TECNA SOE1/P1/E184

# Identification of Industrial Needs of SUDOE Region

## Online Survey Results



# Identification of Industrial Needs of SUDOE Region

Carlos Nuno Veiga Barbosa

Pau Cortes

---

**TECNA associated members:**

Universidade do Minho

Instituto Tecnológico de Aragón

Universidad de Zaragoza

Université de Pau et des Pays de l'Adour

Ecole Nationale d'Ingénieurs de Tarbes

## EXECUTIVE SUMMARY

The objective of this survey is to identify and quantify the industrial needs of the European Southwest (SUDOE) in terms of advanced materials – polymeric systems – for new applications in machinery and mechanical systems industries. An intended outcome of the survey is to inform education institutions about the gaps and latent needs related to the nano- technology/materials and get industrial companies involved in the emergent nanofield.

More than 450 companies from SUDOE region [North of Portugal, North of Spain (Aragon) and South of France (Aquitaine and Midi-Pyrénées] related to the industries of plastics and mould manufacturing, as well as machinery/equipments and metallurgy were invited to participate in the Interreg IV B TECNA project. This project is part of the Territorial Cooperation Program of SUDOE which supports the regional development through the co-financing of transnational projects by the European Regional Development Fund, *ERDF*.

An online survey was proposed by the following associated partners: Technological and Nanoscience Institutes of Aragon, from Spain; National School of Engineers of Tarbes and University of Pau and countries of l'Adour, from France; as well as University of Minho, from Portugal.

A majority of respondents are plastic manufacturing companies involved in automotive industry that use injection moulding as preferred plastic processing technique. These companies employ less than 50 workers (small companies) and have an annual turnover of less than 50 million € generated on national and international markets.

The mechanical resistance and cost seem to be the most important requirements of the products for the companies. The biggest part of the queried companies does not have knowledge in the nanofield and have no idea that just a small amount (≈ 2 wt %) of nanomaterials can improve a wide range of polymers' properties. In a meanwhile, almost 90 % of the respondents think there is a need of new material properties. In this way, the nano- technology/materials have a great growth potentially and improve the competitiveness of these companies.

One aim of the TECNA project is to demonstrate the possibilities of nanomaterials for industries, particularly to the SMEs related to the mechanical systems and machinery sector. In that way, the results of the survey show that companies are quite interested in participating in nanotechnology-based projects. The survey also indicates that companies are motivated and interested to learn and work with nanomaterials. Hence, the results of TECNA pilot-projects will be shared and explained to these companies by means of workshops and seminars organised in each TECNA member region.

## TABLE OF CONTENTS

# LIST OF FIGURES

# 1. INTRODUCTION

The rapid development of nanotechnology is often considered as a fundamental revolution in technology and compared with the discovery of antibiotics or computer technologies. Nanotechnology generates great opportunities, not only for science and research but also for industrial production and potentially in the everyday life of individuals.

New discoveries, inventions and innovations on a nanoscale will form the basis of sweeping technological change in the 21st century. The basis of this change will be education and training of a generation of scientists, technologists, engineers, entrepreneurs, policy makers, regulators and communicators, in the constantly evolving field of nanoscience and nanotechnology.

The objectives of TECNA project are: initially, by means of an online questionnaire, to identify and quantify the industrial needs of SUDOE [Portugal (North), Spain (Aragon) and France (Aquitaine and Midi-Pyrénées)] in terms of advanced polymeric systems for the application of new components in the machinery and mechanical systems industries; lastly, demonstrate through a pilot-project, to companies in general and particularly to the SMEs related to the mechanical systems and machinery sector, the possibilities that nanomaterials can bring to these industries.

The results of the online survey provide an analytical overview and will be presented as a keynote in internal TECNA workshops (note: can also be published in a European workshop on the field of nanotechnology). These events will be organised by each associated partner and the companies that showed interest in participating will be invited to get to know the results of the pilot-project as well as the overall results of the online survey.

The survey takes into account views of companies related to the industries of plastics and mould manufacturing, as well as machinery/equipments and metallurgy. The range of responses includes large, medium, and small sized organisations across all applicable industry sectors within SUDOE area. This report provides a summary of quantitative results obtained from the survey which intents to characterise the industrial structure in terms of nanofield skills and knowledge, and their motivation in working in this emergent and potential technological field.

The analysis of the survey data is first of all made individually by countries (Portugal, Spain and France) and then a global overview (SUDOE region) is performed. The survey is structured into three main categories: organisational details (name, address, etc.), company's characterisation (activities, number of employees, volume sales, etc.) and innovation activities (nano- technology/materials knowledge, motivation to work with it, etc.).

## 2. SCOPE

The aim of this report is to identifying and quantifying the industrial needs of SUDOE (Spain, South of France and North of Portugal) industries in terms of advanced materials for new components of mechanical systems and machinery industries.

In order to determine these needs, a survey was created and sent/shared to potential companies as possible partners in TECNA project. According to the survey results, a database will be created. This data will assist to the technicians/researchers of TECNA project to define the new materials of the project in order to approach the companies' requirements.

## 3. SURVEY METHODOLOGY

The methodology adopted for the survey was a five step process to acquire the information and analyse it. The survey was written an available in four different languages (Spanish, Portuguese, French and English) to be easier for all.

1. Design – *QuestionPro* website (www.questionpro.com) is an intuitive wizard interface for creating survey questions, tools for distributing surveys via email or websites, and tools for analysing and viewing the results. It was chosen for its easiness of acquiring and analysing data, clarity of presentation and authenticity of responses.
2. Feedback – the developed questionnaire was circulated for feedback to associated members of TECNA project. Relevant changes were introduced based mainly on the feedback obtained from the experience of previous surveys of the Technology Transfer Department of ITA (Technological Institute of Aragon) and the knowledge of the industrial companies.
3. Circulation – the questionnaire was further circulated in SUDOE regions [North of Portugal, North of Spain (Aragon) and South of France (Aquitaine and Midi-Pyrénées] using emails. At first, emails with the *web survey link* were directly sent to specific organisations based in these regions. At last the circulation was made by sending the same *website survey link* to National Associations of Industries.
4. Qualitative information gathering – the information resulting from the responses was organised into open and closed question responses. The survey was structured by organisational details (contact data), company's general characterisation and innovation activities. *QuestionPro* website token care of collecting and recording all responses providing it in real time.
5. Analyses – the quantitative analysis of the questions was done to produce a range of bar and pie charts indicating the comparison and importance of the received responses. Files with the individual responses and names of all companies are attached.

# 4. INDUSTRIAL NEEDS SURVEY RESULTS

## 4.1 PORTUGAL

### 4.1.1 COMPANY'S GENERAL CHARACTERIZATION

The results of *Figure 1* are showing that the queried companies are mainly "involved" in automotive (≈ 26 %) and construction (≈ 22 %) industries. However, other potential industries, such as: sports goods and products for surface treatments were mentioned. In terms of plastic usage, the major part of the companies (≈ 23 %) answered plastic products manufacturing (see

*Figure 2*).

The Portuguese queried companies (≈ 75 %) employ mainly less than 50 workers and have an annual turnover less than 10 million € generated by even national and international sales (see *Figure 3-5*). In fact, more than 90 % of the companies employ less than 250 workers and have an annual turnover less than 50 million €.

*Figure 6* is showing that approximately 38 % of the companies are using injection moulding as preferred plastic processing technique. Some other techniques, such as: thermoforming and pultrusion are also used. In terms of material properties (see *Figure 7*), the major part of the Portuguese queried companies answered that the most important are cost and mechanical resistance. Although, some other properties, such as: impact and corrosion/abrasion resistance, as well as reciclability were also mentioned.

*Figure 1. Survey result for the question: Which is the main industrial area covered by the company's activity (Portugal)?*

| | |
|---|---|
| Aerospace | **0,00%** |
| Automotive | **26,09%** |
| Railway | **4,35%** |
| Packaging | **8,70%** |
| Construction | **21,74%** |
| Vertical transport | **0,00%** |
| Electronics | **8,70%** |
| More | **30,43%** |

*Figure 2. Survey result for the question: Which is, mainly, the use of plastic that the company does (Portugal)?*

| | |
|---|---|
| Plastics manufacturer | **22,73%** |
| Thermoplastics compounder | **13,64%** |
| Reinforced plastics compounder | **9,09%** |
| Plastics recycler | **9,09%** |
| None | **13,64%** |
| More | **31,82%** |

*Figure 3. Survey result for the question: How many workers does the company employ (Portugal)?*

| | |
|---|---|
| Less than 50 | **75,00%** |
| Between 50 and 250 | **18,75%** |
| Between 250 and 500 | **0,00%** |
| More than 500 | **6,25%** |

*Figure 4. Survey result for the question: Which is the volume business sale per year (Portugal)?*

| | |
|---|---|
| Less than 10M (euros) | **75,00%** |
| Between 10M and 50M (euros) | **12,50%** |
| Between 50M and 100M (euros) | **0,00%** |
| More than 100M (euros) | **12,50%** |

*Figure 5. Survey result for the question: Which is the most important geographical market(s) for the company( Portugal?*

| | |
|---|---|
| Local/Regional | **4,00%** |
| National | **48,00%** |
| International | **48,00%** |

*Figure 6. Survey result for the question: Which are the main plastic processing techniques (Portugal)?*

| | |
|---|---|
| Injection moulding | **38,10%** |
| Blow moulding | **0,00%** |
| Thermoforming | **9,52%** |
| Compression moulding | **4,76%** |
| Extrusion | **4,76%** |
| Pultrusion | **9,52%** |
| Resin transfer moulding | **4,76%** |
| SMC/DMC Moulding | **0,00%** |
| Filament winding | **4,76%** |
| None | **14,29%** |
| More | **9,52%** |

*Figure 7. Survey result for the question: Which material properties are more important for the company (Portugal)?*

| | |
|---|---|
| Weight | **3,67%** |
| Cost | **9,17%** |
| Tolerance | **3,67%** |
| Friction/Wear | **5,50%** |
| Self-cleaning | **0,92%** |
| Mechanical resistance | **9,17%** |
| Energy abortion | **0,00%** |
| Sound abortion | **0,92%** |
| Toughness | **3,67%** |
| Adherent | **1,83%** |
| Impact resistance | **6,42%** |
| Fatigue | **3,67%** |
| Thermal insulation | **0,92%** |
| Thermal shielding | **3,67%** |
| Flame retardant | **4,59%** |
| Thermal conductivity | **0,92%** |
| Thermal deformation resistance | **2,75%** |
| Corrosion/abrasion resistance | **6,42%** |
| Extreme conditions | **1,83%** |
| Hydrophobic | **0,92%** |
| Antibacterial properties | **3,67%** |
| Toxicity | **3,67%** |
| Electrical insulators | **4,59%** |
| Electromagnetic shielding | **1,83%** |
| Magnetic properties | **0,92%** |
| Reciclability | **6,42%** |
| Reusable | **1,83%** |
| Eco-friendly | **3,67%** |
| Smart materials | **2,75%** |
| More | **0,00%** |

### 4.1.2 INNOVATION ACTIVITIES

The results of *Figure 8-13* are showing that 75 % of the Portuguese queried companies do not have knowledge of nano- materials/technology. Meanwhile, 50 % of these companies have an idea that nanomaterials can enhance a wide range of polymers' properties and approximately 94 % think there is a need of new material properties. In this way, more than 80 % are motivated and interested to learn (for instance, by attending seminars, meetings, workshops, etc.) and work (by participating in nanotechnology-based projects) with nanomaterials.

*Figure 8. Survey result for the question: Does the company have knowledge of nanocomposites and/or nanotechnology (Portugal)?*


*Figure 9. Survey result for the question: Is there motivation to work with nanomaterials (Portugal)?*


*Figure 10. Survey result for the question: Does the company know these materials as fillers or as coatings can enhance several polymers' properties (Portugal)?*


*Figure 11. Survey result for the question: Does the company think there is a need of new material properties (Portugal)?*


*Figure 12. Survey result for the question: Is the company interested in participating an European nanotechnology-based project (Portugal)?*


*Figure 13. Survey result for the question: Is there interest to participate in meetings, seminars, workshops, etc., related with advanced materials (Portugal)?*


## 4.2 SPAIN

### 4.2.1 COMPANY'S GENERAL CHARACTERIZATION

The results of *Figure 14* are showing that the Spanish queried companies are mainly "involved" even in automotive and vertical transport industries (≈ 30 %). In terms of plastic usage, the major part of the companies (≈ 29 %) answered plastic products manufacturing (see

*Figure 15*).

The Spanish queried companies (80 %) employ less than 250 workers and have an annual turnover less than 50 million € (≈ 73 %) generated by even national and international sales (see *Figure 16-18*). However, 20 % of the companies employ more than 500 workers and have an annual turnover more than 100 million €.

*Figure 14. Survey result for the question: Which is the main industrial area covered by the company's activity (Spain)?*

| | |
|---|---|
| Aerospace | **5,00%** |
| Automotive | **30,00%** |
| Railway | **0,00%** |
| Packaging | **5,00%** |
| Construction | **15,00%** |
| Vertical transport | **30,00%** |
| Electronics | **0,00%** |
| More | **15,00%** |

*Figure 19* is showing that approximately 29 % of the companies are using injection moulding as preferred plastic processing technique. However, approximately 33 % does not process thermoplastics/thermosets. In terms of material properties (see
), the major part of the Spanish queried companies answered that the most interesting properties are: mechanical resistance, weight, cost and fatigue.

*Figure 15. Survey result for the question: Which is, mainly, the use of plastic that the company does (Spain)?*

| | |
|---|---|
| Plastics manufacturer | **28,57%** |
| Thermoplastics compounder | **14,29%** |
| Reinforced plastics compounder | **9,52%** |
| Plastics recycler | **9,52%** |
| None | **19,05%** |
| More | **19,05%** |

*Figure 16. Survey result for the question: How many workers does the company employ (Spain)?*

| | |
|---|---|
| Less than 50 | **33,33%** |
| Between 50 and 250 | **46,67%** |
| Between 250 and 500 | **0,00%** |
| More than 500 | **20,00%** |

*Figure 17. Survey result for the question: Which is the volume business sale per year (Spain)?*

| | |
|---|---|
| Less than 10M (euros) | **40,00%** |
| Between 10M and 50M (euros) | **33,33%** |
| Between 50M and 100M (euros) | **6,67%** |
| More than 100M (euros) | **20,00%** |

*Figure 18. Survey result for the question: Which is the most important geographical market(s) for the company (Spain)?*

| | |
|---|---|
| Local/Regional | **9,52%** |
| National | **42,86%** |
| International | **47,62%** |

*Figure 19. Survey result for the question: Which are the main plastic processing techniques (Spain)?*

| | |
|---|---|
| Injection moulding | **28,57%** |
| Blow moulding | **9,52%** |
| Thermoforming | **0,00%** |
| Compression moulding | **9,52%** |
| Extrusion | **4,76%** |
| Pultrusion | **4,76%** |
| Resin transfer moulding | **4,76%** |
| SMC/DMC Moulding | **0,00%** |
| Filament winding | **0,00%** |
| None | **33,33%** |
| More | **4,76%** |

*Figure 20. Survey result for the question: Which material properties are more important for the company (Spain)?*

| | |
|---|---|
| Weight | **10,98%** |
| Cost | **9,76%** |
| Tolerance | **0,00%** |
| Friction/Wear | **7,32%** |
| Self-cleaning | **1,22%** |
| Mechanical resistance | **17,07%** |
| Energy abortion | **2,44%** |
| Sound abortion | **1,22%** |
| Toughness | **4,88%** |
| Adherent | **0,00%** |
| Impact resistance | **2,44%** |
| Fatigue | **8,54%** |
| Thermal insulation | **2,44%** |
| Thermal shielding | **0,00%** |
| Flame retardant | **2,44%** |
| Thermal conductivity | **1,22%** |
| Thermal deformation resistance | **2,44%** |
| Corrosion/abrasion resistance | **4,88%** |
| Extreme conditions | **2,44%** |
| Hydrophobic | **0,00%** |
| Antibacterial properties | **1,22%** |
| Toxicity | **1,22%** |
| Electrical insulators | **1,22%** |
| Electromagnetic shielding | **1,22%** |
| Magnetic properties | **2,44%** |
| Reciclability | **2,44%** |
| Reusable | **3,66%** |
| Eco-friendly | **1,22%** |
| Smart materials | **3,66%** |
| More | **0,00%** |

### 4.2.2 INNOVATION ACTIVITIES

The results of *Figure 21-26* are showing that approximately 73 % of the Spanish queried companies do not have knowledge of nano- materials/technology. About of 87 % of these companies do not know that nanomaterials can enhance a wide range of polymers' properties and approximately 94 % think there is a need of new material properties. More than 70 % are motivated and interested to learn (for instance, by attending seminars, meetings, workshops, etc.) and work (by participating in nanotechnology-based projects) with nanomaterials.

*Figure 21. Survey result for the question: Does the company have knowledge of nanocomposites and/or nanotechnology (Spain)?*


*Figure 22. Survey result for the question: Is there motivation to work with nanomaterials (Spain)?*


*Figure 23. Survey result for the question: Does the company know these materials as fillers or as coatings can enhance several polymers' properties (Spain)?*


*Figure 24. Survey result for the question: Does the company think there is a need of new material properties (Spain)?*


*Figure 25. Survey result for the question: Is the company interested in participating an European nanotechnology-based project (Spain)?*


*Figure 26. Survey result for the question: Is there interest to participate in meetings, seminars, workshops, etc., related with advanced materials (Spain)?*


## 4.3 FRANCE

### 4.3.1 COMPANY'S GENERAL CHARACTERIZATION

The results of *Figure 27* are showing that the French queried companies are mainly "involved" in aerospace (25 %) and automotive (17 %) industries. However, other potential industries that are not on the list were mentioned. In terms of plastic usage, the major part of the companies (≈ 23 %) answered reinforced plastic compounding (see *Figure 28*).

*Figure 27. Survey result for the question: Which is the main industrial area covered by the company's activity (France)?*

| | |
|---|---|
| Aerospace | **25,00%** |
| Automotive | **16,67%** |
| Railway | **0,00%** |
| Packaging | **0,00%** |
| Construction | **0,00%** |
| Vertical transport | **0,00%** |
| Electronics | **0,00%** |
| More | **58,33%** |

The French queried companies (≈ 66 %) employ less than 250 workers and have an annual turnover less than 50 million € (75 %) generated by sharing markets [local (≈ 31 %), national (≈ 23 %) and

international (≈ 46 %)] as we can see in *Figure 29-31*. However, more than 20 % of the companies employ more than 500 workers and 25 % have an annual turnover more than 100 million €.

*Figure 28. Survey result for the question: Which is, mainly, the use of plastic that the company does (France)?*

| | |
|---|---|
| Plastics manufacturer | **9,09%** |
| Thermoplastics compounder | **9,09%** |
| Reinforced plastics compounder | **27,27%** |
| Plastics recycler | **0,00%** |
| None | **9,09%** |
| More | **45,45%** |

*Figure 29. Survey result for the question: How many workers does the company employ (France)?*

| | |
|---|---|
| Less than 50 | **33,33%** |
| Between 50 and 250 | **33,33%** |
| Between 250 and 500 | **11,11%** |
| More than 500 | **22,22%** |

*Figure 30. Survey result for the question: Which is the volume business sale per year (France)?*

| | |
|---|---|
| Less than 10M (euros) | **25,00%** |
| Between 10M and 50M (euros) | **50,00%** |
| Between 50M and 100M (euros) | **0,00%** |
| More than 100M (euros) | **25,00%** |

*Figure 31. Survey result for the question: Which is the most important geographical market(s) for the company (France)?*

| | |
|---|---|
| Local/Regional | **30,77%** |
| National | **23,08%** |
| International | **46,15%** |

*Figure 32* is showing that approximately 23 % of the companies are using thermoforming as preferred plastic processing technique. Some other techniques, such as: blow moulding and resin transfer moulding are also used. However, about 15 % does not process thermoplastics/thermosets.

In terms of material properties (see *Figure 33*), the major part of the French queried companies answered that the most important properties are: weight, cost and energy abortion.

*Figure 32. Survey result for the question: Which are the main plastic processing techniques (France)?*

| | |
|---|---|
| Injection moulding | 7,69% |
| Blow moulding | 15,38% |
| Thermoforming | 23,08% |
| Compression moulding | 7,69% |
| Extrusion | 7,69% |
| Pultrusion | 0,00% |
| Resin transfer moulding | 15,38% |
| SMC/DMC Moulding | 0,00% |
| Filament winding | 0,00% |
| None | 15,38% |
| More | 7,69% |

*Figure 33. Survey result for the question: Which material properties are more important for the company (France)?*

| | |
|---|---|
| Weight | 12,12% |
| Cost | 9,09% |
| Tolerance | 0,00% |
| Friction/Wear | 0,00% |
| Self-cleaning | 0,00% |
| Mechanical resistance | 6,06% |
| Energy abortion | 9,09% |
| Sound abortion | 6,06% |
| Toughness | 0,00% |
| Adherent | 3,03% |
| Impact resistance | 6,06% |
| Fatigue | 3,03% |
| Thermal insulation | 3,03% |
| Thermal shielding | 0,00% |
| Flame retardant | 0,00% |
| Thermal conductivity | 3,03% |
| Thermal deformation resistance | 0,00% |
| Corrosion/abrasion resistance | 3,03% |
| Extreme conditions | 3,03% |
| Hydrophobic | 0,00% |
| Antibacterial properties | 3,03% |
| Toxicity | 3,03% |
| Electrical insulators | 3,03% |
| Electromagnetic shielding | 3,03% |
| Magnetic properties | 0,00% |
| Reciclability | 6,06% |
| Reusable | 6,06% |
| Eco-friendly | 3,03% |
| Smart materials | 0,00% |
| More | 6,06% |

### 4.3.2 INNOVATION ACTIVITIES

The results of *Figure 34-39* are showing that approximately 67 % of the French queried companies do not have knowledge of nano- materials/technology. Meanwhile, 50 % of these companies have an idea that nanomaterials can enhance a wide range of polymers' properties and 75 % think there is a need of new material properties. More than 75 % are motivated and interested to learn (for instance, by attending seminars, meetings, workshops, etc.) and work (by participating in nanotechnology-based projects) with nanomaterials.

*Figure 34. Survey result for the question: Does the company have knowledge of nanocomposites and/or nanotechnology (France)?*


*Figure 35. Survey result for the question: Is there motivation to work with nanomaterials (France)?*


*Figure 36. Survey result for the question: Does the company know these materials as fillers or as coatings can enhance several polymers' properties (France)?*


*Figure 37. Survey result for the question: Does the company think there is a need of new material properties (France)?*


*Figure 38. Survey result for the question: Is the company interested in participating an European nanotechnology-based project (France)?*


*Figure 39. Survey result for the question: Is there interest to participate in meetings, seminars, workshops, etc., related with advanced materials (France)?*


## 5. SUDOE REGION – CONCLUDING REMARK

It was created an online survey to identify the industrial needs of the companies of the SUDOE region [North of Portugal, North of Spain (Aragon) and South of France (Aquitaine and Midi-Pyrénées)] for the TECNA project (see Figure 40).

Figure 40. SUDOE region.

The results of *Figure 41* are showing that the SUDOE queried companies are mainly "involved" in automotive (25 %) and construction (15 %) industries. However, other potential industries that are not on

the list were mentioned. In terms of plastic usage, 22 % of the companies answered plastic manufacturing (see *Figure 42*).

The half part of the SUDOE queried companies employ less than 50 workers (small companies) and have an annual turnover less than 50 million € generated, mainly, by sharing national (41 %) and international (47 %) markets as we can see in *Figure 43-45*. However, 15 % of the companies employ more than 500 workers and 18 % have an annual turnover more than 100 million €.

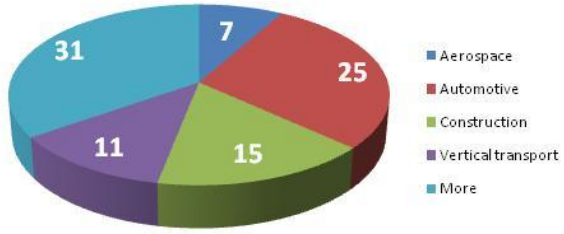


Figure 41. Survey result for the question: *Which is the main industrial area covered by the company's activity (SUDOE)?*

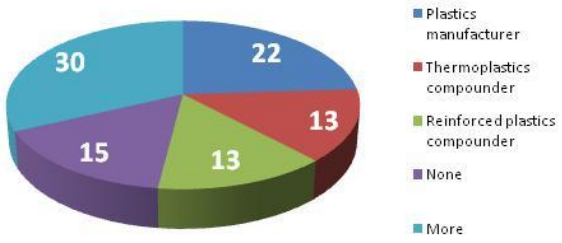


Figure 42. Survey result for the question: *Which is, mainly, the use of plastic that the company does (SUDOE)?*

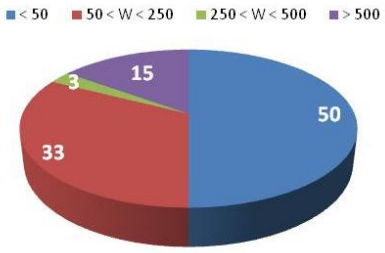


Figure 43. Survey result for the question: *How many workers does the company employ (SUDOE)?*

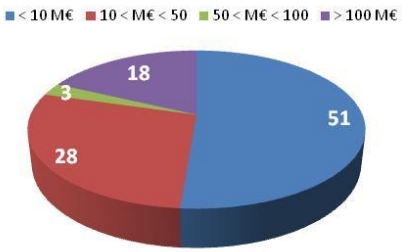


Figure 44. Survey result for the question: *Which is the volume business sale per year (SUJDOE)?*

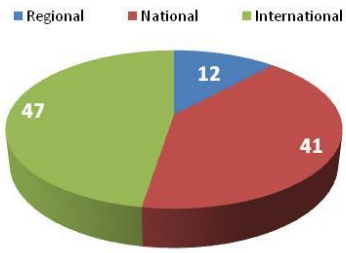


Figure 45. Survey result for the question: *Which is the most important geographical market for the company (SUDOE)?*

*Figure 46* is showing that 27 % of the companies are using injection moulding as preferred plastic processing technique. Some other techniques, such as: thermoforming and pultrusion are also used. In terms of material properties (see *Figure 47*), the major part of the queried companies answered that the most important are: mechanical resistance, cost and weight. Although, some other properties, such as: impact and corrosion/abrasion resistance, as well as reciclability were also mentioned.

The results of *Figure 48-53* are showing that 73 % of the SUDOE queried companies do not have knowledge of nano- materials/technology and 64 % of these companies do not have idea that nanomaterials can enhance a wide range of polymers' properties. In the meantime, 87 % think there is a need of new material properties. More than 75 % are motivated and interested to learn (for instance, by

attending seminars, meetings, workshops, etc.). More than 80 % would like to work, by participating in nanotechnology-based projects, with nanomaterials.

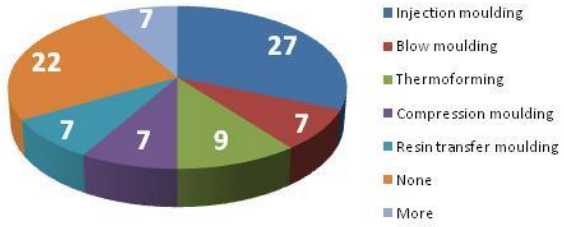


Figure 46. Survey result for the question: *Which are the main plastic processing techniques (SUDOE)?*

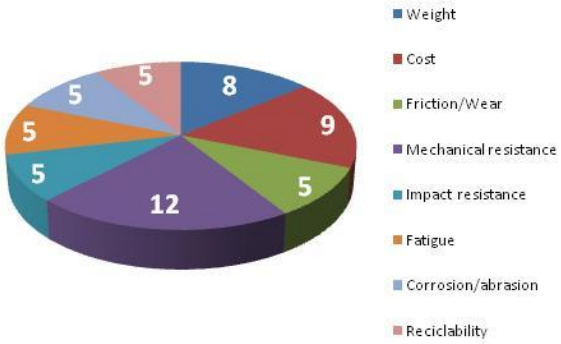


Figure 47. Survey result for the question: *Which material properties are more important for the company (SUDOE)?*

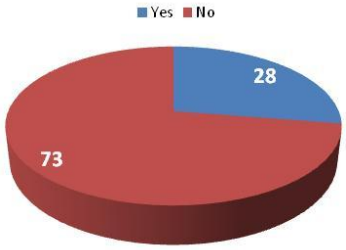


Figure 48. Survey result for the question: *Does the company have knowledge of nanocomposites and/or nanotechnology (SUDOE)?*

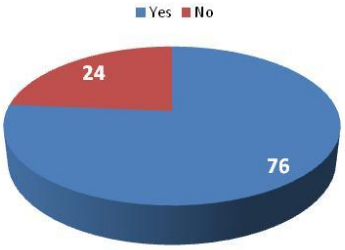


Figure 49. Survey result for the question: *Is there motivation to work with nanomaterials (SUDOE)?*

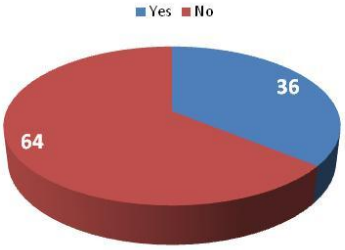


Figure 50. Survey result for the question: *Does the company know these materials as fillers or as coatings can enhance several polymers' properties (SUDOE)?*

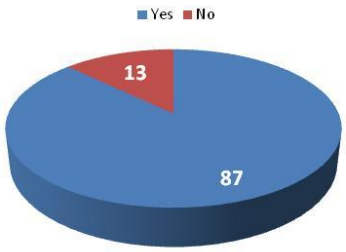


Figure 51. *Survey result for the question: Does the company think there is a need of new material properties (SUDOE)?*

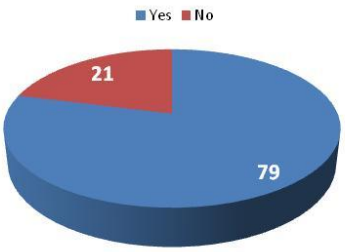


Figure 52. *Survey result for the question: Is the company interested in participating an European nanotechnology-based project (SUDOE)?*

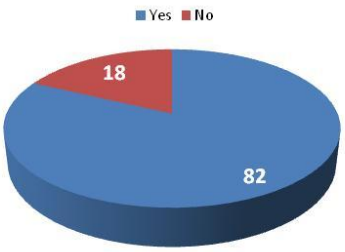


Figure 53. *Survey result for the question: Is there interest to participate in meetings, seminars, workshops, etc., related with advanced materials (SUDOE)?*

## 6. ANNEXES

The survey was available in four different languages: Portuguese, Spanish, French and English. All versions are attached.

| | |
|---|---|
| Portuguese version: | Annexe 1 |
| Spanish version: | Annexe 2 |
| French version: | Annexe 3 |
| English version: | Annexe 4 |

# ANNEXE 1

# INQUÉRITO ONLINE

**Convite**

**Este inquérito é proposto pelo consórcio envolvido no projecto Interreg TECNA o qual faz parte do Programa de Cooperação Territorial da zona Sudoeste da Europa (*SUDOE*). Este programa apoia o desenvolvimento regional através do co-financiamento de projectos transnacionais financiados pelo Fundo Europeu para o Desenvolvimento Regional (*FEDER*).**

**A finalidade do projecto TECNA é demonstrar, através dum projecto-piloto, às empresas em geral e particularmente às PMEs relacionadas com o sector da maquinaria e sistemas mecânicos, as possibilidades que os nanomateriais lhes podem oferecer para aumentar a sua competitividade.**

**O objectivo deste inquérito é a "Identificação e quantificação das necessidades industriais da zona SUDOE (Aragão, Espanha; Aquitaine and Midi-Pyrénées, França; e Norte de Portugal) em termos de materiais avançados – sistemas poliméricos – para aplicações de novos componentes nas indústrias da maquinaria e sistemas mecânicos". De acordo com os resultados deste inquérito, uma base de dados será criada. Nós asseguramos que todas as respostas permanecerão confidenciais e seguras, e não serão utilizadas para fins comerciais. Esta informação será usada apenas para garantir que as nossas acções vão de encontro às vossas necessidades.**

**As empresas que completem este inquérito receberão um Pen Drive com todos os resultados deste. Para além disso, nós (Universidade do Minho, no caso de Portugal) vos oferecemos a possibilidade de receber formações em nanociência e nanotecnologia bem como consultoria para resolver os vossos problemas diários. Agradecemos com antecedência o vosso importante feedback. Apreciamos a vossa confiança e esperamos ser-vos úteis no futuro.**

| **A. Identificação da empresa** | | |
|---|---|---|
| 1. Nome: _____ | | |
| 2. Endereço: _____ | 3. Cidade: _____ | 4. Zip: _____ |
| 5. Website: _____ | 6. Telefone: _____ | 7. Email: _____ |

| **B. Caracterização geral da empresa** | | |
|---|---|---|
| 1. Qual é a principal área industrial coberta pela actividade da empresa? | Aeroespacial | ○ |
| | Automóvel | ○ |
| | Caminho-de-ferro | ○ |
| | Embalagem | ○ |
| | Construção | ○ |
| | Transporte vertical (elevadores) | ○ |
| | Electrónica | ○ |
| | Mais _____ | |
| 2. Qual o principal uso que a empresa faz do plástico? | Fabricante de peças em plástico | ○ |
| | Fabricante de termoplástico (granulado, masterbatches, etc.) | ○ |
| | Fabricante de plástico reforçado | ○ |
| | Reciclagem de plásticos | ○ |
| | Mais _____ | |
| | Nenhum | ○ |

| | | | | |
|---|---|---|---|---|
| 3. Quantos funcionários trabalham na empresa? | | | Menos de 50 | ○ |
| | | | Entre 50 e 250 | ○ |
| | | | Entre 250 e 500 | ○ |
| | | | Mais de 500 | ○ |
| 4. Volume de vendas (aproximadamente)? | | | Menos de 10M€ | ○ |
| | | | Entre 10 e 50M€ | ○ |
| | | | Entre 50 e 100M€ | ○ |
| | | | Mais de 100M€ | ○ |
| 5. Qual o mercado (s) geográfico mais importante para a empresa? | | | Local/Regional | ○ |
| | | | Nacional | ○ |
| | | | Estrangeiro (especificar) _____ | |
| 6. Quais as principais técnicas de processamento de plástico (se aplicadas)? Por favor, escolher as duas mais importantes. | Moldação por injecção | ○ | Pultrusão | ○ |
| | Moldação por sopro | ○ | Moldação por transferência de resina | ○ |
| | Termoformação | ○ | Moldação por SMC/DMC | ○ |
| | Moldação por compressão | ○ | Enrolamento filamentar | ○ |
| | Extrusão | ○ | Mais _____ | |
| | | | Nenhum | ○ |
| 7. Quais propriedades vos parecem ser mais importantes? Faça, por favor, a selecção das três propriedades mais importantes. (Por exemplo: resistência à fadiga, propriedades antibacterianas, eco-compatibilidade, etc.). | **Propriedades térmicas** | | **Propriedades gerais** | |
| | *Isolamento térmico* | ○ | *Peso* | ○ |
| | *Protecção térmica* | ○ | *Preço* | ○ |
| | *Retardante de chama* | ○ | *Tolerância* | ○ |
| | *Condutividade térmica* | ○ | **Propriedades mecânicas** | |
| | *Dilatação térmica* | ○ | *Fricção/Desgaste* | ○ |
| | *Mais _____* | | *Auto-limpeza* | ○ |
| | **Propriedades químicas** | | *Resistência mecânica* | ○ |
| | *Resistência à corrosão/abrasão* | ○ | *Absorção de energia* | ○ |
| | *Condições extremas* | ○ | *Absorção de som* | ○ |
| | *Hidrofóbicas* | ○ | *Dureza* | ○ |
| | *Propriedades antibacterianas* | ○ | *Aderência* | ○ |
| | *Toxicidade* | ○ | *Resistência ao impacto* | ○ |
| | *Mais _____* | | *Resistência á fadiga* | ○ |
| | **Propriedades eléctricas** | | *Mais _____* | |
| | *Isolamento eléctrico* | ○ | **Outras propriedades** | |
| | *Protecção electromagnética* | ○ | *Reciclabilidade* | ○ |
| | *Propriedades magnéticas* | ○ | *Reutilizável* | ○ |
| | *Mais _____* | | *Eco-compatibilidade* | ○ |
| | | | *Materiais inteligentes* | ○ |

| **C. Actividades relacionadas com a inovação** | | |
|---|---|---|
| 1. A empresa tem conhecimento sobre os nanomateriais e/ou as nanotecnologias? | Não | ○ |
| | Sim | ○ |
| 2. A empresa está motivada para trabalhar com nanomateriais? | Não | ○ |
| | Sim | ○ |
| 3. A empresa sabe que estes materiais usados com reforços ou revestimentos podem melhorar uma larga gama de propriedades dos materiais poliméricos? | Não | ○ |
| | Sim | ○ |
| 4. A empresa acha que existe a necessidade de materiais com novas propriedades? | Não | ○ |
| | Sim | ○ |
| 5. A empresa tem interesse em participar num projecto europeu relacionado com as nanotecnologias? | Não | ○ |
| | Sim | ○ |
| 6. A empresa está interessada em participar em reuniões, seminários, workshops, etc., sobre materiais avançados? | Não | ○ |
| | Sim | ○ |

**Nós vos agradecemos pelo interesse demonstrado e tempo dispendido a preencher este inquérito. Relembramos que todas as respostas dadas permanecerão confidenciais e seguras e não serão utilizadas para fins comerciais. Uma vez mais, e para sublinhar a nossa vontade em cooperar com a industria, nós oferecemos-vos a possibilidade de receber formações em nanociência e nanotecnologia bem como consultoria para resolver os vossos problemas diários.**

**Caso tenha alguma questão sobre o objectivo ou conteúdo deste inquérito, podem contactar as seguintes pessoas:**


***PORTUGAL (UM):*** ***Carlos Nuno Barbosa em cbnuno@dep.uminho.pt ou por telefone +351 253 510 320***

***FRANCE (ENIT):*** ***Valérie Nassiet em valerie.nassiet@enit.fr ou por telefone +335 62 44 29 30***

***ESPAGNE (ITA):*** ***Pau J. Cortés Forteza em pcortes@ita.es ou por telefone +34 976 011 188***

# ANNEXE 2

# CUESTIONARIO ONLINE

**Introducción**

**El proyecto TECNA es parte del Programa de Cooperación Territorial del Espacio Sudoeste Europeo, SUDOE, programa que promueve el desarrollo regional medialte la cofinanciación de proyectos transnacionales a traves de fondos Feder (Fondo Europeo de Desarrollo Regional).**

**El objetivo del proyecto es demostrar, a través de un proyecto piloto, a las empresas en general y particularmente a las PYMES, las posibilidades que los nanomateriales pueden aportar a la industria.**

**Para ello se ha querido identificar y cuantificar las necesidades de la industria del SUDOE (España, Sur de Francia y Portugal) en términos de materiales avanzados para nuevos componentes del sector metalmecánico.**

**A partir de este cuestionario se creará una base de datos la cual será confidencial y no será usada paa fines comerciales. La información que pueda facilitarnos será únicamente para el asegurar que el desarrollo del proyecto es acorde a sus necesidades.**

**La compañía que elabore el cuestionario recibirá un Pen Drive con todos los resultados del proyecto, además de ofrecerle la posibilidad de recibir cursos de formación sobre nanomateriales así como servicios de consultoría al respecto para sus problemas del día a día.**

**Gracias por la valiosa información que nos hace llegar y su sinceridad, y esperamos poder servirle en un futuro.**

| **Datos de la empresa** | | |
|---|---|---|
| 1. Nombre: _____ | | |
| 2. Dirección: _____ | 3. Ciudad: _____ | 4. C.P.: _____ |
| 5. Página web: _____ | 6. Teléfono: _____ | 7. Email: _____ |

| **B. Actividad de la empresa** | | |
|---|---|---|
| 1. ¿Cual es el principal sector al cual se dedica su empresa? | Aeroespacial | ○ |
| | Automoción | ○ |
| | Trenes | ○ |
| | Packaging | ○ |
| | Construcción | ○ |
| | Transporte vertical | ○ |
| | Electrónica | ○ |
| | Otros _____ | |
| 2. ¿Cuál es el principal uso del plástico hace la empresa? | Procesado de plástico | ○ |
| | Thermoplastics compounder | ○ |
| | Reinforced plastics compounder | ○ |
| | Reciclado del plástico | ○ |
| | Otros _____ | |
| | Ninguno | ○ |
| 3. ¿Cuántos empleados tiene la empresa? | Menos de 50 | ○ |
| | Entre 50 y 250 | ○ |
| | Entre 250 y 500 | ○ |

| | | |
|---|---|---|
| | Más de 500 | ○ |
| 4. Volumen de ventas por año (aproximadamente)? | Menos de 10M€ | ○ |
| | Entre 10 y 50M€ | ○ |
| | Entre 50 y 100M€ | ○ |
| | Más de 100M€ | ○ |
| 5. ¿Cuál es el principal mercado de la compañía? | Local/Regional | ○ |
| | Nacional | ○ |
| | Extranjero (especificar) _____ | |

| | | | | |
|---|---|---|---|---|
| 6. ¿Cual es la principal técnica de procesado plástico que usan en la empresa (si procesan plástico)? Por favor, elija las dos más importantes. | Moldeo por inyección | ○ | Pultrusión | ○ |
| | Moldeo por soplado | ○ | Moldeo por transferencia | ○ |
| | Termoconformado | ○ | SMC/DMC Moulding | ○ |
| | Moldeo por compresión | ○ | Filament winding | ○ |
| | Extrusión | ○ | Otra _____ | |
| | | | Ninguno | ○ |

| | | | | |
|---|---|---|---|---|
| 7. ¿Que propiedades de los materiales crees que pueden ser más interesantes los objetivos de su empresa? Por favor, elija las tres propiedades más relevantes. | **Propiedades Térmicas** | | **Propiedades generales** | |
| | *Aislamiento térmico* | ○ | *Peso* | ○ |
| | *Apantallamiento térmico (materiales refractarios)* | ○ | *Precio* | ○ |
| | *Materiales ignífucos* | ○ | *Tolerancia* | ○ |
| | *Conductividad térmica* | ○ | **Propiedades mecánicas** | |
| | *Resistencia a las deformaciones térmicas* | ○ | *Fricción/Desgaste* | ○ |
| | *Otros _____* | | *Autolimpiables* | ○ |
| | **Propiedades químicas** | | *Resistencia mecánica* | ○ |
| | *Resistencia a la corrosión y abrasión* | ○ | *Absorción de energía* | ○ |
| | *Condiciones extremas* | ○ | *Fonoabsorbente* | ○ |
| | *Hidrófobos* | ○ | *Dureza* | ○ |
| | *Propiedades antibacterianas* | ○ | *Superficia adherentes* | ○ |
| | *Toxicidad* | ○ | *Tenacidad* | ○ |
| | *Otros _____* | | *Resistencia a fatíga* | ○ |
| | **Propiedades eléctricas** | | *Otros _____* | |
| | *Aislantes eléctricos* | ○ | **Other properties** | |
| | *Apantallamiento electrmagnético* | ○ | *Reciclabilidad* | ○ |
| | *Propiedades magnéticas* | ○ | *Reutilizabilidad* | ○ |
| | *Otros _____* | | *Ecológico* | ○ |
| | | | *Materiales inteligentes* | ○ |
| | | | *Otros _____* | |

| **C. Actividades de innovación** | | |
|---|---|---|
| 1. ¿Tiene la compañía conocimientos sobre nanomateriales? | No | ○ |
| | Sí | ○ |
| 2. Tiene alguna motivación de trabajar con nanomateriales? | No | ○ |
| | Sí | ○ |
| 3. ¿Tiene la compañía conocimientos de aplicaciones de los nanomateriales como en filtros o recubrimientos para mejorar las propiedades de los materiales convencionales? | No | ○ |
| | Sí | ○ |
| 4. ¿Tiene la empresa la necesidad de nuevos materiales? | No | ○ |
| | Sí | ○ |
| 5. ¿Está la empresa interesada en la participación en proyectos europeos en nanotecnología? | No | ○ |
| | Sí | ○ |
| 6. ¿Tiene la compañía intención de participar en talleres de formación, seminarios, etc relacionados con materiales avanzados? | No | ○ |
| | Sí | ○ |

**Muchas gracias por su tiempo e interés. Recuerde que toda la información facilitada será tratada con cofidencialidad y no será usada para intereses comerciales. Queríamos reiterarle en nuestra intención de cooperar con las empresas, se ofrecerá la posibilidad de realizar cursos de formación en nanomateriales así como actividades de consultoría para las soluciones del día a día.**

**De tener alguna pregunta sobre los contenidos u objetivos del cuestionario contactar con:**

***Pau J. Cortés Forteza; email: pcortes@ita.es; Teléfono: +34 976 011 188***

# ANNEXE 3

# ENQUETE EN LIGNE

**Invitation**

**Cette enquête est proposée par le consortium impliqué dans le projet Interreg TECNA qui fait partie du Programme de Coopération Territoriale de la zone SUD-Ouest de l'Europe (*SUDOE*). Ce programme territorial soutient le développement régional à travers le co-financement de projets transnationaux financés par le fond européen de développement régional (FEDER).**

**L'objectif de TECNA est de démontrer, à travers un projet pilote, auprès des sociétés et particulièrement des TPEs des secteurs de la mécanique, les opportunités que les nanotechnologies en général et les nanomatériaux en particulier leur offrent pour augmenter leur compétitivité en mettant sur le marché des produits innovants. Le but de cette enquête est "l'identification et la quantification des besoins des Industries du SUDOE (Espagne, sud de la France et nord du Portugal) en terme de matériaux avancés, systèmes polymères pour des applications dans l'industrie de la machinerie et des systèmes mécaniques. Une base de données sera créée en relation avec les résultats de l'enquête. Nous vous assurons que toutes les réponses et données resteront confidentielles et sécurisées, et ne seront pas utilisées à des fins commerciales. Nous souhaitons seulement nous assurer que nos propositions sont en adéquation avec vos besoins. Les sociétés qui auront complété l'enquête recevront une clé USB contenant la totalité des résultats de l'enquête. De plus nous vous offrirons la possibilité de suivre des formations en nanoscience et nanotechnologie ainsi que de prendre en charge des actions d'expertise sur vos problématiques. Merci d'avance pour votre retour d'information. Nous apprécions votre confiance et espérons pouvoir vous être utile dans le futur.**

## A. Identification de la société

| | | |
|---|---|---|
| 1. Nom: _____ | | |
| 2. Adresse: _____ | 3. Ville: _____ | 4. Code postal: _____ |
| 5. Site web: _____ | 6. Téléphone: _____ | 7. E-mail: _____ |

## B. Caractéristiques générales sur la société

| | | |
|---|---|---|
| 1. Quel est le domaine principal d'activité couvert par la société? | Espace | ○ |
| | Automobile | ○ |
| | Ferroviaire | ○ |
| | Intégration des systèmes | ○ |
| | Construction | ○ |
| | Ascenseurs | ○ |
| | Electronique | ○ |
| | Autre _____ | |
| 2. Quelle est son activité principale liée à l'utilisation des matériaux plastiques ? | Fabriquant de plastiques | ○ |
| | Plasturgiste | ○ |
| | Fabriquant de composites | ○ |
| | Recyclage des plastiques | ○ |
| | Autre _____ | |
| | Aucune | ○ |

| | | | | |
|---|---|---|---|---|
| 3. Quels sont les effectifs humains de la société? | | | Moins de 50 | ○ |
| | | | Entre 50 et 250 | ○ |
| | | | Entre 250 et 500 | ○ |
| | | | Plus de 500 | ○ |
| 4. Chiffre d'affaire par an (valeur approximative)? | | | Moins de 10M€ | ○ |
| | | | Entre 10 et 50M€ | ○ |
| | | | Entre 50 et 100M€ | ○ |
| | | | Plus de 100M€ | ○ |
| 5. Quelle est l'échelle géographique visée pour la société? | | | Local/Régional | ○ |
| | | | National | ○ |
| | | | Etranger (préciser) _____ | |
| 6. Quelles sont les techniques de mise en forme des plastiques utilisées (si vous en utilisez)? S'il vous plait, choisissez deux techniques principalemet utilisées. | Moulage par injection | ○ | Pultrusion | ○ |
| | Injection soufflage | ○ | Transfert de résine RTM | ○ |
| | Thermoformage | ○ | Moulage SMC/DMC | ○ |
| | Moulage par compression | ○ | Enroulement filamentaire | ○ |
| | Extrusion | ○ | Autre _____ | |
| | | | Aucun | ○ |
| 7. Quelles propriétés vous semblent les plus importantes? Pourriez-vous en choisir trois. (par exemple : fatigue, résistance, conductivité électrique, propriétés magnétiques,…). | **Propriétés thermiques** | | **Propriétés générales** | |
| | *Isolation thermique* | ○ | *Poids* | ○ |
| | *Protection thermique* | ○ | *Prix* | ○ |
| | *Ignifugeant* | ○ | *Tolerance* | ○ |
| | *Conductivité thermique* | ○ | **Propriétés mécaniques** | |
| | *Dilatation thermique* | ○ | *Friction/usure* | ○ |
| | *Autre* _____ | | *Auto nettoyant* | ○ |
| | **Propriétés chimiques** | | *Résistance mécanique* | ○ |
| | *Resistance à la corrosion, à l'abrasion* | ○ | *Amortissement énergétique* | ○ |
| | *Conditions extrêmes* | ○ | *Amortissement acoustique* | ○ |
| | *Hydrophobicité* | ○ | *Dureté* | ○ |
| | *Propriétés antibactériennes* | ○ | *Adhérence* | ○ |
| | *Toxicité* | ○ | *Résistance à l'impact* | ○ |
| | *Autre* _____ | | *Fatigue* | ○ |
| | **Propriétés électriques** | | *Autre* _____ | |
| | *Isolation électrique (diélectrique)* | ○ | **Other properties** | |
| | *Protection électromagnétique* | ○ | *Recyclabilité* | ○ |
| | *Propriétés magnétiques* | ○ | *Réutilisable* | ○ |
| | *Autre* _____ | | *Eco-compatibilité* | ○ |
| | | | *Matériaux intelligents* | ○ |

| **C. Activités innovantes** | | |
|---|---|---|
| 1. La société a-t-elle des connaissances sur les nanomatériaux et/ou les nanotechnologies? | Non | ○ |
| | Oui | ○ |
| 2. Etes-vous motivés pour travailler avec des nanomatériaux? | Non | ○ |
| | Oui | ○ |
| 3. La société connait-elle ces matériaux en tant que charges ou revêtements qui améliorent les propriétés des polymères? | Non | ○ |
| | Oui | ○ |
| 4. Pensez-vous que formuler de nouveaux matériaux et qualifier leurs différentes propriétés est nécessaire? | Non | ○ |
| | Oui | ○ |
| 5. La société est-elle intéressée pour participer à un projet européen sur les nanotechnologies? | Non | ○ |
| | Oui | ○ |
| 6. Etes-vous intéressé pour participer à des réunions, séminaires, des ateliers, etc., sur les matériaux avancés? | Non | ○ |
| | Oui | ○ |

**Nous vous remercions pour le temps passé à répondre et l'intérêt porté à cette enquête. Nous vous rappelons que toutes vos réponses et données resteront confidentielles et sécurisées et non utilisées à des fins commerciales. De plus comme précédemment indiqué, nous vous offrirons la possibilité de suivre des formations en nanoscience et nanotechnologie ainsi que de prendre en charge des actions d'expertise sur vos problématiques.**

**Si vous avez des questions sur l'objectif ou sur le contenu de cette enquête, vous pouvez contacter :**

***Valérie Nassiet à valerie.nassiet@enit.fr ou par téléphone au +335 62 44 29 30***

# ANNEXE 4

# ONLINE SURVEY

**Invitation**

**We are associated partners involved in the *TECNA* project which is part of the Territorial Cooperation Program of Southwest European space, *SUDOE*. This program supports regional development through the co-financing of transnational projects by the European Regional Development Fund, *ERDF*.**

**The *TECNA* project's goal is to demonstrate, through a pilot-project, to companies in general and particularly to the SMEs the possibilities that nanomaterials can bring to these industries.**

**The aim of this survey is "Identifying and Quantifying the Needs of SUDOE (Spain, South of France and North of Portugal) Industries in terms of Advanced Materials – Polymer Systems – for New Components of Mechanical Systems and Machinery Industries".**

**In accordance with the survey results, a database will be created. We ensure that all responses and data will remain confidential and secure, and will not be used for commercial purposes. Your input will only be used to warrant that we continue to meet your needs.**

**The companies that complete the survey will receive a Pen Drive with all the results and, in addition, we will offer to you the possibility to receive training courses in nanoscience and nanotechnology as well as consultancy to solve your daily problems. Thank you in advance for your valuable feedback. We appreciate your trust and look forward to serving you in the future.**

| **A. Company's identification** | | |
|---|---|---|
| 1. Name: _____ | | |
| 2. Address: _____ | 3. City: _____ | 4. Zip: _____ |
| 5. Website: _____ | 6. Phone: _____ | 7. Email: _____ |

| **B. Company's general characterization** | | |
|---|---|---|
| 1. Which is the main industrial area covered by the company's activity? | Aerospace | ○ |
| | Automotive | ○ |
| | Railway | ○ |
| | Packaging | ○ |
| | Construction | ○ |
| | Vertical transport | ○ |
| | Electronics | ○ |
| | More _____ | |
| 2. Which is, mainly, the use of plastic that the company does? | Plastics manufacturer | ○ |
| | Thermoplastics compounder | ○ |
| | Reinforced plastics compounder | ○ |
| | Plastics recycler | ○ |
| | More _____ | |
| | None | ○ |

| | | | | |
|---|---|---|---|---|
| 3. How many workers does the company employ? | | | Less than 50 | ○ |
| | | | Between 50 and 250 | ○ |
| | | | Between 250 and 500 | ○ |
| | | | More than 500 | ○ |
| 4. Volume business sales per year (approximately)? | | | Less than 10M€ | ○ |
| | | | Between 10 and 50M€ | ○ |
| | | | Between 50 and 100M€ | ○ |
| | | | More than 100M€ | ○ |
| 5. Which is the most important geographical market(s) for the company? | | | Local/Regional | ○ |
| | | | National | ○ |
| | | | Foreign (specify) _____ | |
| 6. Which are the main plastic processing techniques (if you are using it)? Please, choose the two most important techniques. | Injection moulding | ○ | Pultrusion | ○ |
| | Blow moulding | ○ | Resin transfer moulding | ○ |
| | Thermoforming | ○ | SMC/DMC Moulding | ○ |
| | Compression moulding | ○ | Filament winding | ○ |
| | Extrusion | ○ | More _____ | |
| | | | None | ○ |
| 7. Which material properties does the company think that more important? Please choose the three most important properties. (For instance: fatigue resistance, electrical conductivity, magnetic properties, bactericidal properties, etc.). | **Thermal properties** | | **General properties** | |
| | *Thermal insulation* | ○ | *Weight* | ○ |
| | *Thermal shielding* | ○ | *Cost* | ○ |
| | *Flame retardant* | ○ | *Tolerance* | ○ |
| | *Thermal conductivity* | ○ | **Mechanical properties** | |
| | *Thermal deformation resistance* | ○ | *Friction/Wear* | ○ |
| | *More _____* | | *Self-cleaning* | ○ |
| | **Chemical properties** | | *Mechanical resistance* | ○ |
| | *Corrosion/abrasion resistance* | ○ | *Energy abortion* | ○ |
| | *Extreme conditions* | ○ | *Sound abortion* | ○ |
| | *Hydrophobic* | ○ | *Toughness* | ○ |
| | *Antibacterial properties* | ○ | *Adherent* | ○ |
| | *Toxicity* | ○ | *Impact resistance* | ○ |
| | *More _____* | | *Fatigue* | ○ |
| | **Electrical properties** | | *More _____* | |
| | *Electrical insulators* | ○ | **Other properties** | |
| | *Electromagnetic shielding* | ○ | *Reciclability* | ○ |
| | *Magnetic properties* | ○ | *Reusable* | ○ |
| | *More _____* | | *Eco-friendly* | ○ |
| | | | *Smart materials* | ○ |

| **C. Innovation activities** | | |
|---|---|---|
| 1. Does the company have knowledge of nanocomposites and/or nanotechnology? | No | ○ |
| | Yes | ○ |
| 2. Is there motivation to work with nanomaterials? | No | ○ |
| | Yes | ○ |
| 3. Does the company know these materials as fillers or as coatings can enhance a wide range of the polymers' properties? | No | ○ |
| | Yes | ○ |
| 4. Does the company think there is a need of new material properties? | No | ○ |
| | Yes | ○ |
| 5. Is the company interested in participating an European nanotechnology-based project? | No | ○ |
| | Yes | ○ |
| 6. Is there interest to participate in meetings, seminars, workshops, etc., related with advanced materials? | No | ○ |
| | Yes | ○ |

**Thank you very much for your time and interest. Please remember that all responses and data will remain confidential and secure, and will not be used for commercial purposes. Once again, and to emphasize our willingness to cooperate with the industry, we will offer to you the possibility to receive training courses in nanoscience and nanotechnology as well as consultancy to solve your daily problems.**
**If you have any queries regarding the objective or the contents of the survey, you may contact:**

***PORTUGAL: Eng. Carlos Nuno Barbosa at cbnuno@dep.uminho.pt or over the phone at +351 253 510 320***
***FRANCE: Valérie Nassiet à valerie.nassiet@enit.fr ou par téléphone au +335 62 44 29 30***
***SPAIN: Pau J. Cortés Forteza at pcortes@ita.es or over the phone at +34 976 011 188***