoost-Zuid-Holland	145	+0%	+4%	+5%
Upper Bavaria	191	-1%	-3%	-2%	Norrbottnens län	145	-13%	-9%	-15%
Utrecht	187	+1%	+3%	+3%	Arr. Tielt	144	+0%	+4%	+6%
Ile de France	182	+3%	-7%	-11%	Vestjylland	144	-2%	-12%	-15%
Stockholm	180	-8%	-11%	-23%	Baden-Württemberg	144	-1%	-6%	-7%
Arr. Halle-Vilvoorde	174	-1%	+9%	+9%	Noord-Overijssel	144	+1%	+3%	+6%
West-Nederland	173	+0%	+2%	+3%	Delfzijl en omgeving	143	-22%	-12%	-50%
Delft en Westland	170	+1%	+0%	+2%	Vorarlberg	143	-13%	-5%	-8%
Mid-West	169	-1%	+10%	+58%	Åland	143	+5%	+0%	-20%
Prov. Brabant wallon	167	+2%	-6%	+11%	Arr. Kortrijk	142	-3%	+0%	-1%
Arr. Nivelles	167	+2%	-6%	+11%	Mittelfranken	142	-1%	-6%	-5%
Salzburgo	167	+1%	+1%	+0%	Noord-Limburg	142	+1%	+2%	+4%
Arr. Gent	166	-3%	+6%	+4%	Tirol	142	+0%	-4%	-5%
Syddjylland	165	-1%	+0%	-6%	Midtjylland	141	-7%	-8%	-10%
Danmark	164	-7%	-1%	-5%	Karlsruhe	141	-1%	-5%	-7%
Darmstadt	164	+1%	-4%	-8%	Veluwe	141	+3%	+3%	+4%
Prague	163	-1%	+7%	+31%	Østjylland	140	-8%	-7%	-7%
Hlavní m sto Praha	163	-1%	+7%	+31%	Braunschweig	140	+0%	-15%	-10%
Stuttgart	163	-1%	-5%	-7%	Oberösterreich	140	-1%	-4%	-7%
Groot-Rijnmond	162	-2%	+2%	+5%	Tübingen	138	-1%	-5%	-5%
Overig Groningen	161	-7%	+7%	-16%	Oberpfalz	138	+0%	-2%	-3%
Noord-Brabant	161	+2%	+4%	+7%	Arnhem/Nijmegen	138	+1%	+6%	+6%
Helsinki-Uusimaa	160	-5%	-11%	-14%	Vlaams Gewest	137	-1%	+2%	+1%
Arr. Antwerpen	158	-2%	-1%	-4%	Nordsjælland	137	+1%	-1%	-1%
Arr. Turnhout	158	-4%	+3%	+6%	Berlin	137	+0%	-1%	+6%
Noordoost-Noord-Brabant	158	+2%	+3%	+7%	Het Gooi en Vechtstreek	137	-3%	-3%	-5%
Bolzano/Bozen	157	+1%	+3%	-2%	Arr. Roeselare	136	-1%	+1%	-4%
Prov. Antwerpen	156	-3%	+1%	-1%	Västra Götalands län	136	-6%	-8%	-19%
Wien	156	-1%	-5%	-11%	Arr. Brugge	134	+0%	+1%	-1%
Ostra Sverige	154	-7%	-9%	-22%	Basque Country*	104	+3%	-2%	-4%

Top regions by percentage of GDP per capita relative to the EU average (100) plus the Basque Country. Only those with data for 2023 (includes provisional and estimates). Source: Eurostat (updated to March 2025).

MACROECONOMICS | REGIONAL GDP IN THE EU

GERMANY RULES THE REGIONAL ROOST

GERMANY PLACES SIX REGIONS AMONG THE TEN WEALTHIEST IN THE EUROPEAN UNION

The latest Eurostat figures, updated in March this year, show that six German states ranked among the top ten EU territories with the highest Gross Domestic Product (GDP) at market prices in 2023.

France's Île-de-France region led the ranking, with 860 billion and a 10% increase over the previous year (+31% since 2014). It was followed by the German states of North Rhine-Westphalia, with 855 billion (up 5% year-on-year), and Bavaria, with 779 billion (+7%). Both also posted strong growth over the past nine years: 38% and 46%, respectively.

Germany's dominance in the top 10 was completed by Baden-Württemberg (622 billion, +6%), Lower Saxony (369 billion, +6% year-on-year), Hesse (357

billion, +7%), and Upper Bavaria (350 billion, +6%). In all four cases, GDP growth since 2014 ranged between 41% and 49%.

Among Spain's major regional economies, Madrid came out on top at the European level with a GDP of 293 billion in 2023 (+10%), closely followed

NORTH RHINE-WESTPHALIA'S GDP UP 31% SINCE 2014

by Catalonia with 282 billion (+9%). Further behind were Andalusia and Valencia, followed by the Basque Country. In the ca-

Düsseldorf, capital of North Rhine-Westphalia, one of Germany's key industrial hubs



WIRESTOCK/FREPIK

se of the Basque Country, the 88 billion recorded represented a 9% year-on-year increase and a 40% rise since 2014 — compared to growth of 43% in Catalonia and 50% in Madrid over the same period.

GDP per capita

However, when looking at the ranking of regions by GDP per capita relative to the EU average (set at 100%), significant disparities emerge. Germany, for example, had only one region in the top 15: Hamburg, which in 2023 reached 211% of the EU average — that is, 111 points above the EU baseline, although 14 points lower than the year before.

Upper Bavaria (191%) ranked three positions below in a list largely dominated by Irish, French, and Danish regions, with German territories appearing much further down.

The same trend applies to Spain's leading regional economies. In fact, only

Madrid (111%) and the Basque Country (104%) exceeded the EU average in 2023, gaining two and three points, respectively, compared to 2022.

IN SPAIN, ONLY MADRID (111%) AND BASQUE AUTONOMOUS COMMUNITY (104%) ARE ABOVE EU AVERAGE

ITALY ALSO PLACES REGIONS AMONG EUROPE'S GDP HEAVYWEIGHTS

Italy's Nord-Ovest, Nord-Est, Centro regions — along with Lombardy — also rank among Europe's largest regional economies by gross GDP. Île-de-France leads the chart, which features a strong German presence.

	2023	%23/22	%23/19	%23/14		2023	%23/22	%23/19	%23/14
Ile de France	860	+10%	+13%	+31%	Southern Sweden	215	-0%	+15%	+26%
Rhineland North-Westf.	855	+5%	+17%	+38%	New Aquitaine	214	+7%	+18%	+32%
Bavaria	779	+7%	+19%	+46%	Occitania	213	+10%	+20%	+37%
Baden-Württemberg	622	+6%	+16%	+41%	Ostösterreich	203	+6%	+19%	+42%
West-Nederland	567	+8%	+27%	+58%	Andalucía	200	+9%	+20%	+44%
Lombardia	490	+7%	+23%	+38%	Véneto	197	+7%	+19%	+33%
Lower Saxony	369	+6%	+17%	+42%	Hauts-de-France	197	+4%	+16%	+28%
Hessen	357	+7%	+18%	+41%	Provence-Alpes-Côte d'Azur	196	-8%	+16%	+29%
Flanders	356	+6%	+27%	+53%	Emilia-Romagna	193	+7%	+18%	+32%
Upper Bavaria	350	+6%	+19%	+49%	East Holland	191	+9%	+30%	+62%
Auvergne-Rhône-Alpes	329	+8%	+17%	+34%	Grand Est	189	+5%	+16%	+25%
Madrid Com.	293	+10%	+20%	+50%	Westösterreich	182	+5%	+20%	+45%
Eastern and Midland	291	+2%	+41%	+131%	Voivodato de Mazovia	178	+16%	+45%	+98%
Rhône-Alpes	285	+9%	+18%	+36%	Renania-Palatinado	177	+1%	+18%	+39%
Catalonia	282	+9%	+17%	+43%	Southern	177	-9%	+35%	+230%
Mainland Finland	272	+3%	+15%	+33%	Estockholm	169	-2%	+12%	+23%
Middle East Sweden	248	-1%	+14%	+25%	Noord-Brabant	162	+9%	+29%	+63%
Lazio	239	+5%	+18%	+29%	Hovedstaden	161	-7%	+28%	+52%
Noord-Holland	232	+8%	+27%	+64%	Saxony	158	+6%	+20%	+45%
Zuid-Nederland	218	+9%	+27%	+58%	Piamonte	156	+6%	+13%	+26%
Zuid-Holland	217	+7%	+27%	+53%	Basque Country*	88	+9%	+19%	+40%

EU regions with the highest gross GDP plus the Basque Country (of those that provided information for that year). Data in billions of euros. Some are forecasts and estimates. Source: Eurostat (updated to March 2025).

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BASQUE ECONOMY | FOREIGN TRADE

GERMANY LOSES ITS DRIVE

DETERIORATING TRADE RELATIONS HIT BASQUE INDUSTRY EXPORTS TO GERMANY, DOWN 13%, AND NOW TRAILING THE FRENCH MARKET

BASQUE EXPORTS DECLINE

France overtakes Germany as the top export destination, with the UK and Mexico the only growth markets among the top ten.

	2024	%24/23	%24/19	2023	2022	2021
France	4,855	-1%	+23%	4,901	5,016	4,169
Germany	4,475	-13%	+16%	5,168	5,023	4,132
United Kingdom	2,165	+6%	-8%	2,037	1,979	1,702
U.S.A.	1,992	-28%	+11%	2,762	2,300	1,616
Italy	1,802	-2%	+52%	1,843	1,757	1,377
Belgium	1,550	-4%	+45%	1,615	1,747	1,372
Portugal	1,381	-4%	+34%	1,440	1,473	1,130
Netherlands	1,139	-15%	+7%	1,340	2,043	1,421
Mexico	846	+18%	+71%	716	578	465
Poland	791	-2%	+36%	806	740	608
China	780	+11%	+57%	704	713	669
Türkiye	488	-16%	+89%	581	568	377
Czech Republic	461	-10%	+22%	511	472	348
Switzerland	416	+6%	+71%	392	351	255
Norway	409	+26%	+73%	325	326	357
Sweden	399	+1%	+29%	394	422	300
Morocco	386	+6%	+60%	365	354	213
Austria	338	-10%	+18%	374	341	285
Canada	305	+42%	+94%	215	205	206
Brazil	266	-10%	+9%	296	369	284
Saudi Arabia	242	+15%	+111%	211	160	132
Hungary	239	+3%	+41%	232	233	194
Romania	239	-9%	+23%	263	234	181
U.A.E.	239	+23%	+68%	194	210	143
Denmark	236	-21%	+16%	300	266	248
Australia	235	+25%	+32%	188	198	157
Myanmar	227	-	-	11	1	4
Slovakia	223	-4%	+41%	231	204	168
Finland	212	+10%	+39%	194	237	140
India	189	-3%	-16%	194	173	159
Japan	176	-11%	+41%	199	157	157
Israel	140	-47%	-24%	266	195	129
South Africa	135	-2%	-11%	138	145	105
Ireland	130	-11%	+28%	145	122	132
Chile	114	+24%	-1%	92	103	107
Gibraltar	109	+193%	+155%	37	155	7
TOTAL	30,967	-5%	22%	32,750	32,721	26,022

Provisional data for 2024. Source: Eustat. Millions of euros.

The year 2024 served as a prelude to the geopolitical turmoil now engulfing global trade — a reality that also weighed on the foreign operations of the Basque business sector. Although the upward trend regained in 2021 after the pandemic had held until now, 2024 marked a reversal, with Basque exports falling 5% to 30.967 billion.

The challenging conditions across European markets — and particularly in Germany — affected its status as the top destination for Basque products, dropping it to second place worldwide, behind France and ahead of the United Kingdom, the United States, and Italy.

Despite France's new leadership as the main export market for Basque companies, the broader

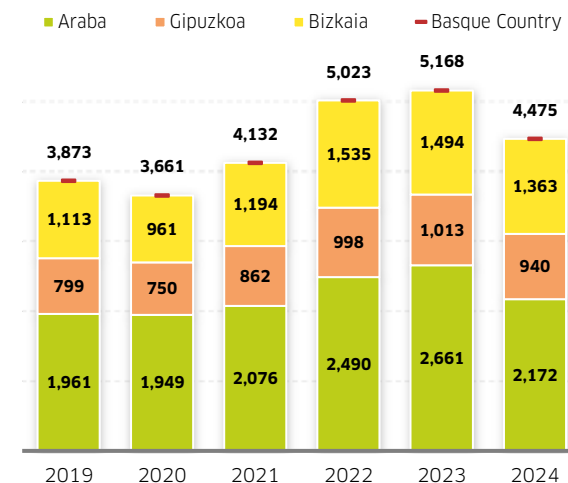
contrast, robust domestic demand drove imports from Germany up by 1%, reaching 4.015 billion — barely maintaining a positive trade balance.

By province, Álava continued to lead in trade volume with Germany, both in exports and imports, and also recorded the steepest export decline (-19%). Im-

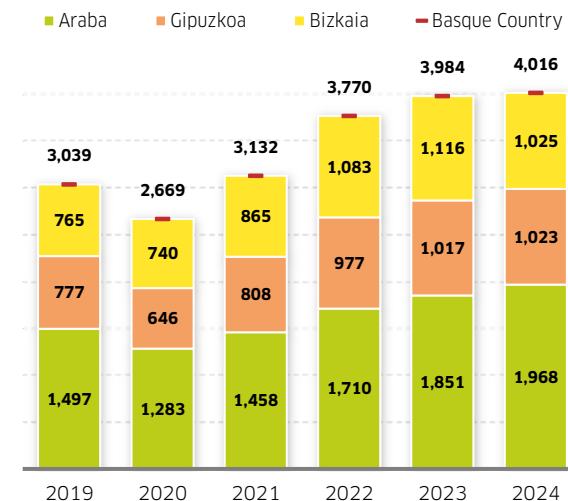
TRADE WITH GERMANY TAKES A HIT

Basque exports to Germany fall 13%, while imports edge up nearly 1%, barely maintaining trade balance.

EXPORTS



IMPORTS



Data in millions of euros. Source: Eustat

THE AUTOMOTIVE INDUSTRY REMAINS THE TOP EXPORTER

outlook for international trade is far from encouraging. Of the ten most important markets for Basque exports, only two posted growth: the United Kingdom (+6% to 2.165 billion), which rose to third place ahead of the U.S., and Mexico (+18% to 846 million), which climbed to ninth.

As for trade with Germany, the downturn resulted in a 13% drop in Basque exports compared to the previous year, limiting revenues to 4.475 billion. In

ports from Germany, however, rose 1 percent. Bizkaia saw a 9% drop in exports, while Gipuzkoa ended the year with a trade deficit.

Motor vehicles

By sector, motor vehicles remained the leading export category to Germany despite a sharp annual drop (-24% to 1.643 billion), followed by automotive parts and components, which also declined, along with rubber products.

There's no need to reiterate the serious challenges facing the automotive industry — challenges that also affect the Bridgestone and Michelin tire plants in the Basque Country. On a more positive note, Mercedes-Benz's Vitoria plant has promising prospects: starting in 2026, it plans to produce its new electric van, first unveiled in April at the Shanghai Auto Show.

€
7.646
BILLION
IN BASQUE EXPORTS
BETWEEN JANUARY
AND MARCH

Among the ten most export-heavy industrial sectors, only two posted gains: general-purpose machinery (+2% to 195 million) and other special-purpose machinery (+38% to 103M).

Early signs of recovery

The first quarter of the year, however, points to a possible shift. Between January and March, Basque exports rose 1.6% to 7.646 billion, while imports climbed 5.9%. Trade with Germany also improved by 1% compared to Q1 2024, totaling 1.134 billion. Still, Germany remained the second-largest export market behind France.

Motor vehicle exports to Germany grew by 8% to 433 million — a positive development — though parts (-22%) and rubber products (-15%) continued to decline. Meanwhile, machine tool exports surged by 38%.

SECTOR SHIFT IN EXPORTS TO GERMANY

Despite the significant setback, motor vehicles and parts remain the top Basque export categories to Germany.

	2024	%24/23	%24/19	2023	2022	2021
Motor vehicles	1,643	-24%	+8%	2,155	1,884	1,582
Motor vehicle components	441	-2%	+5%	448	425	397
Other metal products	237	-12%	+17%	268	255	203
Rubber products	234	-27%	+23%	321	270	251
General purpose machinery	195	+2%	+40%	190	185	167
Iron, steel and ferro-alloy products	175	-27%	+38%	240	283	228
Other first processing of steel	151	-25%	-17%	203	238	166
Other non-ferrous metals	127	+9%	+1%	117	227	146
Cutlery, tools and ironmongery	116	+8%	+50%	108	106	92
Other special purpose machinery	103	+38%	-33%	74	49	41
Engines, generators and electric transfer equip.	101	+9%	+1%	92	85	67
Machine tools for metal and other kind of MT	89	-14%	+644%	103	101	81
Transport equipment n.e.c.	86	-10%	+145%	96	94	22
Tubes, pipes and hollow sections	79	-28%	+100%	110	120	92
Pulp, paper and paperboard	66	+10%	+52%	61	73	55
Other general purpose machinery	48	-6%	+27%	51	49	57
Waste collection	46	+5%	-26%	44	74	64
Other electrical equipment	37	+13%	+96%	33	43	45
Locomotives and rolling stock	36	+9%	+95%	33	21	37
Cables and wiring	36	+78%	+32%	20	18	13
Basic chemicals	35	+26%	+91%	28	30	28
Other food products	31	-22%	+22%	39	31	15
Fruit and vegetable processing and preserv.	28	+15%	+41%	25	21	22
Abrasives and non-metallic mineral products	22	-16%	+23%	26	25	25
Plastics products	21	-15%	+156%	25	27	23
TOTAL	4,183	-15%	+15%	4,909	4,733	3,919

Data in millions of euros. 2024, provisional. Source: Eustat

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INDUSTRIAL TURNOVER RISES IN 2023

The seven sectors analyzed increased turnover by 3% to €14.506 billion in 2023, though five of them reduced investment levels that year.

	2023	%23/22	%23/19	2022	2021	2020
METAL SMELTING						
Staff employed	7,312	+12%	+5%	6,552	6,697	6,532
Staff costs	370	+15%	+20%	323	303	291
Realised investment	74	-19%	-9%	91	47	57
Turnover	1,788	+3%	+24%	1,738	1,398	1,164
Profit for the year	51	+59%	+54%	32	10	-2
MACHINE TOOLS						
Staff employed	4,111	-1%	-2%	4,133	3,995	4,099
Staff costs	234	+8%	+12%	217	199	192
Realised investment	51	+104%	+76%	25	24	21
Turnover	1,205	+10%	+23%	1,097	911	813
Profit for the year	59	+59%	+26%	37	44	8
METAL CONSTRUCTION						
Staff employed	9,761	+0%	-3%	9,731	9,517	9,444
Staff costs	436	+8%	+16%	405	382	362
Realised investment	32	-41%	-38%	54	38	29
Turnover	1,525	+3%	+14%	1,477	1,234	1,059
Profit for the year	86	-15%	+71%	101	52	15
FORGING AND STAMPING						
Staff employed	6,824	-0%	-3%	6,841	6,769	6,757
Staff costs	377	+9%	+14%	346	328	312
Realised investment	66	-37%	+11%	105	69	78
Turnover	2,319	+3%	+11%	2,255	1,744	1,636
Profit for the year	19	-75%	-62%	77	58	11
MECHANICAL ENGINEERING						
Staff employed	20,640	+1%	+0%	20,351	20,289	20,161
Staff costs	945	+8%	+12%	879	826	790
Realised investment	114	-22%	-30%	147	94	110
Turnover	2,772	+0%	+11%	2,763	2,383	2,068
Profit for the year	183	+63%	+26%	112	84	8
METAL ARTICLES						
Staff employed	13,640	-2%	-11%	13,942	14,040	14,476
Staff costs	688	+6%	-0%	650	627	626
Realised investment	156	+42%	+2%	110	103	93
Turnover	2,739	+1%	+10%	2,721	2,385	2,086
Profit for the year	159	+19%	+73%	134	90	25
ELECTRICAL MATERIAL AND EQUIPMENT						
Staff employed	8,786	+6%	+5%	8,309	8,335	8,257
Staff costs	440	+9%	+23%	403	376	369
Realised investment	48	-49%	+28%	95	34	38
Turnover	2,158	+6%	+31%	2,043	1,787	1,650
Profit for the year	122	+171%	+113%	45	31	41
TOTAL SEVEN SECTORS						
Staff employed	71,074	+2%	-2%	69,859	69,642	69,726
Staff costs	3,490	+8%	+12%	3,223	3,041	2,941
Realised investment	541	-14%	-6%	627	409	425
Turnover	14,506	+3%	+16%	14,094	11,842	10,476
Profit for the year	679	+26%	+43%	538	369	106

Staff in units, other data in millions of euros. Source: Eustat.

BASQUE ECONOMY | MANUFACTURING FOCUS

INDUSTRY FEELS THE STRAIN

CAPITAL GOODS HOLD THE LINE WITH A 1.1% RISE IN THE FIRST QUARTER AFTER A 1.1% DROP IN 2024

Industrial activity in the Basque Country fell by 0.9% in 2024, according to Eustat data. Similar declines were recorded in the annual aggregate figures for the three historical territories: Álava saw a 2.5% drop, Bizkaia 0.5%, and Gipuzkoa 0.4%.

This negative trend is mainly due to the poor performance of durable consumer goods (-3%), including furniture and household appliance manufacturing, and capital goods, which encompass the production of motor vehicles, locomotives and railway equipment, and aircraft or shipbuilding — all of which posted a combined annual decline of 1.1%.

In the intermediate goods segment — covering metallurgy and metal products, chemicals, rubber and plastics — accumulated output in 2024 was 0.5% lower than the previous year. Energy, which includes electricity generation and petroleum refining, grew by 0.8% over the same period.

Capital goods edge upward by March

This industrial slowdown was confirmed in early 2025 figures: the cumulative Industrial Production Index fell by 1% in the first quar-

ter, driven by a 3.6% year-on-year decline in intermediate goods. By contrast, output between January and March rose by 1.4% in consumer goods and 1.1% in capital goods.

These results reflect the difficult environment faced by Basque industry, shaped by ongoing geopolitical conflicts and heightened trade uncertainty, exacerbated by U.S. tariff policies.

According to Eustat's latest industrial accounts for 2023, industrial turnover rose 25 percent in 2022 to 74.642 billion, before falling 5.7% in 2023 to 70.380 billion. Gross value added (GVA), however, rose by 5.4% to 17.554 billion.

Motor vehicles

This shift is also evident by activity branch. While almost all sectors saw gains in 2022 — led by coking and petroleum refining, electricity, steel and non-ferrous metals, and motor vehicles — 2023 saw a reversal in three of them. Only motor vehicle manufacturing increased revenues, up 11 percent to 7.348 billion. It was followed by general-purpose machinery (+7% to 4.977 billion) and other transport equipment (+18% to 3.203 billion).



BASQUE MACHINE TOOL EXPORTS HOLD STEADY

The U.S. remained the top market in 2024, with Mexico surging and Germany slipping to fourth place in Basque machine tool exports.

	2024	%24/23	%24/19	2023	2022	2021	2020
U.S.A	193,263	+42%	+166%	135,834	64,256	87,622	56,744
Mexico	180,532	+185%	+365%	63,257	45,021	25,090	36,942
China	97,321	+14%	+47%	85,710	58,678	54,024	32,624
Germany	88,620	-14%	-11%	102,818	100,507	81,022	75,651
France	64,025	+11%	+17%	57,649	58,374	40,050	47,241
Italy	56,220	-50%	-23%	113,416	102,346	70,031	42,456
United Kingdom	37,817	+55%	+112%	24,321	37,834	20,753	21,086
Türkiye	32,004	-14%	+65%	37,256	29,663	38,425	17,884
Portugal	15,119	+39%	-39%	10,860	14,787	12,476	10,586
India	14,868	-46%	-50%	27,483	12,334	34,551	27,249
Poland	12,904	-45%	-30%	23,519	14,806	19,673	12,775
TOTAL	983,420	+12%	+45%	881,339	715,945	656,725	540,514

Units in thousands of euros. Source: Eustat.

MACHINE TOOLS DODGE THE EXPORT SLUMP

The Basque Country accounts for 80 percent of Spain's machine tool industry. The sector holds a prominent position internationally and is recognized for its manufacturing excellence. Still, the outlook is uncertain.

Eustat data for 2023 showed a 10% increase in turnover over the previous

year, reaching 1.205 billion. Even more notable is the investment effort and sustained growth: investment more than doubled compared to 2022, and was 75% higher than in 2019 — a push that also translated into greater R&D spending.

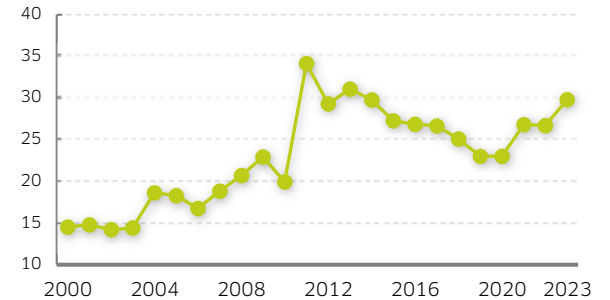
Export figures were equally positive, rising 12%

in 2024 to 983 million. However, Germany's weak economy saw it lose its status as the top market, falling behind the United States, Mexico, and China.

While 2024 closed with strong results in production and exports, falling orders and global uncertainty are clouding the outlook for 2025.

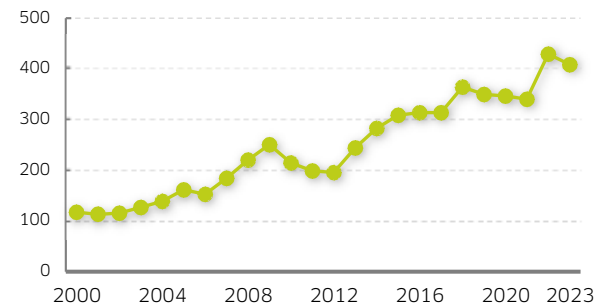
MACHINE TOOL SECTOR R&D SPENDING

R&D investment in the machine tool sector rose 12% in 2023, returning to 2014 levels and nearing €30 million.



MACHINE TOOLS LOSE RESEARCHERS

In 2023, the number of R&D researchers in the machine tool industry fell by 5% — the first drop since 2012.



R&D personnel in the MT sector. Source: Eustat.

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DIGITAL TERRITORY | DIGITALIZATION

POWERING UP INDUSTRIAL TRANSFORMATION

BDIH HAS SUPPORTED OVER 270 COMPANIES IN DEVELOPING 450 PROJECTS THROUGH A NETWORK OF MORE THAN 270 TECHNOLOGY ASSETS AND SERVICES

The Spri program BDIH Kone-xio offers Basque industrial companies access to more than 270 technological assets and services through the Basque Digital Innovation Hub (BDIH), a network of infrastructures designed to provide them with the digital and sustainable capabilities required by today's market.

Access to these solutions and infrastructures is facilitated via technical guidance to create action plans or proof-of-concept tests that help companies boost their technology absorption capacity. Over the past five years, BDIH has enabled more than 270 companies to test potential digital and sustainable solutions through over 450 projects.

In 2024, the program received 160 applications, resulting in 124 approved projects. The sixth call will be published in the coming weeks, continuing its mission to help Basque industrial firms access, connect with, and understand the asset catalog.

BDIH's assets and services are organized into nine major technology nodes, spanning AI, additive manufacturing, advanced materials, and digital electric grids. Of the supported projects, 128 were in the Advanced Materials node; 85 in Smart Machines; 66 in Additive Manufacturing; 64 in Flexible and Collaborative Robotics; 36 in Medical Devices and Digital Health; 25 in Cybersecurity; and 9 in Digital Electrical Grids.

Additive Manufacturing is one of the fastest-growing nodes in terms of applications, as-

sets, and business interest, due largely to its rapid evolution. Notable projects in this area include friction welding for rail bed manufacturing and the integration of new materials into 3D printing processes. Other developments include improve-



BDIH'S ASSETS AND SERVICES ARE GROUPED INTO NINE MAJOR NODES

The more than 270 assets and infrastructures offered by the Basque Digital Innovation Hub to support digital and sustainable industrial transformation span cutting-edge technologies such as AI, robotics, additive manufacturing, and advanced materials.

NODE	TECHNOLOGICAL CAPABILITIES	APPLICATION AREAS	ASSETS AND SERVICES
Artificial Intelligence	Adoption of AI technologies	Model building and processing capabilities	Hyperconnected architecture for production plants or Smart digital platform for joining and additive manufacturing
Flexible Robotics	Integration of automation	Quality control, assembly, and advanced robotic handling	Welding and inspection cobots or 6DOF laser tracker for high-precision positioning
Additive Manufacturing	Products with enhanced performance	AM Digital Chain or design for AM and digital pre-processing	Flexible robotic and Cartesian additive manufacturing cell or multi-function laser cell for additive manufacturing and post-processing
Cybersecurity	Protection against external cyberattacks	Attack detection, threat and risk identification	Cybersecurity and Network monitoring laboratories
Advanced Materials	Added value to products and processes	Material design and development or advanced coatings, surfaces, and joining solutions	250 kN Biaxial Machine and high-temperature torsion bench or 4000 kN servo-mechanical press
Smart Machines	New machines for core processes	CAdvanced forming or precision and micro-machining	Atom, Gantry machine adaptable to different manufacturing processes or Unit for filament winding part manufacturing
Digital Electric Grids	Digitalization of SMEs in the electric sector	Grid cybersecurity or Optimal grid operation and demand management	Smart Electric Grids laboratory or applications for integrating storage into electric grids
Medical Devices and Digital Health	Innovation in the medical field	Biomedical consumables, in vitro diagnostics, or electromedical devices	Molecular Imaging Unit - CIC biomaGUNE or Biomaterials Synthesis and Functionalization - CIC biomaGUNE
Data Driven Solutions	Complements the assets and knowledge of the other nodes	All of the above	Adv. modelling applied to metal forming and joining technologies or Composite Process Monitoring System 4.0

Source: Basque Digital Innovation Hub.



Fully automated assembly line.

MB SISTEMAS

ments to tailstocks using LMD technologies; surface modification studies using MJF technologies; development of metrology software for pre-scanned parts; additive manufacturing of a refractory plate prototype for a sliding valve; and management of complex industrial data.

THE ADDITIVE MANUFACTURING NODE IS ONE OF THE FASTEST-GROWING IN RECENT YEARS

BDIH's deep connection to the Basque industrial ecosystem is evident in its catalog, which is closely aligned with the business community's real needs and challenges. Its partners include universities, vocational training centers, and the technology centers grouped under the Basque Research & Technology Alliance (BRTA).

BDIH is also internationally connected to other European hubs and supported by regional public institutions.

DATA TAKES THE LEAD

The Euskadi Atlantic Data Infrastructure – ADI project — aimed at building a world-class network of data centers in the Basque Country — is becoming a reality with the completion of the first phase of the Abanto facility and the launch of a second one in Mondragon.

Behind the initiative are the Basque Government, Teknei, Dominion, Euskaltel, Gertek, Kutxabank, Iberdrola, Mondragon, Seed Capital Bizkaia, and Seed Gipuzkoa. Together, they aim to equip companies and institutions with advanced cloud storage capabilities under the highest standards of security and proximity, in support of digital and technological transformation.

This infrastructure will foster a digital business ecosystem, generating employment, wealth, and technological progress. The project is part of the “Euskadi 2025 Transformation Strategy” approved by the Basque Government in 2021, which underscores the strategic importance of data management and sovereignty for any organization.

access to multiple local fiber-optic providers.

The center will house up to 2MW of IT equipment and offer advanced infrastructure, platform, and cloud application services for key sectors like energy, manufacturing, healthcare, and finance. It will enable companies to adopt cloud-dependent technologies such as artificial intelligence and the Internet of Things (IoT).

ADI Mondragon Data Center

In parallel, the ADI Mondragon Data Center is now under development and scheduled to be operational by late 2026. It will be located in the Garaia Technology Park in Arrasate-Mondragon. The design and construction will be led by Krean.

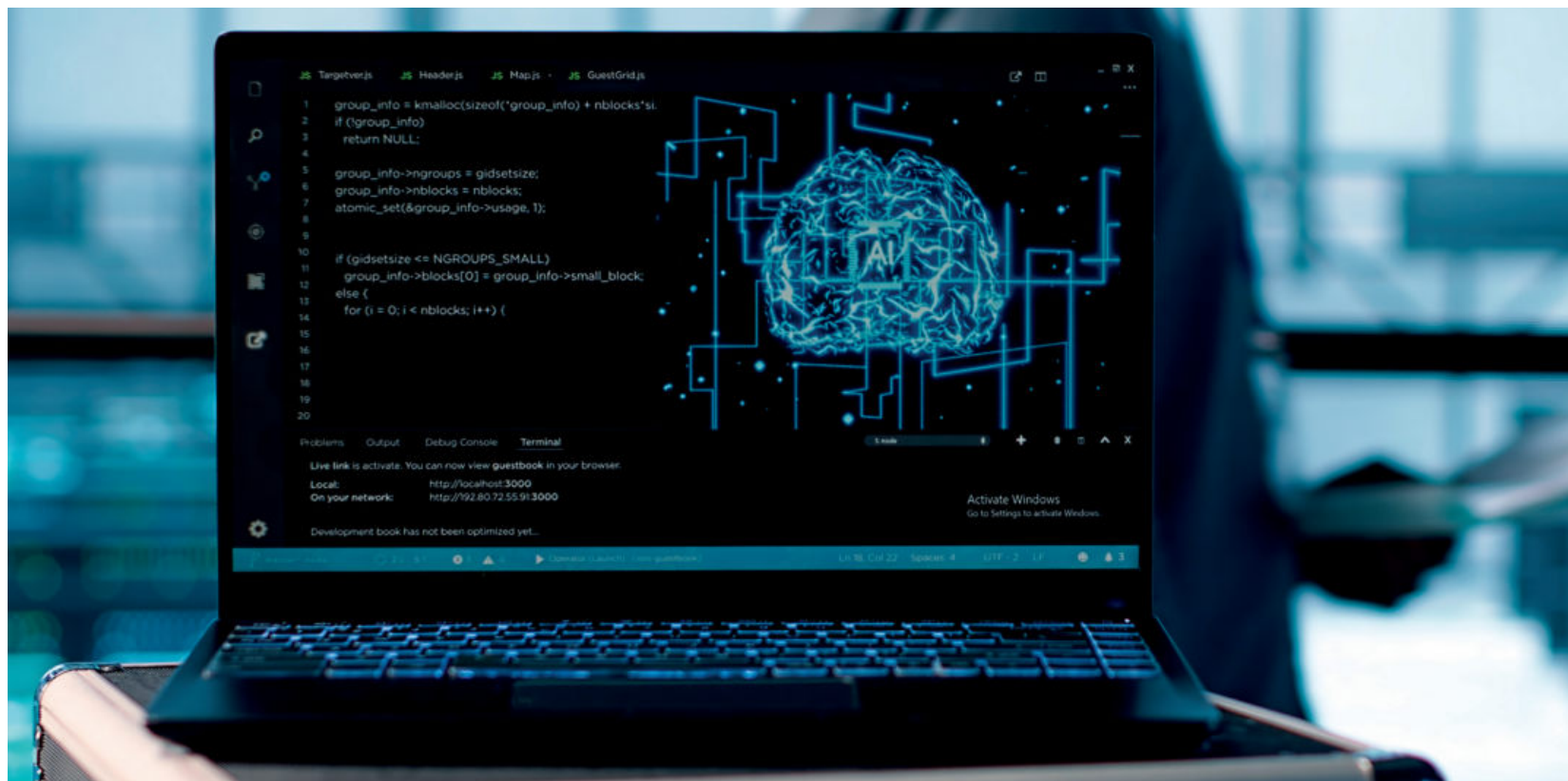
The new facility will accommodate up to 3MW of IT equipment across two server rooms, which will be fitted out in phases depending on service demand. The total building area will exceed 5,000 m². The network will be completed with the addition of another center in Álava.



GARAIA

The first of two modules planned for the Abanto Data Center has already been completed. The facility, with a 25 million investment, will create 30 jobs. Located on the Abanto Campus of the Bizkaia Science and Technology Park, it lies just 10 kilometers from the landing point of the Marea and Grace Hopper transoceanic cables — ensuring energy and connectivity supply. It will also have

Infographic of the new ADI Data Center Euskadi under construction in the Garaia Technology Park.



The Basque AI business ecosystem includes nearly 100 companies.

DIGITAL TERRITORY | ARTIFICIAL INTELLIGENCE

BAIC CHANNELS THE AI SURGE

THE BASQUE AI CENTER CONFIRMS THE PROGRESSIVE ADOPTION OF AI WHILE DRIVING INFRASTRUCTURE AND RESOURCES TO ENABLE EXPONENTIAL GROWTH

The Basque AI ecosystem is expanding and strengthening with each passing day. The first-ever AI Diagnosis in Euskadi, produced by the Basque Artificial Intelligence Center (BAIC) using 2023 data, records growing adoption of AI both by Basque companies and public administrations, as well as among technology providers.

Through its strategic roadmap for the coming years, BAIC is supporting this adoption with close monitoring of the local and global landscape, investment in necessary infrastructure and resources, and the rollout of initiatives aimed at bringing AI applications to life.

Its roadmap to 2026 is built around five strategic pillars: Observatory, Talent and Skills, Data Strategy, Applied AI, and Positioning.

The Observatory pillar — focused on continuous analysis and benchmarking of AI in the Basque Country against other regions — has helped paint a clear picture of the technology's implementation, based on tools such as the Diagnosis and the AI Use Case Catalog.

The findings point to solid growth, with 12.2% of Basque organizations using AI systems — mostly SMEs in professional, scientific and technical services, information and communications, and manufacturing. BAIC has identified more than 400 AI use cases from various sources. According to the Diagnosis, AI implementation in businesses has led to a 9% increase in turnover.

As for the business ecosystem, 89 Basque companies now develop and commercialize AI solutions, employing more than 7,500 professionals. In fact, 0.68% of the Basque workforce is already employed in AI-related roles.

The Talent pillar focuses on training and attracting professionals to the field. In 2023, more than 900 students completed formal education programs in AI.

Technological Sovereignty

The strategic line aimed at boosting AI capabilities focuses on strengthening enabling infrastructure and technological assets. While the Basque Country already has core infrastructure like high-performance computing (HPC) centers and labs, BAIC stresses the need to further reinforce technological sovereignty.

In that same vein, the Data Strategy pillar is vital to AI development — as data is a prerequisite for deployment.

The Applied AI pillar promotes specialization, technological maturity, and open innovation to tackle specific business challenges. Notable initiatives include Dataton and BAICChallenge, which engage companies in solving real-world problems. The latest Dataton, held in May, focused on a challenge titled "System for Designing

BAIC HAS IDENTIFIED OVER 400 USE CASES

FROM BITS TO QUBITS

Bizkaia has made the leap from bits to qubits with the launch of Biqain – Bizkaia Quantum Advanced Industries, a roadmap promoted by the Provincial Council to drive and accelerate the development and adoption of quantum technology, following its initial commitment in 2021.

After laying the groundwork for a new productive sector to meet growing demand for quantum services, Biqain will now focus on creating and fostering a new market built around quantum applications across industries such as finance, energy, automotive, aerospace, and biology.

To stimulate demand, Biqain will centralize the knowledge generated over the past three years in the María Goyri building, located at the Leioa Campus Technology Park of the University of the Basque Country (EHU). This hub will bring together universities, research and tech centers, global tech firms, clusters, startups, and public institutions — forming a dynamic and open ecosystem.

“It will host projects, labs, a business classroom, awareness areas, and coworking space,” the Provincial Council of Bizkaia stated.

The future quantum center will offer 1,000 m² of space to house EHU’s quantum laboratories — including the business tra-

ining area — and quantum hardware operated by Tecnalia, in collaboration with GAIA, the Basque Knowledge and Technology Industries Association. Over 15 quantum startups from the region are expected to relocate to Leioa. The center is scheduled to open in 2026.

Within these facilities, Lantik — the Provincial Council’s innovation and technology agency — will promote knowledge sharing and coordinate activity related to the 12 quantum platforms expected to operate in Bizkaia, including those from IBM and D-Wave Fujitsu.

IBM Quantum Computer

Another major step forward in the development of quantum technology in Euskadi will be the installation of IBM’s Quantum System Two in San Sebastián — the company’s most powerful networked quantum computer to date — expected in the last quarter of the year.

Powered by the IBM Quantum Heron, the company’s most advanced quantum processor, the system can be expanded to multiple processors in the future. IBM Heron is capable of running utility-scale algorithms that surpass brute-force classical simulation, including precise execution of certain quantum circuits using the Qiskit software framework.



Biqain presentation by Valentín García, Director of Innovation at Lantik.

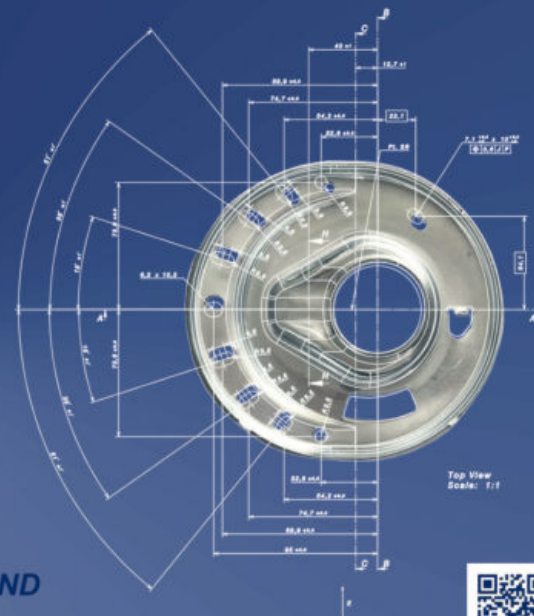
Power Transformation Centers,” and was won by a team from Ormazabal and Henko, who developed a generative AI solution that dramatically shortens design timelines and enhances infrastructure efficiency.

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ROBOTEKIN SHAPES THE FUTURE OF ROBOTICS AND AUTOMATION IN THE BASQUE COUNTRY, AS MACHINE TOOL MAKER DANOBAT DISRUPTS INDUSTRIAL MANUFACTURING WITH A HIGH-PRECISION ROBOT



Precision robot developed by Danobat.

In a world driven by data, algorithms, and artificial intelligence, robotics has become one of the key technologies of the 21st century. And while the global race for tech leadership may seem reserved for giants, the Basque Country is carving out a name for itself as an emerging powerhouse with a robust ecosystem of industrial companies, technology centers, and startups.

At the heart of this momentum is Robotekin — the Basque Association for Robotics and Automation. Launched two years ago with the support of the Basque Government and the Provincial Council of Álava, the hub now includes nearly 60 companies and public institutions across the value chain: manufacturers, service providers, training institutions, R&D centers, end users, and startups.

Robotekin fosters collaboration among compa-

nies, research centers, training entities, and startups to develop solutions aligned with real market needs.

Its roadmap is anchored on six strategic goals: innovation, internationalization, talent attraction, industrial transformation, te-

THE ASSOCIATION INCLUDES NEARLY 60 MEMBERS ACROSS THE VALUE CHAIN

chnical education, and startup support. These young ventures play a vital role in strengthening even the most traditional sectors.

Several of these startups are already making waves internationally. Examples include Alias Robotics, focused on cybersecurity in robotics, and Accelertion

Robotics, a semiconductor firm offering consulting services tailored to the robotics market.

Robotekin also counts on major industrial players such as Mercedes-Benz, Michelin, DHL, and Eroski, along with suppliers and manufacturers like Smartlog, Inser Robótica, Ingemat, Bereiker, MB Sistemas, Aldakin, and Added Value Solutions (AVS) — active in the aerospace sector — and Danobat, the machine tool manufacturer that has made a decisive leap into robotics with the launch of a disruptive precision robot.

Danobat redefines the rules

Danobat has ushered in a new era in industrial manufacturing, breaking away from traditional machining standards with a game-changing precision robot. This innovation bridges the gap in machining lightweight materials with

a breakthrough solution that combines the agility and flexibility of a six-axis robot with the stability and accuracy of a machine tool.

This new robotics range delivers unprecedented performance: ten times less vibration and 20% shorter machining cycles.

Developed over five years in collaboration with the Ideko technology center, the robot opens new possibilities for advanced manufacturing in industries such as aerospace, energy, and automotive.

Designed to machine materials like composites, aluminum, and even steel, the new line triples the performance of traditional robots in terms of repeatability and precision in critical tasks like drilling and riveting. It also delivers three times greater accuracy in contouring operations. These features position Danobat's solution as a compelling alternative to conventional systems in com-

plex machining and high-precision additive manufacturing.

The product range includes four models — from a compact version with a 70 kg payload and 2.2-meter reach to a heavy-duty model capable of handling

DANOBAT'S DMTR RANGE HAS NEVER-BEFORE-SEEN CAPABILITIES

520 kg loads over 3.6 meters. This versatility allows Danobat to meet the most demanding market needs, offering precision, performance, and flexibility across a wide range of industrial applications — from composite tape-laying and steel machining to riveting, systems assembly, and 3D printing. The company is also exploring broader use cases.

COLAB BRINGS SMART FACTORIES TO SMES

Colab — a new collaborative space launched by the Tekniker technology center and German firm Schunk — brings the smart factory model

toward advanced manufacturing, while fostering knowledge transfer and the co-creation of solutions tailored to real-world market challenges.



Colab space located at Tekniker facilities

within reach for small and medium-sized enterprises. The space enables SMEs to test new, scalable solutions in automation and digitalization.

Located in Tekniker's robotics lab, Colab helps SMEs fast-track their digital and automation journeys

ges. It also boosts their ability to navigate the transition toward smarter, more sustainable models.

Under the partnership, Tekniker contributes its deep expertise in integrating robotic technologies into industrial environments, while

Schunk maintains a permanent presence at the center with personnel and equipment, including clamping systems, tool changers, and picking solutions.

Collaborative R&D

Colab stands out as a space for innovation and collaboration, equipped with state-of-the-art facilities specifically designed for R&D in automotive, robotics, and advanced technologies. It features cutting-edge resources like collaborative robots, high-precision handling systems, AI-enabled vision systems, and specialized automation tools.

The research area includes eight robots and various Schunk-donated tools for testing applications like automated tool changing, metal part finishing, and part selection and retrieval.

A key strength of Colab is its adaptability to different industrial sectors such as aerospace and advanced manufacturing, allowing customized solutions based on project-specific requirements.

Its main current activity is conducting proof-of-concept testing to help clients assess the feasibility of the automation solutions they plan to implement.

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FAST TRACK SUPPORTS 150 PROJECTS

Companies such as Ibarria, Ekide, BTI Technologies, Cimico, AJL Ophthalmics, and Biolan received funding for more than one innovation project.

COMPANY	SUBSIDY	COMPANY	SUBSIDY
Ibarria innovatek (2)	240,830	Ubikare zainketak	70,166
IES Medical	202,086	Naturpolo	68,997
Polimerbio	196,432	Cocoon bioscience	66,983
I+Med	193,563	Gogoia mobility robots	66,341
Ekide (3)	184,031	Tech pro packag	64,907
AVS	182,478	Sdad. bienes equip. lig...	63,737
Cyber surgery	176,567	Zubiola	63,489
Korta	160,494	Instant sport	62,607
Aldakin Gipuzkoa	151,512	Revenant	58,547
Izadi mecanizados	151,511	Grabit retail	57,961
Sealpath technologies	145,731	Metrologia sariki	56,821
Kernova innova	130,147	Aurrelan	56,607
Vivebiotech	127,600	Airlan industrial	56,272
Biotechnology Inst. (2)	124,227	Agria hispania	56,172
Cimico (2)	123,566	Ameztoi anaiak	55,758
Alcad electronics	123,175	Smartlog services	54,740
Heroslam	120,238	Taineret	54,715
Bost	118,505	Cast. y echevarria-vitoria	54,498
Agria zero emissions	112,215	Almis inform. finan.	53,598
Loramendi	112,092	Fesia technology	53,443
Virtualware 2007	111,866	Eredu	51,959
Mikrobiomik	108,187	Bodegas luis cañas	51,267
Ezarri	107,547	Noticias taldea mult.	48,635
Aluminios Eibar	101,407	Lin3s seo	48,316
We are clickers	101,386	Kautenik	48,134
SVE	100,342	Graphenea	47,264
RIL DMG Eng. Sol.	95,612	Lanit consulting	46,196
Zuia ingenieria	93,201	Todolufe	45,004
Tratam. termicos T.T.T.	90,309	Optidel biosystems	44,866
AJL Ophthalmics (3)	88,830	Amilibia y de la iglesia	44,613
Ceata ingenieria	86,682	Sellex	44,490
Jegan	85,046	Komat	44,185
Oiarso	84,625	JRG	43,830
Cons. mec. Jose Lazpiur	84,417	Couth r&d	43,580
Biolan Microbiosens. (2)	83,809	Kategora investments	43,085
Syngoi technologies	83,786	Reviglass	41,046
Pasaban	82,308	Fisify technology	40,352
Coremarine solutions	80,993	Osatu	39,586
Aria Araba	80,665	Camepack-2	39,573
Hirutrans garraioak	76,778	Trak health solutions	39,290
HWS Concrete Towers	76,567	Irundin	38,753
Mizar Health	76,516	Smiley owl tech	36,886
Innoprick	75,688	Euroclor	36,766
Manitek Recuperaciones	74,183	Odei	36,472
Linqcase indus. sol.	74,134	Talleres agui	36,000
Kimua engineering	73,583	Innguma technologies	35,734
Epl engineering	73,404	Ing. y desarr. maquinas	35,345
Innov.rotary table sol.	71,992	TOTAL	8,970,822

Note: The total corresponds to the 142 projects approved. Source: SPRI.



Demo Day held in 2024 at the Euskalduna Palace in Bilbao.

DIGITAL TERRITORY | INSTITUTIONAL DRIVE

FAST TRACK FUELS INNOVATION

THE FIRST EDITION OF "FAST TRACK INNOBIDEAK" SUPPORTS 150 PROJECTS FROM 142 COMPANIES

The Basque Government continues to place a firm bet on driving innovation in small and medium-sized enterprises. Among its many support initiatives, Fast Track Inno-bideak stands out. The program's first edition was launched in 2024 with a 9 million budget, funding 137 innovation projects and 13 complementary actions submitted by 142 industrial and industry-related service SMEs — mobilizing more than 23 million in total investment.

IES Medical, I+Med, and Polimerbio received the highest level of support. The biotech firm I+Med secured funding for its Ingosec project, aimed at manufacturing a new generation of eye drops for treating dry eye syndrome. Polimerbio's initiative focused on scaling up its first medical device — a Biodegradable Intra-urethral Device for the treatment of urethral stricture — from TRL 7 to TRL 9.

Some companies received financial

support to accelerate more than one innovation project, targeting the development of new or improved products, services, processes, or business models. These included

Ibarria, Ekide, BTI, Cimico, AJL Ophthalmics, and Biolan.

The Gipuzkoa-based machine tool manufacturer Ibarria, for instance, was awarded 240,830 to develop two projects. The first of these, focused on a new gantry-style machine family for applications requiring greater precision and part accessibility.

The second one, aimed to integrate the in-house production of critical components to improve quality, reduce costs and lead times, and lessen reliance on external suppliers.

The second edition of the Fast Track program is already underway, with a projected 10 million budget to provide comprehensive support and funding for the final phases of innovation projects.

**€
23**
MILLION
IN TOTAL
INVESTMENT
MOBILIZED BY THE
PROGRAM

BIND 4.0 MATCHES 17 STARTUPS WITH 21 BASQUE FIRMS

The Basque Government's BIND 4.0 open innovation platform is celebrating its ninth edition this year. In 2025, 17 startups — 11 of them from the Basque Country — will develop 24 projects with 21 corporate partners in fields such as smart industry, clean energy and sustainability, health, and food.

Of all the selected startups, 35 percent submitted projects involving artificial intelligence to optimize and maintain processes, manage quality, and forecast demand. Another 25% are applying Energy and Clean Tech solutions to reduce environmental impact and enhance sustainability at Basque companies. Meanwhile, 13 percent are betting on immersive technologies to digitize processes and enhance user experiences.

Scott & Irwin - Mercedes

One of the selected projects is by the digital innovation studio Scott & Irwin, which is developing a virtualized version of an exhibition organized by Mercedes in Vi-

toria to celebrate the 70th anniversary of its production plant.

This year's edition also stands out for projects ex-

ploring quantum computing to solve complex industrial processes and the use of renewable energies to reduce carbon footprints and energy costs.

Since its inception in 2016, BIND has launched three initiatives that have helped over 240 startups and developed more than

310 projects.

Among them, the BIND SME program in 2025 is fostering collaboration between 28 startups and 18 small and medium-sized enterprises, allowing them to share knowledge and experiences in the development of digitalization projects.

AI, ENERGY, AND CLEAN TECH DOMINATE BIND 4.0 2025

A total of 17 national and international startups are developing 24 tech projects in collaboration with 21 Basque companies. The results will be showcased next July at Demo Day.

STARTUP	PARTNER	ORIGIN	VERTICAL MARKET SOFTWARE	TECHNOLOGICAL AREA	TECHNOLOGICAL SUB-AREA
Alcautech	Ondarreta	Vizcaya	Smart Ind./Clean Energy	IoT	IIoT
Bioferric Ink	Tubacex	Alicante	Clean Energy&Sustainability	Energy Tech	New Material for wastewater regeneration
Bork	Betsaide, GH Cranes, Ormazabal, Sidenor	Chile	Smart Industry	IA	Maching Learning
Clever Solar Devices	Serveo	Soria	Smart Ind./Clean Energy	Energy Tech	Solar Fotovoltaic
Comexsoft	Eroski	Guipuzcoa	Smart Industry	Big Data	Advanced Anaytics
Cybertix	Zikotz	Guipuzcoa	Smart Industry	Cibersecurity	Integral Immune System
Digital Experience	Viuda de Sainz	Guipuzcoa	Smart Industry	IA	Adaptive IA
Greemko	Erreka	Madrid	Smart Ind./Clean Energy	Software	Carbon footprint and environmental manag.
Inspectrail	Elecnor	Guipuzcoa	Smart Industry	IA	Image Procesing/Artificial Vision
Lowerton	Mondragon, BDC, Copreci, Ramondin	Vizcaya	Smart Industry	IA	Machine Learning
Menditech	ITP Aero, Danobat Group	Navarre	Smart Industry	Robotics& Electr.	Optical Fiber sensing
Powerfultree	Iberdrola	Alava	Smart Ind./Clean Energy	Energy TEch	Agrivoltaics
Quantum Mads 2020	Arania	Vizcaya	Smart Industry	Computing	Quantum Computing
Scott&Irwin	Mercedes Benz	Guipuzcoa	Smart Ind./Health	Inmersive Tech.	Mixed Reality
Siaps Visual	Garay	Guipuzcoa	Smart Industry	IA	Image Procesing/Artificial Vision
Twindustry	Arteche	Malaga	Smart Industry	Inmersive Tech.	Digital Twin

Source: SPRI.

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- Power **Generation** Units (On and Offshore)
- Rotary **Frequency Converters**

- According to the rules of the main Classification Societies:

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 - Electrical Type Test
 - Vibration
 - Shock
 - EMC's



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Soraluce machine, an example of the sector's green transition.

DIGITAL TERRITORY | SUSTAINABLE ECONOMY

MT GOES GREEN

AFM GREEN LEADS THE SUSTAINABILITY SHIFT IN THE MACHINE TOOL SECTOR

AFM Cluster, representing companies in machine tools, advanced manufacturing technologies, and 4.0 services, has launched AFM Green, a strategic initiative to drive sustainability across the industry.

To accelerate the green transition, AFM Green develops tools, disseminates knowledge, connects companies, and leads by example. "It doesn't watch the change from the sidelines — it leads it from within," the association states. AFM's strategic role as sector representative is key to identifying needs, channeling solutions, and coordinating high-impact actions.

The goal of AFM Green is to position the sector as a European leader in industrial sustainability, offering high-value technological

solutions with minimal environmental impact.

According to an Ihobe report (the Basque public environmental management company), the usage phase accounts for up to 80% of a machine tool's total environmental impact, due to continuous energy consumption over an average lifespan of 15 years. The extraction and production of raw materials account for another 12%. These figures highlight the urgency of addressing design, energy efficiency, and durability as levers for a more sustainable industry.

AFM Green encourages companies to measure their environmental impact as a first step toward sustainability and urges them to find inspiration in the progress made by their peers.

80% OF THE ENVIRONMENTAL IMPACT OCCURS DURING USE

DESIGN MUST INCORPORATE SUSTAINABLE CRITERIA

One such example is Soraluce, a cooperative that became the first in the machine tool sector to certify an Eco-Design Management System under the UNE-EN ISO 14006 standard.

Cutting Consumption

By incorporating sustainable design criteria, Soraluce reduces the environmental impact of its machines compared to previous models. Improvements include lighter, more compact structural components, lower electricity consumption via efficient technologies such as Sleep Mode, DAS, Adaptive Control, and Digital Twin, and reduced lubricant usage through automated lubrication systems.

Meanwhile, Optimus 3D

develops additive manufacturing solutions for automotive and cycling parts that eliminate traditional molds and tooling, reduce material usage, and improve production process sustainability. One such initiative involves 3D-printing stainless steel parts for Volvo's aftermarket, avoiding mold-making and casting processes.

Fagor Arrasate, a leader in stamping, cutting, and metal and composite processing systems, has also implemented a sustainability strategy to reduce its environmental impact. This includes assessing the organizational and product carbon footprint across raw materials, manufacturing, distribution, usage, and end-of-life stages. The company has optimized pro-

HIREKIN AT FULL STEAM WITH NEW ENTREPRENEURSHIP PROJECTS

The Hirekin Center for Sustainable Industrial Innovation and Entrepreneurship at Mondragon Unibertsitatea's School of Engineering celebrates its first anniversary with several business projects focused on digitalization, sustainability, and technological innovation.

By 2028-2029, it expects to have supported 36 projects and over 50 entrepreneurs.

These initiatives involve the development, prototyping, and industrialization of new technologies, products, and production processes with high specialization requirements. Many demand facilities capable of handling large volumes, heavy weights, or specific environmental conditions.

Focused on prototyping, the 6,000-square-meter center includes an extensive industrial space equipped with prototyping, simulation, and testing equipment, workshops, computing rooms, co-creation spaces, and meeting rooms.

Mondragon Unibertsitatea contributes entrepreneurial talent from its student body and R&D resources from its research groups, available through labs and workshops across other campuses — broadening the capabilities available to Hirekin and supporting industrial transformation.

dustry and competitive economy.

Open Project

As an open project, companies and institutions can join Hirekin in multiple roles: as advisors helping shape strategy; as sponsors funding students and entrepreneurship initiatives; or as promoters bringing in projects and contributing to governance, which is rooted in cooperative values.

The center addresses the unique challenges of industrial entrepreneurship, where the size of the investment and risk are proportional to the complexity of the resulting hardware - based products, services, and processes.

For that reason, it offers facilities that meet demanding industrial standards to make such ventures viable.

Another defining trait of Hirekin is its openness to society. Rooted in cooperative principles, it welcomes collaboration from within and beyond the region.



Hirekin, the sustainable industrial innovation and entrepreneurship center.

Hirekin was conceived as a collaborative environment for companies, entrepreneurs, researchers, and students — from the School of Engineering and other faculties at Mondragon University or beyond — to work together in building a sustainable in-

duction processes by reducing emissions, applying advanced filtration systems, and using water-based paints instead of solvents. Additionally, it now runs on 100% renewable electricity at its headquarters.

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BASQUE FIRMS IN GERMANY | MT

GOING BIG IN GERMANY

THROUGH ITS GERMAN SUBSIDIARIES DANOBAT-OVERBECK AND BIMATEC SORALUCE, DANOBATGROUP HAS NOT ONLY BROKEN INTO THE GLOBAL MARKET BUT ALSO DIVERSIFIED ITS PORTFOLIO WITH NEW PRODUCTS AND TECHNOLOGIES

Danobatgroup, a specialist in designing and manufacturing machine tools and advanced manufacturing solutions, has built its global leadership on product excellence and a solid internationalization strategy. This approach has made it one of the world's leading machine tool manufacturers — with Germany playing a pivotal role in its international expansion.

Its German subsidiaries, Danobat-Overbeck and Bimatec Soralue, have not only opened up Danobatgroup's innovations to the global market but have also become leaders in their respective niches in Germany. Bimatec Soralue ranks among the top two in the country by revenue, with over 1,900 installed machines. Danobat-Overbeck, meanwhile, leads the high-precision grinding segment for applications requiring internal, external, and radius grinding — as well as high-precision hard turning.

Soraluce, a specialist in milling, boring, and machining centers, entered the German market in 1991 through the acquisition of Bimatec, based in Limburg. Over the years, Bimatec Soralue has strengthened its foothold in the German market as a springboard for global growth. In 2012, it invested 6.2 million to expand its workshop to 3,800 square meters, with a crane clearance of 10 meters — enabling the exhibition of machines with vertical

travel up to 8 meters. The new facilities included a technology center for milling and boring trials, unlocking new possibilities for application development and machining tests.

The subsidiary also houses the Soraluce Academy, a platform connecting customers with technical experts to share knowledge, learn, and implement practical solutions and projects.

A Strong Commercial Partnership

Bimatec Soralue, which has its own machining engineering department, showcases the full Soraluce machine lineup in a dedicated showroom for live demonstrations. The subsidiary serves the entire Central European region, providing technical support and services. It boasts a headstock maintenance center and stocks 3.9 million in spare parts.

In addition to leading the milling segment in Germany, Bimatec Soralue amplifies the Soraluce brand's global reach and exemplifies the strong commercial ties between Basque and German firms.

Danobat, known for its grinding machi-

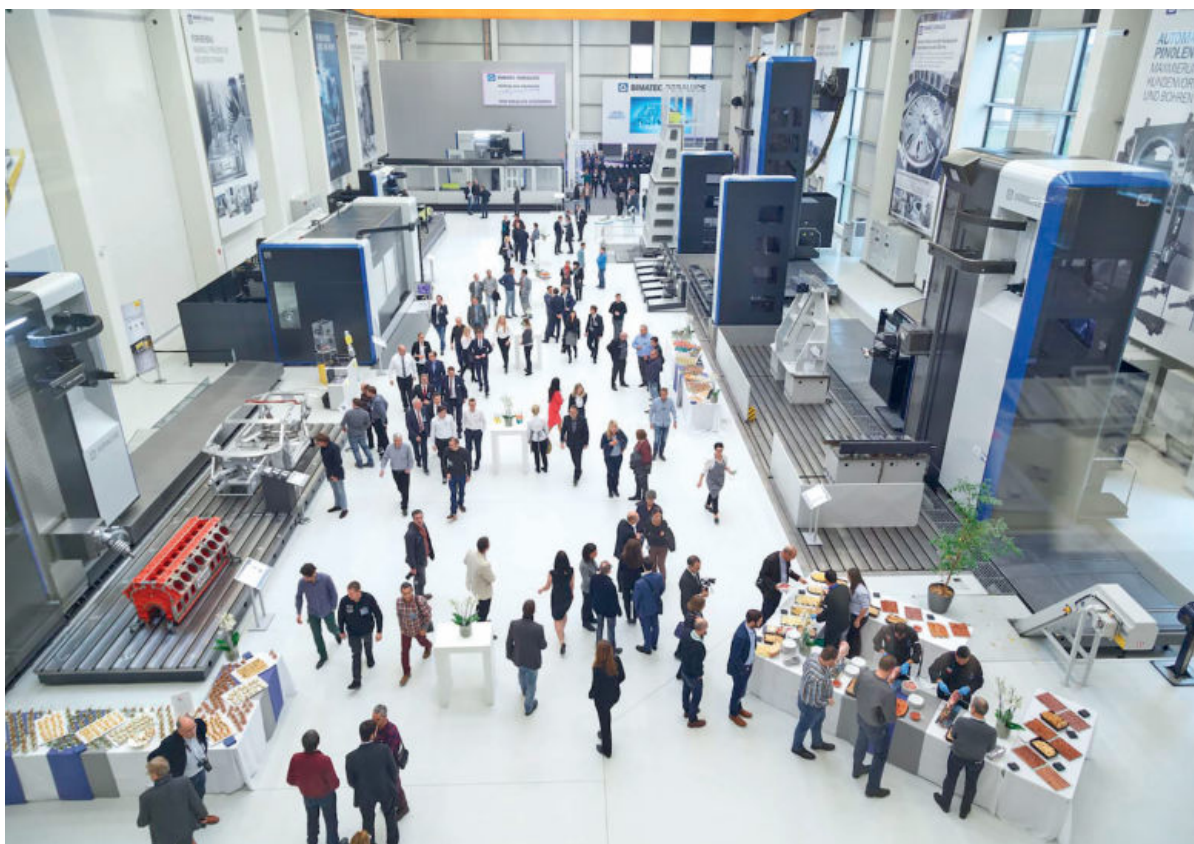
logical capabilities. Overbeck brought with it a century of expertise in German precision engineering.

From Workshop to World Stage

Overbeck GmbH was founded in 1924, when master mechanic Gustav Overbeck opened a precision engineering workshop in Herborn. Its first major orders came from the aerospace industry after the 1929 crash. In 1948, the firm launched the first Overbeck grinder in the Zetto series. By 1959, its internal and external grinding machines commanded over 25% and 15% market share, respectively.

The company's Herborn facilities took on their current form in the 1970s, coinciding with the global rise of its high-precision grinders, renowned for their technical excellence. In subsequent decades, the product line expanded to include specialized grinders for the bearing industry and fully automated NC external grinding machines. Danobat acquired Overbeck in 2022, continuing its legacy in internal grinding with the backing of the company's extensive experience.

BIMATEC SORALUCE HAS OVER 1,900 MACHINES INSTALLED



Bimatec Soralue facilities in Limburg.

nes, lathes, hard turning systems, and hybrid machines, began its journey in Germany in 2002 with the acquisition of Overbeck GmbH — a move aimed not only at expanding the Danobat brand but also at diversifying its product range and techno-

Recent innovations include the new ILD series of grinders for large, long parts, and the IED-1200 model designed for spindle housings, shafts, and machine tool components.

BASQUE FIRMS IN GERMANY | MT

DOUBLE DOWN ON A KEY MARKET

COMPANIES LIKE MTE MILLING MACHINES, CMZ, FAGOR ARRASATE, AND IBARMIA ARE REINFORCING THEIR PRESENCE IN GERMANY

Germany remains a crucial market for Basque machine tool companies, many of which have established subsidiaries or facilities there. Among them are MTE Milling Machines, CMZ, Fagor Arrasate, and Ibarria, to name a few.

The Gipuzkoa-based firm MTE, known for its innovative milling technologies, has operated a branch in Montabaur (Rhineland-Palatinate) since 2008. MTE Deutschland spans 4,000 square meters, employs 30 people, and handles sales, distribution, after-sales service, and technical support for all machines in Germany and Central Europe. The site includes a showroom with four demo machines, a technical assistance team, and headstock repair services. The company is currently building a larger headstock repair facility



and expanding its office space.

CMZ, the CNC lathe manufacturer from Bizkaia, established a German subsidiary in 2010. Located in Stuttgart, it serves as a commercial office

and provides qualified after-sales service through a local team that also trains customers. Germany is one of CMZ's top-priority markets.

Fagor Arrasate has had com-

MTE's
showroom at
its German
branch in
Montabaur.

mercial ties with Germany for decades and later opened a Service facility in Hilpoltstein (Bavaria). Germany — particularly through the automotive industry — has traditionally been a key market for this Mondragon Group cooperative. The firm has a significant number of presses installed across the country.

The Hilpoltstein site includes offices and dedicated space for assembly, programming, and project management by in-house specialists.

Ibarria in Baden-Württemberg

Besides these three firms, other top-tier players like Ibarria also maintain an active presence in Germany, via a commercial subsidiary in Eisingen/Fils, in the state of Baden-Württemberg.



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SURVEY | MACHINE TOOL

DIGITAL CHANGES EVERYTHING

IBARMIA, SORALUCE, FAGOR AUTOMATION, AGME AND ONA INTEGRATE AI, DIGITALIZATION AND CONNECTIVITY INTO THEIR R&D STRATEGIES TO OFFER INCREASINGLY INTELLIGENT MACHINES

Machining solutions, process integration, industrial digitalization and AI, monitoring, and intelligent automation are shaping the R&D strategies of the machine tool industry. Representatives from Ibarria (Arrate Olaiz), Soralue (Oier Elgueabal), Fagor Automation (Javier Arenas), Agme (José Antonio García de Vicuña), and Ona Electroerosión (José Mari Ramos) agree that the main challenge is to achieve greater precision, productivity, and performance while embracing sustainability and a holistic view of innovation.

► What areas of research are currently the focus of your R&D efforts?

Arrate Olaiz / Ibarria

Our activity is centred on developing complete machining solutions through process integration, automation, digitalisation, and sustainability—always with a focus on achieving higher precision and improved machine performance.

Software-related topics are increasingly present in our R&D developments, both in terms of computation and modelling and through the integration of technological cycles that enable advanced machine usage.

We're also advancing in new machine architectures to expand our current portfolio: we've just finalised the design of a new gantry-type machine family for large parts and are working on machinery lines specifically tailored to the aerospace sector.

Oier Elgueabal / Soralue

At Soralue, our R&D revolves around three strategic pillars: advanced machining technology, industrial digitalisation, and intelligent automation—all aimed at delivering increasingly precise, productive, and sustainable solutions.

We continue developing technologies such as active vibration control (DAS®, DWS), which enhances cutting capacity, surface finish, and tool life. We also work on smart thermal control

systems using sensors and predictive models to compensate in real time for thermal deviations, ensuring maximum dimensional accuracy during machining. In metrology, we're advancing with VSET solutions for off-machine alignments and verifications, reducing non-productive time and boosting reliability. Additionally, we promote digitalisation through digital twins, AI, and predictive maintenance in complex industrial environments.

Javier Arenas / Fagor Automation

Fagor Automation's products are shaped by a broad range of technologies. At the heart of our CNCs lies real-time software development, which handles trajectory generation and control loops to ensure accuracy and performance. But R&D must also encompass developments in power electronics, human-machine interfaces (HMI), industrial cybersecurity... to name a few.

For our position sensors, we focus on miniaturisation and enhancing the precision of our optical technology—key to offering more compact and higher-performing solutions. And we cannot overlook digitalisation and connectivity.

Our innovation approach is holistic: we combine multiple disciplines to continue developing intelligent, robust solutions aligned with the demands of advanced manufacturing.

José Antonio García de Vicuña / Agme

At Agme, our R&D focuses on developing more flexible, intelligent, and efficient assembly solutions. We aim for our cells to adapt easily to part changes in fast-moving industries like automotive.

We delve into advanced forming and assembly technologies, integrating process control systems and real-time data analytics. We're exploring AI applications in both standard and custom presses and riveting machines to improve performance, quality, and predictive maintenance.

In 2024, we accelerated the development of servo presses and servo ri-

veters, also advancing in automation, robotics, sensorics, traceability, and interconnectivity. Our goal is to keep our solutions at the technological forefront, delivering robust, sustainable machines that integrate seamlessly into demanding advanced industrial environments.

Jose Mari Ramos / ONA Electroerosión

We focus our efforts on the development of specialised EDM solutions for the aerospace and energy sectors, including turbines and compressors.

► What technical milestones have you reached in recent years? How do they improve upon previous solutions?

Arrate Olaiz / Ibarria

Among our recent achievements are new generations of machines already launched to market.

In the travelling-column machining centres (Z Series), we've introduced Generation 6, offering a market-leading range in terms of size, travel, working volume optimisation, dynamics, and flexibility.

In universal machining centres (T Series), the second-generation design is proving highly successful, offering enhanced precision and dynamics.

Process integration is also a major result of our R&D efforts: to our established milling and turning capabilities, we've added grinding and gear manufacturing via hobbing and skiving.

Oier Elgueabal / Soralue

In recent years, we've significantly expanded and renewed our product range. Highlights include a new family of high-gantry milling machines for large, high-precision parts, and the introduction of gyroscopic heads that enhance operational flexibility and access to complex geometries with improved precision and stability.

In the aerospace sector, we've developed solutions for machining aerospace structures, engines, and landing gear, integrating 5-axis technology, active vibration control, automation, and monitoring.

In industrial automation, our palletising systems and centralised tool storage units stand out, boosting productivity and efficiency. With the Soralue Control System, we manage machining cells in an integrated way.

Meanwhile, we've strengthened our machine digitalisation through platform development that enables real-time monitoring, predictive maintenance, and data analysis for process optimisation.

Javier Arenas / Fagor Automation

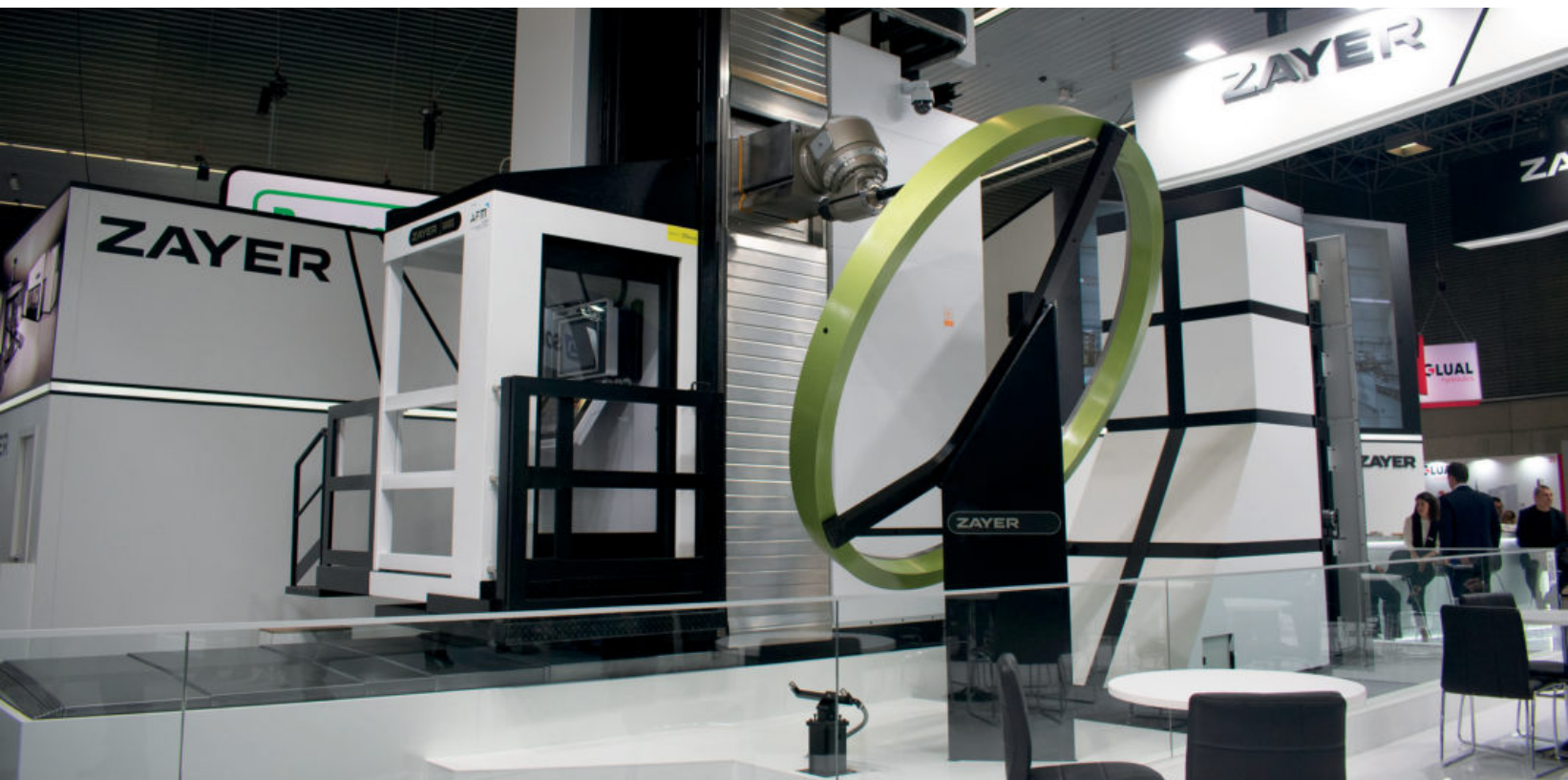
We've made a technological leap in re-

ARRATE
OLAIZ

Innovation Director,
Ibarria



"AI WILL PLAY
A PRODUCT-
DRIVEN ROLE"



Exhibitor's stands
at BIEMH 2024,
Bilbao.

cent years with the launch of the Quercus family—a new generation of CNC systems offering improved performance, accuracy, and connectivity. This comprehensive platform upgrade enables us to deliver more powerful, flexible, and digitally oriented solutions.

We've also evolved our position sensor technology, enabling entry into new industrial sectors and creating a new business unit with products tailored to high-demand applications.

Moreover, we've developed a complete offering for machine and process digitalisation, integrating connectivity, data analytics, and advanced services that improve efficiency and enable smarter decision-making.

These advances mark a clear step forward from previous offerings and reaffirm our commitment to innovation that delivers real market value.

José Antonio García de Vicuña / Agme

Agme has achieved major technological progress, resulting in improved precision, efficiency, process control, and versatility in our solutions.

We've expanded our AGME PE electric servo press range to three models (PE-15, PE-50, and PE-100), covering everything from low-capacity applications to presses for demanding processes. These presses feature modular design, low maintenance, and open PLC architecture.

In our flexible riveting centres, we've incorporated electric X, Y, and Z axes, high-precision electric heads, smart

**OIER
ELGUEZABAL**

Sales Director,
Soraluce



**"EVERYTHING
DIGITAL HAS A
CROSS-CUTTING
IMPACT"**

control, automatic punch tool change, and intuitive interfaces—enabling efficient operation even without specialised operators.

In both our riveters and electric presses, under the Invesnac project (supported by the CDTI), we've developed a new control architecture for optimal integration into automated assembly lines.

Jose Marí Ramos / ONA Electroerosión

We continue improving our traditional EDM technologies (SEDM and WEDM) and have developed Fasthole EDM for shaped-hole drilling in turbine blades and vanes.

In sinker EDM (SEDM), we now offer an advanced 3D graphics CNC with a tablet-like interface. In this field, we've developed a dual-head option for our large modular machines, with generators reaching up to 400 A—800 A in the dual-head version. We've also co-developed the 'Lean' model with key clients.

We're also advancing EDM applications for turbine manufacturing. Notably, we offer a dedicated SEDM technology package for impeller machining, which includes 200–400 A generators per head, adaptive machining, smooth integration of various rotary axis configurations (even in the SEDM head), reinforced C-axis, traceability features, and a safety package.

In wire EDM (WEDM), we manufacture the largest machines on the market and continue developing WEDM

generator technology to ensure consistent results in our AV series (AV130, Z800). We offer a dedicated WEDM package for the turbine sector's fire-tree applications (rotary axis integration, probing, etc.), extending this to AV60/80-based configurations for large disks. This technology has enabled ONA to secure reference clients in the aerospace and energy sectors.

WEDM is also offered for extra-tall parts (up to 800 mm in height/thickness) via our modular AV series, and we're currently preparing to launch the AV Z1000mm concept in 2025.

► To what extent is digitalization influencing your processes and products?

Arrate Olaiz / Ibarmia

Digitalisation of Ibarmia products has steadily progressed in recent years, including developments in machine connectivity, data analytics, technological cycles to optimise machine use, virtual twins, automation, and more.

We use our internal manufacturing digitalisation as a platform to develop technologies before bringing them to market. This enhances machining efficiency and continuously incorporates new functionalities.

(continued on page 30)

SURVEY | MACHINE TOOL

(from page 29)

In the coming months, we plan to automate parts of our manufacturing process and develop production management software.

Oier Elguezabal / Soraluece

Digitalisation is having a cross-cutting and transformative impact at Soraluece, acting as a key driver of competitiveness in both our internal manufacturing and our technological offering.

We use digital twins to simulate and optimise machining, anticipate risks, and reduce physical testing. We incorporate real-time monitoring, self-diagnosis, and predictive maintenance to enhance uptime, efficiency, and safety. We also analyse data such as vibrations and temperature to improve performance and detect deviations. This evolution positions us firmly in the realm of intelligent, connected machine tools aligned with Industry 4.0.

Javier Arenas / Fagor Automation

Digitalisation is profoundly transforming both our internal processes and product portfolio. Internally, we've improved traceability by creating more connected, flexible, and efficient environments. With monitoring and data analysis, we make faster, more informed decisions.

As for our products, digitalisation enables us to offer smarter, more connected, and adaptable solutions. It's no longer just about selling a CNC system or position encoder, but delivering complete solutions that integrate hardware, software, and digital services.

This transformation brings us closer to our customers, helping us better understand their context and support their digital transition.

José Antonio García de Vicuña / Agme

Digitalisation is comprehensively transforming both our internal processes and customer solutions. For standard machines, Agme constantly implements improvements in traceability, connectivity, and process control. For special machines, our design and manufacturing are optimised through a next-gen ERP fully integrated with CAD-CAM and electronic design systems.

This integration ensures greater precision, agility, and coordination. Additionally, our machines are ready to integrate seamlessly into customers' ERP and MES systems, facilitating their deployment in Industry 4.0 environments. This digital strategy enhances our ability to deliver flexible, automated assembly solutions with high technological value—meeting today's de-

JAVIER ARENAS

Aotek centre Director,
Fagor Automation



"WE IMPROVE TRACEABILITY WITH CONNECTED ENVIRONMENTS"

JOSÉ ANTONIO GARCÍA DE VICUÑA

Manager, AGME



"WE ASSESS THE PRACTICAL USE OF AI"

mands for efficiency, quality, and real-time data control.

Jose Marí Ramos / ONA Electroerosión

Digitalisation is critical. We are interconnecting the company's IT systems: ERP, CRM, and more recently PLM. We've just completed an R&D project (EGIDA, SME Missions, CDTI) with other partners to create a digital twin and digital thread of design and operations processes. We've also explored advanced augmented reality, especially for designing electrical and electronic systems linked to our generators.

> How is artificial intelligence helping to improve your industrial production? What steps are you taking in this field?

Arrate Olaiz / Ibarmia

Artificial intelligence has entered the industrial arena just as it has in other aspects of personal life, and it will undoubtedly be a key technology in the future development of our business.

Our initial approach to AI has focused on improving internal efficiency through applications that facilitate information retrieval, enhance data traceability, analyse business data, or benchmark against competitors. While the potential applications are vast, it's essential to take solid steps in implementation and regulate its use within the organisation.

AI will also play a relevant role in our products—especially for predictive maintenance and process optimisation—and we already have R&D lines active in these areas.

Oier Elguezabal / Soraluece

AI is boosting the efficiency and autonomy of our systems. At Soraluece, we use AI in predictive maintenance, employing algorithms that analyse real-time data to anticipate failures and optimise interventions. We also apply AI to dynamically adjust machining parameters—particularly in vibration control—to enhance stability and performance.

Together with our technology centre Ideko, we are developing projects involving machine learning, intelligent assistants, and cognitively capable machines. These advances are driving a new generation of smarter machines, adaptable to changing environments and with enhanced decision-making capabilities.

Javier Arenas / Fagor Automation

Artificial intelligence represents the next major wave of industrial transformation, building on the foundation we've laid through digitalisation. It will

undoubtedly help us optimise planning, anticipate deviations, and automate operations that currently require constant oversight.

We're already moving in this direction—integrating data from different departments to build a more holistic view of our production. This will allow us to deploy AI algorithms that learn from real plant behaviour and support improvements in quality, energy management, and continuous optimisation.

AI is not here to replace our expertise, but to amplify it.

José Antonio García de Vicuña / Agme

AI holds great potential to enhance efficiency, quality, and sustainability in industrial processes. At Agme, we are assessing its practical application in areas such as predictive maintenance, quality control improvements, and dynamic adjustment of assembly parameters.

Although we are still in an early stage—focused on learning and analysis—we believe that proper AI implementation can optimise decision-making and reduce errors. That's why we're working to identify realistic, safe applications that deliver value in both standard and custom machinery.

As an industrial SME, we favour a gradual integration approach, ensuring that every advancement translates into tangible benefits for our customers and continuous improvement of our assembly and forming solutions.

Jose Marí Ramos / ONA Electroerosión

ONA has long been working on product-oriented AI. We've applied deep learning techniques to process and machine data to create models for complex systems where traditional engineering models don't exist.

Recently, we developed a new SEDM expert system technology for impeller applications (centrifugal compressors), successfully tested with a benchmark customer in the energy sector.

As for generative AI—so widely discussed nowadays—we're analysing its implications for regulatory compliance and certification processes.

> Given the breakneck pace of technological change, is business collaboration in R&D being leveraged as a key lever to tackle future challenges?

Arrate Olaiz / Ibarmia

Ibarmia collaborates on nearly all its R&D projects, building a development ecosystem that includes companies, technology centres, and universities.

The profile of participating companies has evolved over the years toward greater diversity in both technologies

and types of organisations. Software startups are increasingly joining R&D projects, accelerating technological progress, while we also maintain strong ties with other machine tool manufacturers, suppliers, and clients.

Although to a lesser extent, our collaboration also extends internationally—an area we aim to strengthen as part of our future R&D activity.

Oier Elguezabal / Soralue

Absolutely. At Soralue, we strongly believe in business collaboration as a vital lever to face future challenges. We actively participate in European consortia, industrial clusters, and public-private platforms.

Through our R&D department and technology centre, we develop joint projects in digitalisation, automation, artificial intelligence, and new materials. These alliances accelerate innovation, foster knowledge exchange, and enable coordinated responses to the challenges of an increasingly digital, sustainable, and global industry.

Javier Arenas / Fagor Automation

Now more than ever, business collaboration in R&D is essential to keeping pace with rapid technological evolution. In our case, we embrace open innovation, relying on a strong network of partnerships with technology centres, universities, startups, and like-minded companies.

These collaborations allow us to combine capabilities, speed up developments, and tackle complex challenges that would be much harder to address alone. Thanks to these ecosystems, we're shaping stronger, market-

ready technological solutions. In such a dynamic environment, where so many technologies impact our products, cooperation is a true lever for faster, more meaningful progress.

José Antonio García de Vicuña / Agme

Business collaboration in R&D is a powerful tool for developing valuable technological solutions. At Agme, we aim to form partnerships with tech companies and advanced component suppliers, allowing us to create more complete, integrated, and efficient solutions.

While long-term collaboration with technology centres can be challenging for SMEs like ours, we remain alert to viable opportunities.

Our greatest strength lies in our in-house technological capabilities and agility to meet customer needs. Our entire value chain is geared toward developing tailor-made solutions, with in-house engineering and a continuous improvement mindset. This practical R&D approach, supported by strategic partnerships, enables us to face future challenges with confidence and deliver competitiveness to our clients.

Jose Mari Ramos / ONA Electroerosión

Absolutely. ONA is a clear example of commitment to open innovation and collaborative projects with sector peers. Our key advantage is that we're not competitors to anyone locally or nationally—and arguably not even within the EU.

We actively participate in all editions of the Bind 4.0 SME programme, and we are founding members of the CFAA, among others.

JOSE MARÍA RAMOS

Tech & Turbo Machinery Director, ONA



"WE FIRMLY BELIEVE IN OPEN INNOVATION"





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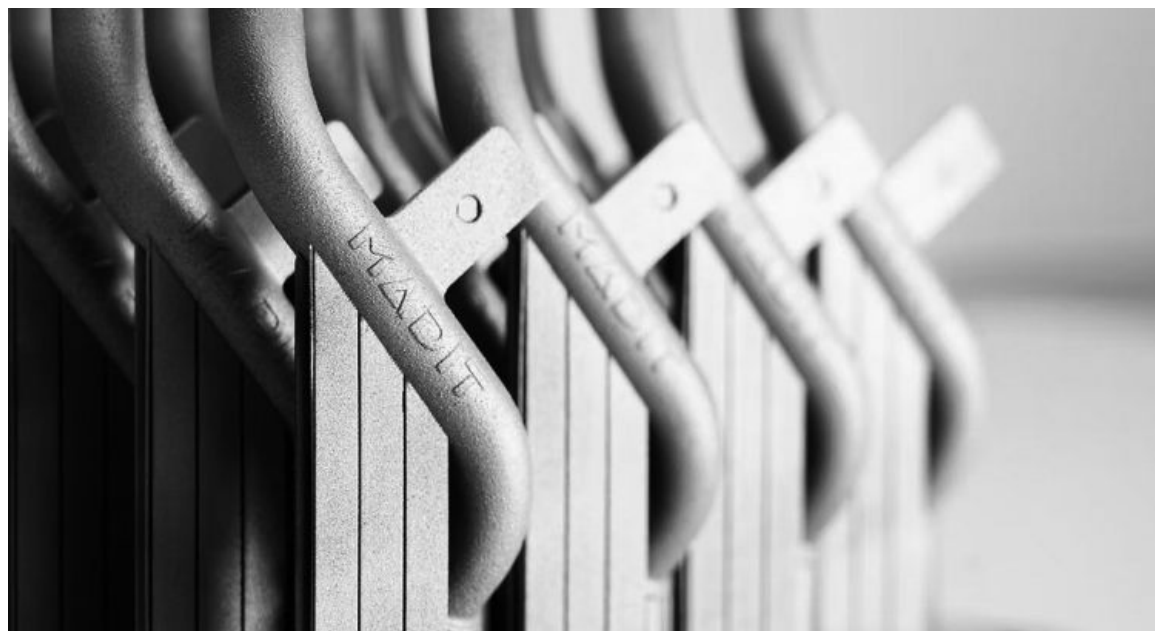
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SURVEY | ADDITIVE MANUFACTURING

MORE THAN A SIDE PRINT

EXECUTIVES FROM MADIT, MAUSA, INDUS3D, SAMYLABS, AND ADDIMEN HIGHLIGHT THE TRANSFORMATIVE POTENTIAL OF ADDITIVE MANUFACTURING ACROSS DESIGN, DEVELOPMENT, AND PRODUCTION PHASES, OPENING UP A NEW WORLD OF POSSIBILITIES



Additive manufacturing is reshaping industrial production. Far from being just a complementary technology, it stands as a transformative tool in design, development, and part manufacturing, according to experts from Madit, Mause, Indus3D, Samylabs, and Addimen. However, despite its growing presence in companies, large-scale adoption still faces technical, economic, and cultural hurdles.

> Additive manufacturing is gaining ground as a complementary technology to conventional processes. How is it reshaping future production?

Asier Domínguez / Madit

Additive manufacturing is already a reality that's improving industrial production because it fills a gap previously underserved or prohibitively costly and time-consuming. This method allows companies to produce single units or small-to-medium batches very quickly, without requiring initial investment. That greatly accelerates the launch of new products and projects.

It also enables complex designs that improve functionality, opening new possibilities in systems and products offered by companies.

Jaime Herrero / Mause 3D

Additive manufacturing is doing more than complementing traditional methods—it's transforming the way we think about design, development, and production. At Mause, we see it daily: where subtractive processes once limited us, we now design freely, create complex geometries, optimize structures, and reduce weight without sacrificing functionality.

This technology introduces a new mindset, on-demand production with less waste. It directly impacts sustainability and supply chain agility. We're no longer talking about mass production, but about mass customization, shorter development cycles, and better products.

In short, additive manufacturing allows industry to be more adaptive, more sustainable, and more customer-focused.

ASIER DOMÍNGUEZ

Project Manager,
Maudit



"AM CAN BRING MUCH MORE TO INDUSTRY"

Adriana Cob / Indus3D

Where parts used to be optimized for the manufacturing process, additive manufacturing now allows for function-driven optimization; lighter, more efficient, and more sustainable. It shortens development cycles and accelerates time to market. It also enables on-demand production closer to the point of consumption. Many industries already view it as a strategic technology.

Jon Martínez / Samylabs

Additive manufacturing is redefining industrial production, not by replacing conventional methods, but by strategically complementing them in design, supply chain, and plant operations. From a design perspective, it removes constraints and allows the creation of high-value parts with impossible geometries (lattices, internal channels, organic topologies), reducing weight by 30–60% and enhancing thermal dissipation or achieving mechanical properties that machining can't reach.

It enables ultra-fast iteration: going from concept to functional part in hours rather than weeks, accelerating time to market and driving continuous innovation. Costs become volume-independent, and every part can be unique without affecting productivity. On the supply chain side, it allows for virtual inventories—critical parts stored as files and printed on demand—eliminating stock and obsolescence.

Additive manufacturing enables distributed production, reduces transport and carbon footprint, and provides local independence during geopolitical tension or supplier shutdowns.

It's shifting from a "prototype board" to a strategic pillar of agile, distributed, and sustainable production. It's not about choosing between lathe or printer, but orchestrating both—printing where it adds unique value, machining where precision remains unrivaled. This hybrid vision—combining generative design, real-time process control, and digital supply chains—will likely lead the next industrial decade.

María Rodríguez / Addimen

Additive manufacturing, or 3D printing, is reshaping production not just as a complementary tool, but as a transformative force across most industrial sectors. Some of its major impacts include: mass customization, waste reduction, rapid prototyping and agile design, complex and innovative geometries, and energy-efficient sustainability.

The combination of less waste, reduced transport needs, and optimized design makes it a greener technology.

> Is the industry harnessing the full potential of additive manufacturing in its production processes?

Asier Domínguez / Madit

Additive technology is increasingly being implemented in companies, but there's still a long road ahead. Today, there are major firms that do not use these technologies or are only just beginning to adopt them—especially in Spain (other European countries are further along).

That means there's still significant growth potential for 3D printing in Spanish industry.

Jaime Herrero / Mause 3D

While key sectors like industrial manufacturing, automotive, robotics and healthcare are already seeing positive results, large-scale implementation is still relatively new. Many companies are beginning to use additive manufacturing primarily for prototyping or to solve very specific problems, but deeper integration into production strategies is still lacking.

And its potential is enormous: we can redesign parts from scratch, create more efficient structures, and even integrate multiple components into a single part... But to achieve this, we need more knowledge, more training, and sometimes a new industrial mindset.

The technology is already ready for many applications, but the transformation is not only technical — it's also organizational and cultural.

Adriana Cob / Indus3D

We're not yet tapping into its full potential, though interest is growing year by year. Many companies use it mainly for prototyping or tooling, but it could become fully integrated into their value chains. There's enormous room to grow in functional applications, short runs and customization — but that requires a learning curve, investment, and changes in both mindset and design practices.

Jon Martínez / Samylabs

No, not at all — especially not in Spain. Other countries are well ahead of us in this field and even they are only just getting started.

Today, some applications have reached maturity (especially outside the industrial sphere — for example, in dentistry), but the true potential of additive manufacturing remains largely untapped.

In many cases, the bottleneck is no longer the machine or the technology, but our ability to imagine parts that

JAIME HERRERO

Head of 3D Materials and Technologies, Mause 3D



“ONE OF THE CHALLENGES IS TO CHANGE THE MINDSET”

MARÍA RODRÍGUEZ

Sales and Marketing Manager, Addimen



“INDUSTRY IS NOT YET EXPLOITING ITS FULL POTENTIAL”

break away from traditional machining logic and justify a new way of manufacturing.

This is a niche technology, and we've realized that many engineers still hesitate about where to apply it.

At Samylabs, we've developed a four-question express questionnaire to quickly determine whether a part makes sense for this technology. We ask about size, material, number of manufacturing steps in the traditional process, and the quantity needed.

Ideally, the more the part resembles a coin-sized item, made from a hard material, requiring several machining operations, and with a production volume of one to 10,000 units — the more likely LPBF is the right technology.

Our SamyStudio software then provides a cost estimate for each part and helps validate the success case.

María Rodríguez / Addimen

I personally believe the industry is not yet taking full advantage of additive manufacturing's potential. While more companies are turning to this technology, barriers and limitations still prevent many others from benefiting.

Since I focus on acquiring new clients, I've noticed growing awareness of what additive manufacturing is. However, resistance remains—especially among companies that rely on traditional manufacturing methods, which are hard to displace.

> Which sectors are embracing additive manufacturing? How much room for growth remains?

Asier Domínguez / Madit

The earliest adopters were advanced engineering sectors like aerospace. But today, virtually any sector can use additive manufacturing to improve production.

That said, we're still in the early-adopter phase, and the technology has much more to offer the industrial world. Some sectors are further along in implementation, while others haven't yet uncovered all the useful applications.

Jaime Herrero / Mause 3D

The sectors leading adoption are those requiring high levels of innovation, complex parts, customization, and weight or geometry optimization. These include industrial manufacturing, automotive, renewable energy, robotics, rail, and healthcare.

It's also gaining traction in consumer goods, fashion, and architecture, where design is a key differentiator.

Still, there's a long way to go. In many industries, it's still viewed as a niche or supplementary technology—not a core part of the production process.

We need companies to understand that it's not just about printing parts — it's about rethinking how we design, manufacture, and deliver value.

At Mause, we work to show customers that potential and help them take the leap.

Adriana Cob / Indus3D

Virtually every industrial sector has adopted additive manufacturing in some form. Sectors like healthcare and the arts are also showing growing demand.

There's still room for improvement in standardizing processes, enhancing materials and reducing costs — but the direction is clear.

Jon Martínez / Samylabs

Industrially speaking, the automotive sector currently invests more than 6 billion per year in additive manufacturing, mostly for prototyping. Premium automotive brands and electric mobility are the main drivers of growing demand.

Rail and maritime sectors are also increasingly active, but if I had to name one area seeing rapid growth—especially in today's geopolitical context—it would be critical sectors like energy, oil & gas, aerospace and defense.

That said, there's still plenty of room for growth in every sector, including general industrial applications for consumer goods.

I'm convinced that the next big revolution will come through generative design and AI.

It's estimated that by 2027 we'll see true “innovative intelligence” — AI that begins designing for us. When it does, it will do so in surprising ways, with highly efficient, resilient generative topologies that, in many cases, can only be manufactured using AM technologies.

At Samylabs, we believe this inflection point could trigger a massive rise in demand, and we're working hard to be ready if that surge materializes.

María Rodríguez / Addimen

Sectors actively investing in additive manufacturing include aerospace, healthcare, automotive, and defense. 3D printing is already a reality in industries where customization, weight reduction, or complex geometries are crucial.

That said, there's still ground to cover, as large-scale adoption faces technical, economic, and cultural challenges.

SURVEY | ADDITIVE MANUFACTURING

(comes from page 33)

I believe we'll see a deeper transformation in the coming years, thanks to the pace of innovation — especially as this technology merges with others, such as artificial intelligence.

► **What are the main challenges additive manufacturing faces for broader implementation in industry?**

Asier Domínguez / Madit

The first challenge is increasing trust in the quality of the manufactured parts. In many cases, it's necessary to produce test parts or perform trials to convince the client that the parts have the required strength. Fortunately, these tests are usually successful, and clients overcome this initial barrier.

Another major challenge is the cost of production. Only by achieving proper industrialization and process control can acceptable and competitive costs be reached.

Jaime Herrero / Mause 3D

I believe one of the biggest challenges is changing the mindset. The technology is already here, and it's becoming increasingly reliable and accessible, but many companies still think in terms of traditional manufacturing. It's difficult to take that step toward seeing additive manufacturing not just as a prototyping tool, but as a viable option for serial production or for manufacturing functional parts.

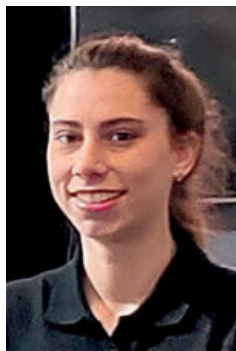
There are also technical challenges, of course: sometimes we face limitations with materials, print times, standards validation, repeatability... But little by little, we're overcoming many of these barriers thanks to advances in software, hybrid processes, and new developments.

And of course, training is a key aspect. It's not enough to have basic skills in using 3D printers; it's essential to know how to design specifically for this technology, to understand the associated costs, to know the real applications, and to understand how to integrate additive manufacturing into existing production processes. If companies don't develop this knowledge internally, implementation will remain limited to isolated projects.

In short, the challenges are more human and strategic than purely technological. And that's where we have a great opportunity: to train, to showcase success stories, and to support companies so that additive manufacturing can reach its full potential.

ADRIANA COB

Chief Operating Office,
Indus3D



"IN MANY SECTORS IT IS ALREADY PERCEIVED AS STRATEGIC"

JON MARTÍNEZ

Founding partner and
CEO, Samylabs



"THERE IS NO NEED TO CHOOSE BETWEEN LATHE AND PRINTER"

Adriana Cob / Indus3D

The main challenges are process repeatability, quality control, part certification, and specialized training. There are still barriers in terms of equipment costs, production speed, and post-processing.

Digital integration with other production systems is key to enabling industrial adoption. Moreover, shifting from traditional design thinking to design for additive manufacturing is an essential step.

Jon Martínez / Samylabs

First of all, the price needs to come down. There needs to be a reduction in the cost of LPBF equipment, as well as greater production capacity of the systems and the emergence of new applications. The entry of Asian equipment into the market and the rise of new companies is reducing the technology's cost, thereby making it more accessible for companies. But as I mentioned earlier, the problem sometimes is simply that a productive method using additive manufacturing hasn't yet been identified for a given component. More and more applications need to be discovered.

Another important point is powdered material, its price, and its environmental impact. For example, the price of Ni and Ti alloys has risen by 12 percent, and there is an increasing urgency to recycle and qualify powder. This is an excellent opportunity for the circular economy.

At Samylabs, we recently participated in a CDTI Misiones program for this purpose. I can tell you that clients who demonstrate a reuse rate above 80% are already receiving tax incentives in several EU countries.

María Rodríguez / Addimen

The challenges additive manufacturing faces today, in my view, cover technical, economic, regulatory, and cultural aspects. It's a rapidly evolving technology, but in order to achieve more effective adoption, it must overcome challenges related to speed, cost, standardization, and design mindset. As these issues are addressed, additive manufacturing will be better positioned to transform industrial processes.

► **Can additive manufacturing become profitable for large-scale production?**

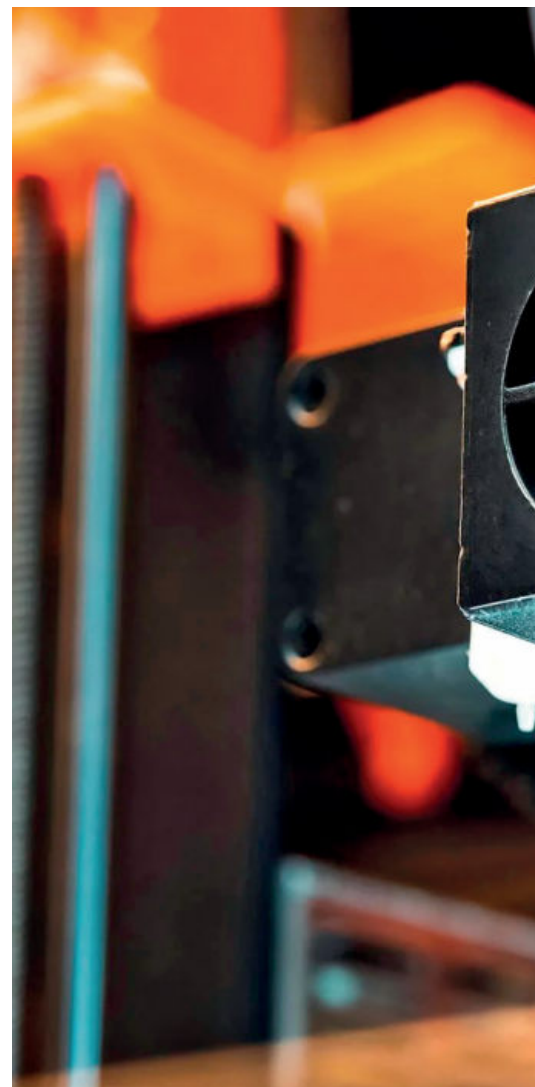
Asier Domínguez / Madit

Additive manufacturing enables the development of highly complex parts that enhance functionality. These kinds of parts can only be manufactured using this technology, which means they can easily evolve into large-scale production projects.

Moreover, 3D printing machines are becoming more productive each year, improving both manufacturing times and costs and making large-scale projects increasingly viable.

Jaime Herrero / Mause 3D

It really depends on the type of product and the approach. Today, if we're talking about large volumes of standardized parts, it's true that traditional pro-



cesses like injection molding or mass machining are still more cost-competitive. But that's not where additive manufacturing shines.

Additive manufacturing is becoming highly profitable at another level: customized production, short or medium runs, parts with complex or hard-to-machine geometries, or even distributed manufacturing close to the point of consumption. In those cases, additive manufacturing helps reduce hidden costs like storage, transportation, or failures caused by overengineered components.

In addition, advances in automation, faster printing, and new materials are

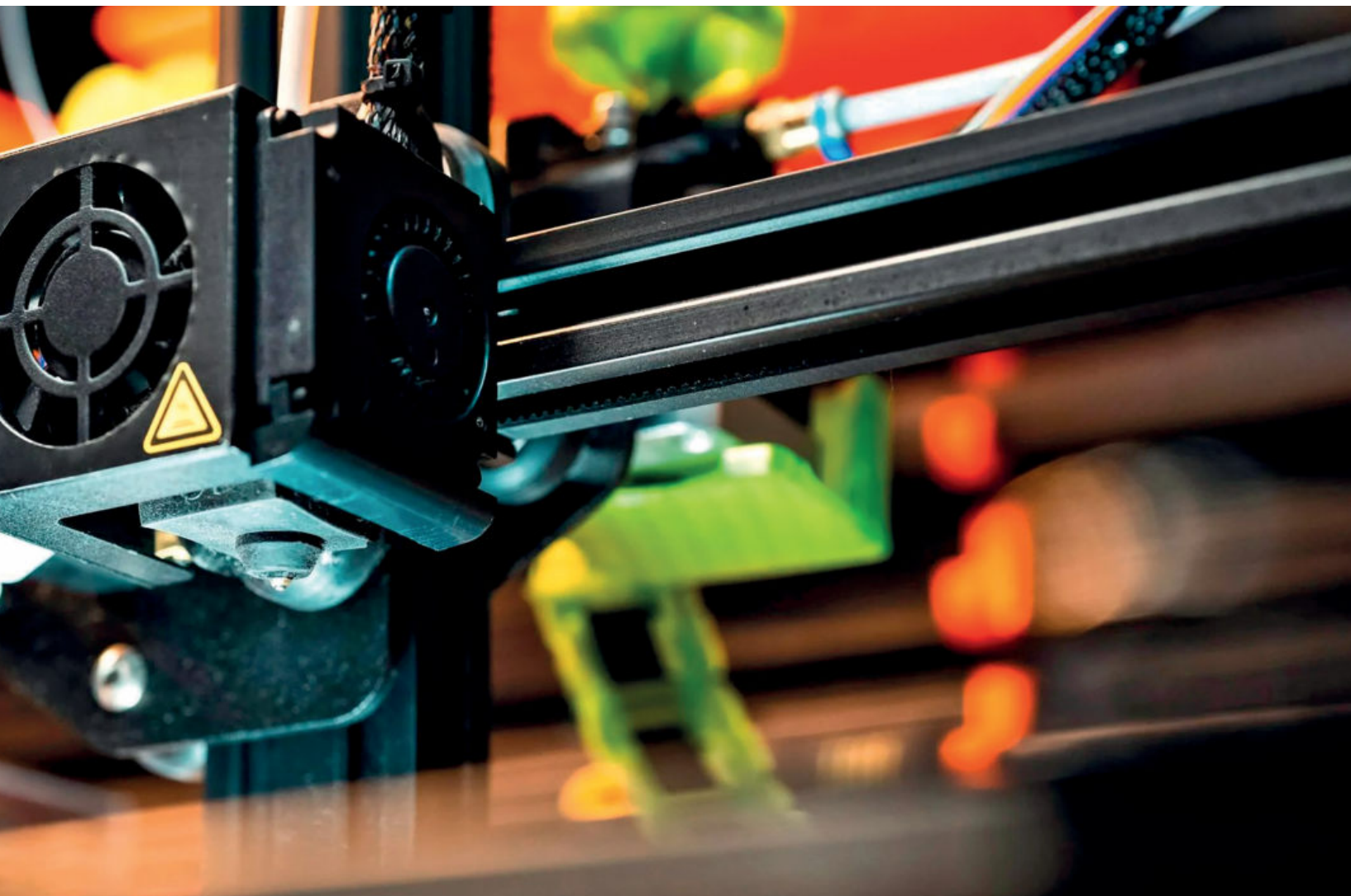
closing the gap with traditional manufacturing. It's not about fully replacing current processes, but about offering an innovative production model that is already competitive in many scenarios.

Adriana Cob / Indus3D

Today, it's mainly profitable for high-value-added parts, complex geometries, or customized production. For large volumes and standard parts, con-

tems with 12 or even 32 lasers and removable build cylinders already deliver productivity rates 10–20 times higher than conventional LPBF. But for medium-to-long runs, technologies like Binder Jetting or Multi Jet Fusion are more commonly used.

Of course, a breakthrough could arrive tomorrow and change everything—that's the magic of progress.



ventional manufacturing is still more competitive. However, workflow automation, better materials, and falling costs are paving the way for greater scalability. In certain niches, it's already a viable option.

Jon Martínez / Samylabs

Yes, it probably will be in time. But right now, with existing technology, scaling to long production runs—over 50,000 units—requires a major reduction in cost per cm³ and machines with far higher productivity and reliability than current systems offer.

We expect to reach that goal around 2027. For now, multi-laser LPBF sys-

María Rodríguez / Addimen

Personally, I believe additive manufacturing can become profitable for large-scale production, but not in all cases or for all products.

Its profitability depends on technical, economic, and strategic factors. While it's currently more oriented toward low-volume, high-complexity production, current advances are paving the way toward scalability.

TECHNOLOGY | ARTIFICIAL INTELLIGENCE

FACTORY GETS A BRAIN

TECNALIA BACKS THE 'FACTORIA' PROJECT TO ENABLE AUTONOMOUS MANUFACTURING AND REPAIR SYSTEMS POWERED BY AI

The manufacturing industry is undergoing a profound transformation. While automation has long been key to improving efficiency and reducing costs, the next big leap is full autonomy. That's the challenge taken up by the FactorIA project, which offers a disruptive proposal: to develop AI-based technologies that enable manufacturing and repair systems to operate autonomously—without human intervention—even in complex environments and with large, high-value components.

Inspired by the concept of "lights-out factories"—facilities that can operate without lighting or personnel—FactorIA seeks to create a production ecosystem where machines not only perform tasks, but also interpret data, make decisions, and adapt in real time.

The technological center Tecnia will tackle the autonomy challenge with a comprehensive approach, having been entrusted with this task by Tecs, the lead company in the FactorIA consortium, which also includes Ibarmia, Lebario, Murueta, DGH, Innerspec, Sothis, Keyland, as well as the universities UPV/EHU, Tecnun, UPNA, and the CSIC.

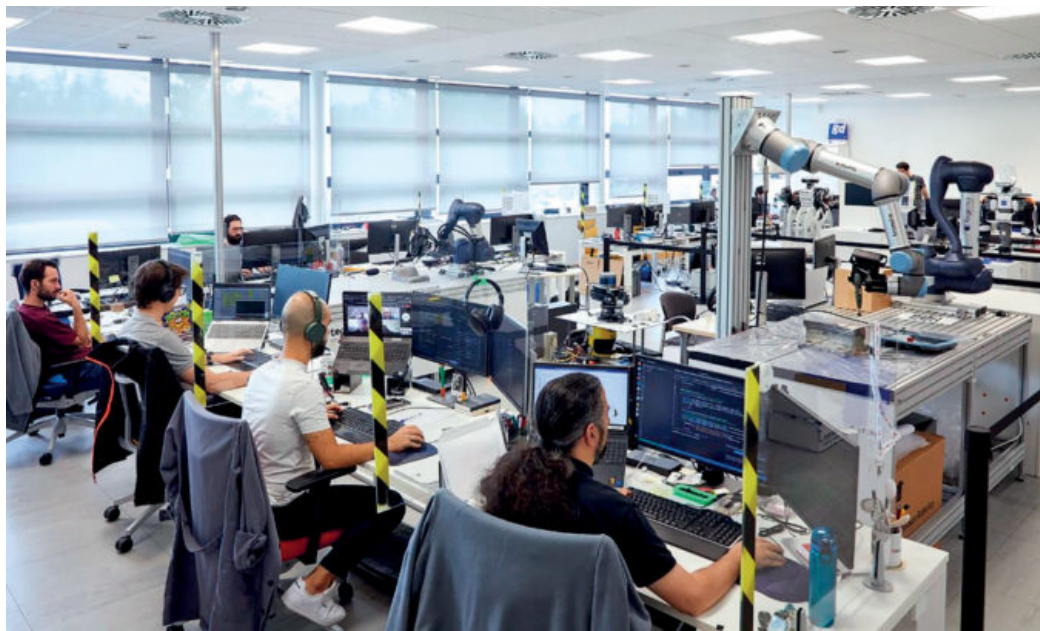
Tecnia contributes its experience and previous developments in autonomous advanced manufacturing systems to the consortium, including te-

chnologies such as robotic welding, directed energy deposition (DED), and intelligent machining. Its primary objective is to help increase the level of autonomy in production processes, in line with the project's ambition to create highly reconfigurable, adaptive, and self-managed factories. To this end, it is providing its mini-factory facilities as a pilot demonstration site. The site integrates

trial IoT and advanced sensors, edge and cloud computing, digital twins and multiphysics simulation, AI and machine learning for adaptive control, and autonomous non-destructive testing (NDT). These technologies are woven together by a central concept: the Digital Thread, which links every stage of the production process—from design to final inspection—enabling complete traceability and autonomous decision-making.

The project is part of the 'Science and Innovation Missions – TransMisiones 2024' program, and it addresses major challenges laid out in the Spain 2050 strategy: increasing industrial productivity and advancing toward a carbon-neutral economy.

Sustainability is also a key goal, with targets to reduce material usage by 20%, cut CO emissions by 15%, minimize waste and defects, and extend component life cycles.



Tecnia brings its experience in autonomous advanced manufacturing systems to the project.

autonomous control solutions, real-time monitoring, and adaptive planning algorithms to validate new developments.

The Digital Thread

FactorIA stands out for its holistic and collaborative approach, bringing together leading industrial companies with universities and research centers. Its innovative edge lies in the integration of a wide range of technologies: indus-

FIDELIA SCALES UP SMART MANUFACTURING

Smart manufacturing is set to scale up through new waves of innovation driven by Tecnia under the Fidelia project. This ecosystem is designed to promote the diffusion of advanced technologies and the development of R&D&I projects in robotics and artificial intelligence.

Led by Tecnia, Fidelia is powered by Spain's top Cervera technology centers: Tecnia (ecosystem coordinator), Tekniker, and Eurecat, working alongside the AFM Cluster, Grupo Oesía, the Instituto Ricardo Valle de Innovación – InnovalRV Foundation, and IMH Campus. These organizations form part of Spain's broader manufacturing sector, which—as explained by Ane Irazustabarrena, Director of Industry and Mobility Technologies at Tecnia—stands out for its diversity, export capacity, and high productivity. The ecosystem aims to rebalance disparities by fostering an inclusive innovation environment that stimulates technological development and brings together key players in smart ma-

WILL PROMOTE R&D PROJECTS IN ROBOTICS AND AI

nufacturing, deep learning, and AI at local, regional, and national levels.

The initiative builds on the momentum of previous Cervera 5R

and AI4ES projects.

Fidelia is structured around three main lines of action. The first, led by Tecnia, focuses on identifying, coordinating, and encouraging collaboration among ecosystem players, while also offering specialized, value-added services to companies and users. The second, coordinated by AFM, is geared toward commercializing and expanding the ecosystem by attracting new players and building a robust network. Finally, Eurecat is responsible for strengthening the ecosystem's capabilities to promote innovative projects.

TECHNOLOGY | MATERIALS

GAIKER POWERS UP SUSTAINABLE MANUFACTURING

WORKING ON A SMART AND AUTOMATED MANUFACTURING SOLUTION FOR LARGE-SCALE COMPONENTS IN MARINE RENEWABLES

Gaiker is set to redefine the manufacturing of tidal turbine blades as part of the Emles project consortium. The initiative is focused on cutting-edge technologies for the smart, automated manufacturing of large composite components for the marine renewable energy sector. This challenge involves the development of new sustainable composite materials, the advancement of automated

and sensor-integrated manufacturing processes, and the creation of new structural modeling techniques.

Research efforts will focus on designing, developing, and evaluating highly recyclable sustainable composites to produce lighter, more durable, and efficient blades for tidal generation systems, helping reduce their overall carbon footprint.

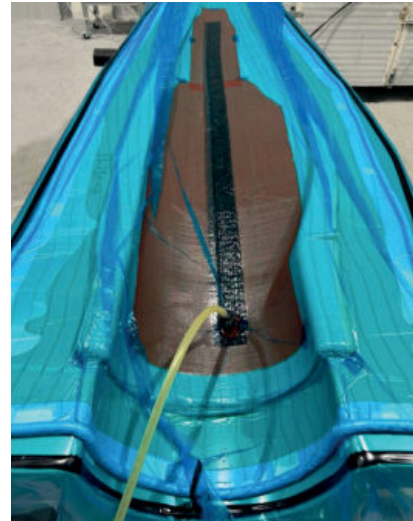
Another key objective is to

establish a fully automated resin infusion process that ensures consistent, reproducible quality while reducing production time and costs.

In these work streams, Gaiker provides technological support to the consortium, which includes partners TSI, Inpre Composites, and Cramix.

The company is involved in defining technical requirements, materials, infusion processes, and monitoring, control, and automation technologies.

This project aims to address three major challenges in tidal blade manufacturing: developing sustainable blades that generate more energy, enhancing repeatability and quality in blade production while lowering costs, and reducing the carbon footprint by using recyclable composite materials.



Gaiker will provide technical support for the Emles project.

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IDEKO

TECHNOLOGY | ARTIFICIAL INTELLIGENCE

RESILIENT BY DESIGN

IDEKO JOINS THE FLEX4RES PROJECT TO BOOST EUROPE'S MANUFACTURING RESILIENCE AGAINST DISRUPTIVE EVENTS

Unpredictable and adverse events—such as pandemics, financial crises, or cyberattacks—underscore the need for greater resilience in supply chains. The challenge lies in the fact that industry lacks a specific methodology to verify the robustness of its systems when decisions need to be made about reconfiguring production planning.

To address this, the European project Flex4Res will develop a set of tools to assess resilience and help manufacturers make smarter, data-driven decisions.

Ideko has joined this initiative, which aims to deliver an open platform to swiftly and efficiently reconfigure supply chains and production systems, thus enhancing the resilience of

European manufacturing in the face of disruptions. The goal is to enable data-driven decision-making using resilience assessment tools integrated at different levels of industrial pro-

LEADS A HIGH-PRECISION MACHINING USE CASE TO ENHANCE PRODUCTION PLANNING

cesses—from individual machines to production lines and full value chains.

To anticipate problems, optimize machine and process performance, and improve produc-

tion planning, the project explores AI-based systems for monitoring, diagnostics, and predictive maintenance. It also supports the creation of secure and sovereign data spaces to promote interoperability and voluntary information exchange among supply chain actors.

Ideko leads the use case focused on high-precision machining, in partnership with Goimek, Soraluce, Savvy Data Systems, and the Mondragon Corporation. The challenge: to optimize production planning using real-time data.

High-precision machining

Specifically, Ideko and Goimek are developing a real-time planning system capable of proposing reconfiguration strategies when deadline risks arise.

The system will incorporate predictive maintenance and digital twin technologies.

Together with other partners, Ideko is also working on AI-based monitoring and diagnostics solutions to improve machine and process efficiency, while advancing the development of sovereign, secure data spaces to enable voluntary data sharing across the production chain.

The project will validate its solutions in four industrial use cases, covering multiple levels—from individual devices to entire value chains.

These solutions are primarily aimed at the advanced manufacturing and machine tool sectors, but offer potential for transfer to other manufacturing industries.

Digital Grinding Innovation Hub, located at Ideko.

TECHNOLOGY | GENERATIVE AI

TEKNIKER GIVES AI A HARD HAT

DEVELOPS NEW AUTOMATIC INSPECTION TOOLS TO AUTOMATE SURFACE DEFECT DETECTION IN INDUSTRIAL PARTS IN THE IKUN PROJECT

Adopting AI models like GPT-4, DALL-E, or LLaMA in industrial settings faces major hurdles: data scarcity, real-world deployment challenges, and strict reliability requirements. In response, Tekniker is taking part in the Ikun project to address these barriers and explore how multimodal large language models (LLMs) can transform manufacturing into a smarter, more connected, and autonomous environment.

Led by Vicomtech and funded by the Basque Government's Elkartek program, Ikun aims to test new technologies, generate high-quality synthetic images of defects and industrial time series, and design intelligent conversa-

try standards for accuracy and quality. This will be complemented by the development of natural language question-answering systems, enabling human interaction and real-time feedback integration for continuous learning and real-world model adaptation.

Researcher Cristina Aceta explains: "Synthetic image generation simulating visual defects allows us to enrich training datasets without relying on real samples. And the ability to interact with industrial systems using natural language enables operators to check production status, generate reports, or issue commands using just voice or text—without navigating complex menus or needing technical knowledge.



Tekniker researcher.

tional assistants capable of interacting with operators via text, voice, and image.

It also seeks to develop and validate prototypes with high transfer potential to the local industrial ecosystem.

Tekniker's role focuses on combining generative models and deep learning techniques to build a visual inspection system for automatically detecting surface defects like cracks, scratches, or imperfections in industrial images.

The center will also generate synthetic images and anomalous data to expand training datasets and meet indus-



Ceit plays a key role in optimizing AM processes.

TECHNOLOGY | ADDITIVE MANUFACTURING

CEIT BREAKS THE MOLD IN METAL AM

AIMS TO OPTIMIZE METAL ADDITIVE MANUFACTURING FOR IMPROVED QUALITY AND SUSTAINABILITY

Ceit is working to overcome the limitations of metal additive manufacturing (AM) as part of the Madison project, which aims to improve production processes through advanced simulations and the development of new industrial-grade alloys.

In collaboration with technology centers Lortek, Aidimme, and Catec, the project focuses on improving materials such as titanium alloys (Ti64), copper, aluminum alloys, steel, and nickel-based superalloys. To achieve this, the team employs advanced simulations and high-precision additive technologies and post-processing techniques to enhance material performance under extreme conditions.

Drawing on its expertise in process simulation and materials optimization, Ceit is responsible for microstructural modeling of

materials like copper and nickel superalloys. Using thermodynamic simulations and experimental testing, the team optimizes manufacturing parameters to improve material behavior in demanding environments.

Ceit is also contributing to the atomization process modeling, analyzing which operational variables have the greatest impact on the properties of atomized powder.

The center is also modifying atomization units to improve their performance for additive manufacturing applications.

Among its most notable achievements is the successful atomization of GRCop-42 powder, a high thermal conductivity copper alloy originally developed by NASA. The material has been processed using Laser Powder Bed Fusion (PBF-L).

GUGGENHEIM BILBAO

BARBARA KRUGER

ANOTHER DAY

ANOTHER NIGHT

06/24 - 11/09

 **Occident**