



# CARBOREP

CAR BODY REPAIR

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## IO1 – Industrial Needs Analysis Report

CARBOREP

European Harmonised Training for Personnel working with Car Body Repair Technology

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## 2 Executive summary

The goal of this IO is to better understand how the training and skills needs of the car body repair personnel should be addressed. Within the car body repair sector of the automotive industry there are a number of key stakeholder profiles whose interaction drives the practical, qualitative and economic shape of the repair sector. A survey-style analysis was performed to ascertain the opinions and requirements of key stakeholders to allow the CarboRep project to focus on delivering a European Car Body repair Technician (ECBRT) training profile properly tailored to its intended market.

The key outcomes of the stakeholder survey were:

The centres of expertise and training were nearly all very positive towards the CarboRep project and creation of the ECBRT training profile, with 80% being in favour or strongly in favour. This response is significant for the CarboRep project as buy-in and cooperation from training providers and centres of expertise will be critical for the successful dissemination of the ECBRT training. The comments of these expert stakeholders will also be considered in the development and approval of the ECBRT training modules, to ensure the ECBRT content is in line with the best possible industry practices.

Feedback from the repair garages indicated that they believe their own technicians may lack the skill to perform high quality repairs on modern vehicles. This demonstrates that there is certainly a skills gap to be filled by the ECBRT profile. The repair garages had very varied opinions on the quality of training available to them, some believing they could receive excellent training, others thought there was nothing suitable available. It is important for the dissemination of the ECBRT training profile, that repairers in markets that feel unable to obtain quality training are specifically supported. Others who feel they already have access to excellent training will be less likely to adopt the ECBRT. Nearly all the repair garages were in favour of the development of the ECBRT training profile, they all saw a benefit in terms of skills and quality of their work. Only one garage was against the ECBRT and this is because they believed they already had access to effective training. The positive response to the survey is extremely important to the CarboRep project, as the final customers will be the repair garages and their uptake of the ECBRT will be critical to its success.

In general, the national associations had the least positive response of all the stakeholders to the CarboRep project and ECBRT profile. The uptake of the ECBRT would benefit greatly from the support of the national associations in all European countries, so it will be necessary to engage with, and garner the support of, this particular group of stakeholders throughout the project.



### 3 Glossary of terms

Acronym	Meaning
ECBRT	European Car Body Repair Technician
IO	Intellectual Output
TWI	The Welding Institute
EWf	European Welding Federation
CESOL	Asociación Española de Soldadura y Tecnologías de Unión
ISQ	Instituto de Soldadura e Qualidade
OEM	Original Equipment Manufacturer



## 4 Introduction

### 4.1 Description IO1 (Industrial Needs Analysis Report)

The aim of this IO is the development of an initial analysis to better understand the skills gaps that exist, and the needs of industrial stakeholders working in, the car body repair business.

Within the automotive repair sector there are a number of key stakeholder profiles whose interaction drives the practical, qualitative and economic shape of the repair sector. These key stakeholders are:

- Repair garages. These can be small independent companies, or larger companies who are endorsed by car manufacturers or insurance companies.
- Training centres, who offer technical vocational training to repair sector technicians. Both small independent trainers and large training centres affiliated with car manufacturers and national bodies exist.
- Centres of expertise, who develop methods and procedures for high quality repair.
- Insurance companies, who are the main paying customer for post-crash repair.
- National and international bodies and associations of the repair industry.
- The car producers (OEM's) who make the vehicles and create their own specific repair instructions, which are passed on to their own accredited repairers.

The goal of this IO is to better understand how the training and skills needs of the wider repair sector should be addressed.

The activities required to produce the Industrial needs analysis report were:

- Development of an analysis method to identify the market needs, most critical points and skills gaps that will be targeted by the methodology and training, in each partner language.
- Production of a report on the methodology and market requirements, namely the requirements in terms of qualified personnel.

### 4.2 Stakeholder interviews

Each project partner contacted a range of stakeholders and conducted interviews with the aim of gathering specific knowledge:

- The perceived present level of proficiency of individuals to perform repairs on complex modern car body materials.
- What areas required additional training?
- Find out what joining technologies were already employed in the car body repair industry.



- How much time and cost the stakeholder was prepared to invest in training.
- If the stakeholder would favour the creation of a European training profile.

## 5 Interview questions

Questions were constructed to generate the information needed for the CarboRep project. Face to face interviews were favoured or those conducted via the telephone so that discussions could be held and the reasons behind partners' answers could be derived. Certain specific questions also required the stakeholder to give their opinion on a scale. This allowed for a statistical analysis of certain key factors. The following questions were asked to each stakeholder:

1. How well does the current level of skill and knowledge in the repair sector satisfy the requirements for performing high quality repair of modern automobiles? - And why?
2. How well do existing training and development pathways for the repair sector prepare personnel to deal with repair of vehicles containing; high strength steels, press hardened steels, aluminium alloys, magnesium alloys, carbon fibre composite components?
3. What joining technologies are you directly involved in applying to the repair of vehicle bodies? - Arc welding? Arc brazing? Resistance spot welding? Adhesive bonding? Hem flanging? Blind riveting? - Others?
4. What is your hourly cost of repair technician time?
5. How easy is it for you to obtain personnel with the necessary skills to perform high quality repairs on modern vehicles? - And why?
6. How easy is it to identify training for your staff for high quality repairs on all materials and components in a modern car body / chassis? - If so what is done to ensure this?
7. What sources of information do your repair staff use to ensure that a repair is carried out correctly? - How are materials identified? - How is the repair technique selected for the specific component?
8. What aspects of further training in joining methods for vehicle body and chassis repair do you require? - And why?
9. In what areas should training be provided to ensure high quality vehicle repairs are performed? (specifically joining areas) - And why?
10. Would you be in favour of a European repair technician training program authorised by EWF? (for ECBRT, European Car Body repair Technician) - And why?
11. How would you like an EWF repair technician qualification to be applied to improve the quality of car body repairs across the sector?
12. How would additional repair technician training requirements impact the costs of car body repairs?
13. What do you believe would be an acceptable cost of repair technician qualification to avoid a loss of business or increased 'write off' rate of vehicles?



14. How many days training per year do you believe repair staff should follow to maintain their competence and keep up to date with technology?
15. What cost would an employer be prepared to pay per staff member to achieve a certified competence level?

## 6 National Reports

### 6.1 Overview national reports

A summary of the responses given from each target country was written by each project partner.

### 6.2 UK National Report, TWI

TWI contacted around 20 stakeholder companies; direct responses were received from 6.

In the UK, a very high standard of training appears to be available via various sources: training centres, centres of expertise and manufacturers. Many repair centres maintain training to a high level but smaller independent businesses may not provide adequate training to ensure high quality repairs. Furthermore, the degree of training provided appears to be optional to the individual company, so there is no major economic disadvantage for companies whose staff are not adequately qualified. Within repair centres, the age profile of skilled staff is increasing and there are relatively few young people entering the profession to replace them.

Also within the UK, the location of training centres is not well distributed. Many small repair companies avoid training their staff, as long travel times and the need for overnight stays increase the cost of training and time away from work.

There is a concern that an EWF run training profile would be in direct competition with training already provided by other training centres, both in the UK and internationally. Although, there was also a concession that the present situation in the UK does not see all UK-based repair garages following a structured training program. Also, there may be opposition to a European harmonised training qualification as the present European standards EN287 or EN ISO 9606 require each material and process combination to be tested separately, which would incur significant extra time and cost during repair welder training. The current UK standards do not require this specific joint by joint qualification test.

Repairs of advanced, high tech materials such as carbon fibre and aluminium are only handled by garages who are affiliated to the specific car companies who use those materials, and the OEM's provide the training information (although the quality of information supplied varies greatly between OEMs). Therefore, generic needs for training revolve around awareness of new and advanced grades of steel (and possibly aluminium) and the following processes: arc



welding, arc brazing, riveting and adhesive bonding. A comment was made by a one training provider, that there wasn't sufficient awareness of when a repair was performed on a safety critical component where a more thorough and critical examination of the joint quality must be performed.

In general, UK companies gave a mixed response regarding the creation of an ECBRT training profile. Repair garages and independent training centres believed that all training needs were already provided for by the centres of expertise. But, the centres of expertise found that the levels of training provided could be improved and were generally neutral or slightly in favour of the creation of the ECBRT training profile, provided it did not offer them direct competition.

### 6.3 Spanish National Report, CESOL

In Spain, CESOL has contacted more than 20 companies through email and telephone. Only four companies replied.

Although the amount of data obtained cannot be used to draw definitive conclusions, some of the answers were of particular interest.

Responses from centres of expertise highlighted the following points:

- Training and instruction to perform repairs is highly dependent upon the information supplied by the vehicle manufacturer.
- The level of training and instruction provided by vehicle manufacturers varies greatly in quality between the brands.
- Repair garages who work with multiple brands, but who are not affiliated to any specific brand do not have access to up to date high quality repair instructions.
- There was a concern that a modern training course should offer a range of joining technologies including; ; welding, bonding, riveting and clinching and materials such as steel, high tensile steel, aluminium and fiberglass.
- And, finally all respondents were in favour of creating the ECBRT training profile.

### 6.4 Portuguese National Report, ISQ

In Portugal, 6 answers to the CARBOREP project questionnaires were collected, which are representative of the following stakeholders: one 'Automotive OEM car producer' one 'Repair garage owned by or sanctioned by specific OEM's', one 'Independent repair garage not sanctioned to work for specific insurance companies', one 'National body /association for repair in Portugal' and two 'Vocational training providers (VET)' .

When asked if the level of skill and knowledge in repair sector satisfies the requirements for performing high quality repair of modern vehicles, most of the stakeholders show some concerns about the low level of knowledge acquired and that it did not match the reality. One of the reasons identified (by a 'Vocational Training Provider') for this concern was a "lack of



information made available by the constructors” and “for many employers and employees, training is not perceived as an investment”. The ‘Automotive OEM car producer’ also added that: “The variety of brands and models versus the different materials used in the construction of the current bodies, does not allow to guarantee high quality repairs.”

Responses to the question ‘How easy is it to identify training for your staff for high quality repairs on all materials and components in a modern car body’, were mixed, some stakeholders considered that: “The training provided to inspectors in the context of motor vehicle inspections ensures the quality of the work performed at the centre and the maintenance of their knowledge”; on the other hand, one of the ‘Vocational Training providers’ thought that “most employers are unaware of the training needs of their employees”.

It came to light from the survey that the stakeholders would require the syllabus to include the following:

- Repair of bodywork (substitution of components)
- The identification of systems added to the components of the bodywork (disassembly / assembly)
- Metal / plastics and other materials
- Budgeting of damages
- Treatment of pieces of different materials

Another point of emphasis in the results collected is that all the stakeholders would be in favour of a European repair technician training program authorized by EWF, some of the reasons were “It would allow the standardisation of the themes of training” and would “establish criteria by which all the technicians who carry out this type of work could be evaluated”.

When asked about how they would like an “EWF repair technician qualification to be applied to improve the quality of car body repairs across the sector”, the ‘Repair garages owned by or sanctioned by specific OEM’s’ responded with “Validating their competencies” and “promoting training modules for professionals and continuing training for new professionals”, also one of the ‘Vocational Training providers’ considers that: “The qualification of the repair technicians should be carried out based on a training reference that covers all the skills of the professional activity, through evaluated modules, in a theoretical and practical training system, with a high incidence in the practical component.”

In terms of “how many days training per year do you believe repair staff should follow to maintain their competence”, there were different perspectives: the ‘Vocational Training providers’ mentioned “10 days per year” and another considered that: “at least the current legislation should be applied”; a ‘Repair garage’ thought that “it would be possible to considerably improve the skills of our employees with a number of hours equivalent to one week of work, distributed at various points throughout the year”.



It's also important to add that when asked about "what joining technologies are directly involved in repairing vehicle bodies", in general the stakeholders mentioned: MIG and MAG welding, Electrical resistance welding and welding of plastics.

Last but not least, in terms of "How easy is it for you to obtain personnel with the necessary skills to perform high quality repairs on modern vehicles", the majority of the stakeholders mentioned that it is difficult to obtain personnel with this kind of technical skill. Reasons given for this were "most trainees do not have the profile to develop technical skills, since these formations turn out to be the last alternative for many of them to obtain the minimum compulsory schooling", and one responder mentioned "that young people are more attracted to other areas such as mechatronics, which results in fewer professionals in the market".

In short, after analysing the information collected, it is fair to conclude that there is a lot of improvement to be made in the Portuguese repair vehicle sector and that an EWF repair technician qualification would be a great contribution for the development process of the sector.

## 6.5 European Overview Report, EWF

As a representative of European industry, particularly of those organisations which perceive welding as an important manufacturing process, EWF made an effort to contact possible stakeholders across Europe. EWF reached out to organisations from Germany, Switzerland, France, Sweden, Italy, Finland, Norway, The Netherlands, Denmark, Belgium, Czech Republic, Poland, Ireland, Luxembourg and Hungary. These contacts targeted several profiles, from people working in insurance companies to training centres or repair garages. Independent experts in car body repair were also addressed.

EWF contacted around 30 different organisations: in the end, the collected questionnaires amounted to 6; some feedback was also given directly over the phone.

Generally, the stakeholders considered that the level of knowledge and skills of the personnel working in car body repair can be improved. It is mentioned that many times the main sources of information are the OEM repair manuals, which may not provide sufficient detail on the new materials employed in a car body. Also, some workers are performing repairs using welding processes, without having received training on how to do so.

It was mentioned that there is a lack of adequate training for the repair of metallic parts (using welding), opposing to the fact that there is already some on offer for adhesive bonding and assembly.

A harmonised training scheme across Europe was mentioned as a means to improve the quality and competence of the training on offer, as well as potentially decreasing costs. Also, it was mentioned that a harmonised training programme may help increase the number of



professionals interested in taking on this profession, which is in decline in some countries, and not seen as a career option.

Stakeholders also remarked on the need to have adequate evaluation of course participants to ensure a high level of knowledge and skills.

Finally, all stakeholders were of the opinion that the amount of training days per year should not be above 10.

## 7 Overview of Responses

### 7.1 Suitability of present skill level of repair technicians to perform high quality repairs in modern vehicles?

A broad spread of responses were received when stakeholders were asked how suitable the present levels of skill and training were to prepare repair technicians for the joining challenges within modern vehicles. Less than half of the stakeholders believed that industry technicians already possess enough skill to deal with the vehicles they are asked to repair. In general, the repair garages and the small training centres were of the belief that they had sufficient expertise already. National bodies, training centres and centres of expertise generally believed that there is a skills gap that needs to be filled. Figure 1 shows the responses.

Nine organisations, mostly consisting of centres of expertise and training centres expressed a view that there was insufficient skill within the repair sector. The views of these organisations should be taken seriously, as they are in a position where they are able to observe the advancing complexity of modern vehicles as well as the direct skill level of repair personnel.

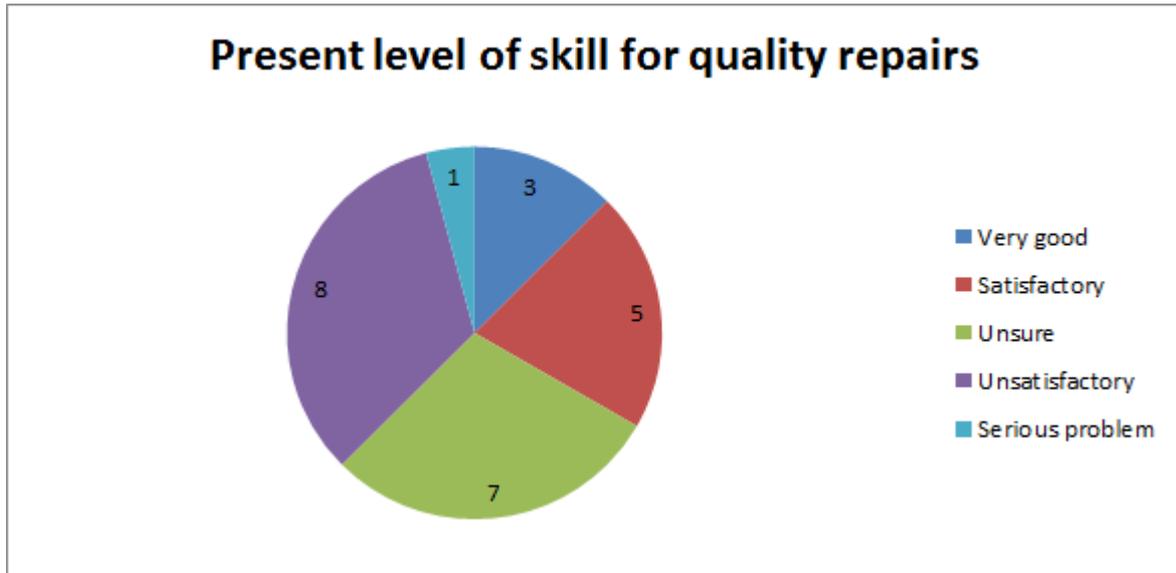
Significant comments suggesting skill levels were insufficient:

- The rapid development of new materials used in vehicle manufacture are making it difficult to keep pace with the joining technologies that can be used or are achievable.
- There is a lack of investment in the training of repair technicians or replenishing the work force with additional new talent.
- A recent focus upon apprenticeships (in the UK) is helping to produce more skilled staff but we are so far behind it will take years to recover within the vehicle repair industry.
- The vehicle manufacturers are not consistent in their approach to collision repair.
- Small companies don't have access to the best training, some companies train staff 1day/2years, and others don't train staff at all.
- There is not enough training on offer in the market for the demand that exists. It is very difficult to find employees with experience in new vehicle repair techniques.
- In some countries there is no specific training devoted to welding technicians for repair. Although adhesive bonding does have training provided.



Contrastingly, the following comments were received suggesting the skill levels were already adequate (mainly from the repair garages themselves):

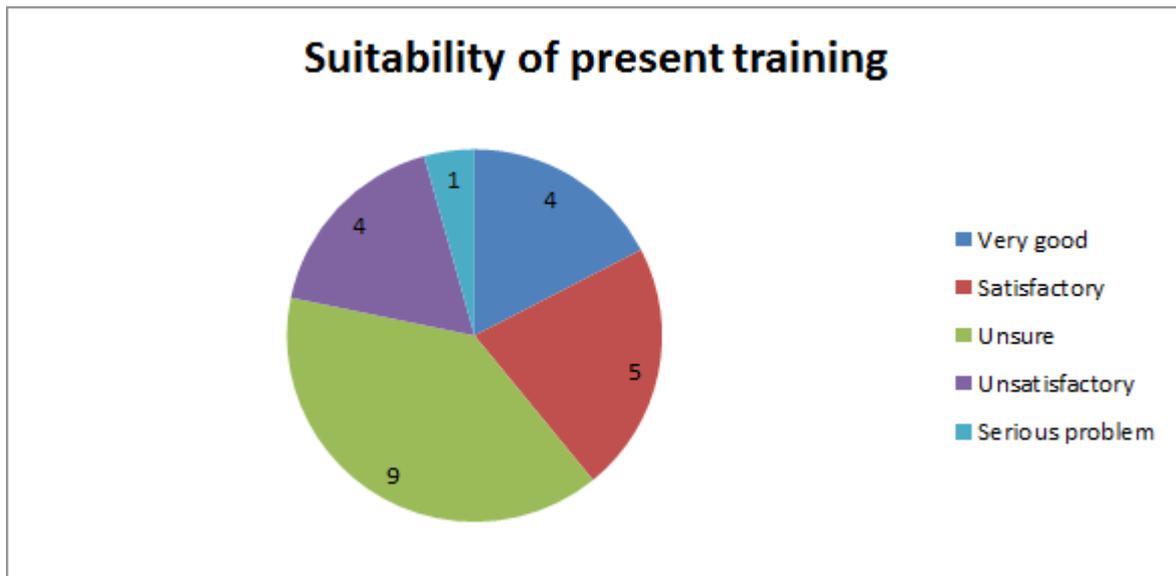
- All methods and training that are required are in place for all materials that will be encountered.
- OEM approved garages have excellent quality and training for individual staff.



*Figure 1. Response chart regarding the present level of skill for repair technicians.*

## 7.2 Suitability of presently available training and development for preparing a technician to perform high quality repairs in modern vehicles?

Less than half of the companies surveyed believed that the current training available provided sufficient expertise and enabled participants to perform high quality repairs. Interestingly the companies who believed that the present training levels are sufficient were repair garages and the car manufacturers. The National bodies and centres of expertise were either unsure if current training was adequate or were of the opinion that current training was not adequate. Responses are shown in figure 2.



*Figure 2. Response chart regarding the suitability of presently available training for repair of modern vehicles.*

### **7.3 How easy is it to identify the training needs of technicians to ensure high quality repair work can be performed?**

Nearly all stakeholders were sure that training needs could be identified by their organisations, see figure 3.

A small number were unsure and only two stakeholders felt they could not identify training needs. These results highlight that the repair sector is aware of the training needs of its technicians, even if adequate training is not necessarily given. The ECBRT profile should focus on the training need highlighted by the stakeholders, the main areas highlighted were:

Joining technologies:

- MIG / MAG welding
- MIG Brazing
- Resistance spot welding
- Blind/self-pierce riveting
- Structural adhesives

Materials:

- Steels
- High strength steels
- Aluminium
- Magnesium
- Carbon fibre



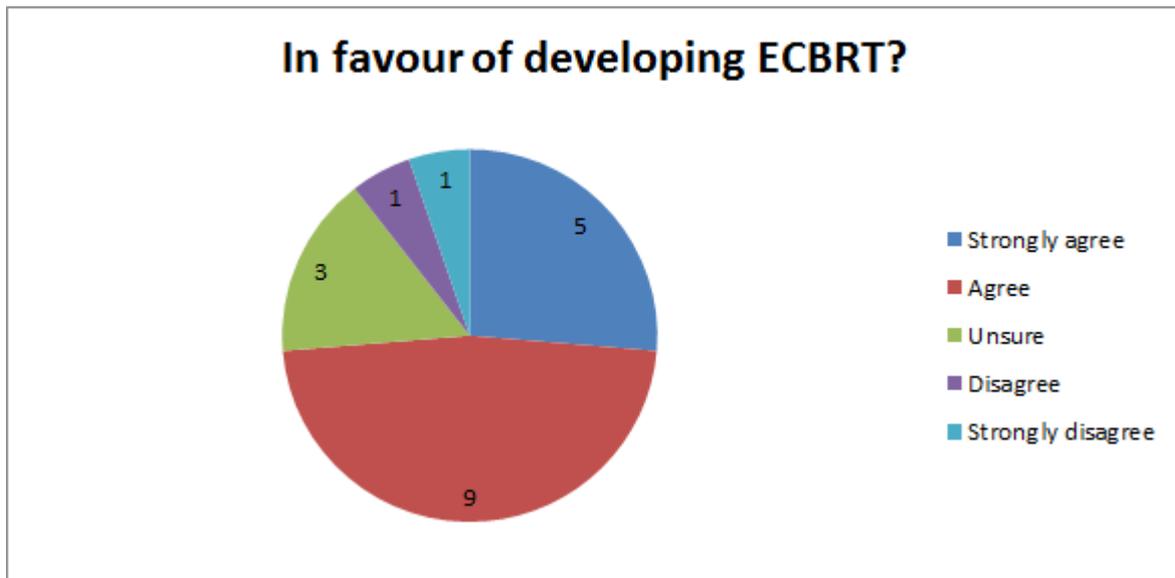
- Plastics



*Figure 3. Response chart regarding the ability of organisations to identify the training needs if their technicians*

#### **7.4 Are you in favour of a European repair technician training program authorised by EWF? (for ECBRT, European Car Body Repair Technician)**

Across the range of stakeholders interviewed there was a positive response to the development of an ECBRT training profile. Most stakeholders saw a benefit although there were many stipulations regarding how it should be applied. Only two organisations were against the creation of this profile, a repair garage and a small independent training centre. Both of these companies saw the ECBRT profile as either competition or duplication of effort.



*Figure 4. Response chart regarding whether organisations are in favour of the creation of a ECBRT training profile.*

## 7.5 How easy is it for you to obtain personnel with the necessary skills to perform high quality repairs on modern vehicles?

All stakeholders agreed that adequately skilled personnel were not readily available. The reasons cited included: low salaries of repair technicians, and lack of interest among young people to follow a repair technician training profile, as they considered employment in other sectors more attractive. It was also stated that a lot of the skilled repair technicians were in an ageing demographic and were very hard to replace.



*Figure 5. Response chart regarding the availability of suitably skilled personnel to the repair sector.*



## 7.6 Knowledge sources for repair information and instruction

From across the whole stakeholder spectrum, the following information sources were used as instructions or guidance for performing repairs:

- OEM specific instructions
- Instructions from national centres of expertise
- Modules from large certified training organisations
- OEM procedures and instructions (not available to independent SME's)
- Training and instruction from welding equipment suppliers
- Standards (e.g. BS1140, BS4872 and EN287/EN ISO 9606)
- Experience of technicians from on the job training

Any training developed within the CarboRep project must be in line with the instructions of these procedures or the project outcomes will be seen as a challenge or competitor to the present best practice. This will affect the credibility of the project and the likelihood of the training profile being adopted within industry.

## 7.7 Days training required per year:

Every stakeholder confirmed that training is important and that high-quality repair work even moreso. Figure 6 shows that most stakeholders thought 3 or more days of training per year per technician is required. Some responses were even as high 2 weeks per year. This shows that there is a commitment to training and quality from stakeholders, although they also mentioned that the cost of training should not be too high. It is worth noting that centres of expertise and training tended to suggest the most days of training per year, while repair garages (those who will be paying for the training) suggested the least.



*Figure 6. Response chart of the number of days training per year that stakeholder believe to be reasonable for a skilled repair technician.*

## 7.8 Cost of training stakeholders are prepared to pay

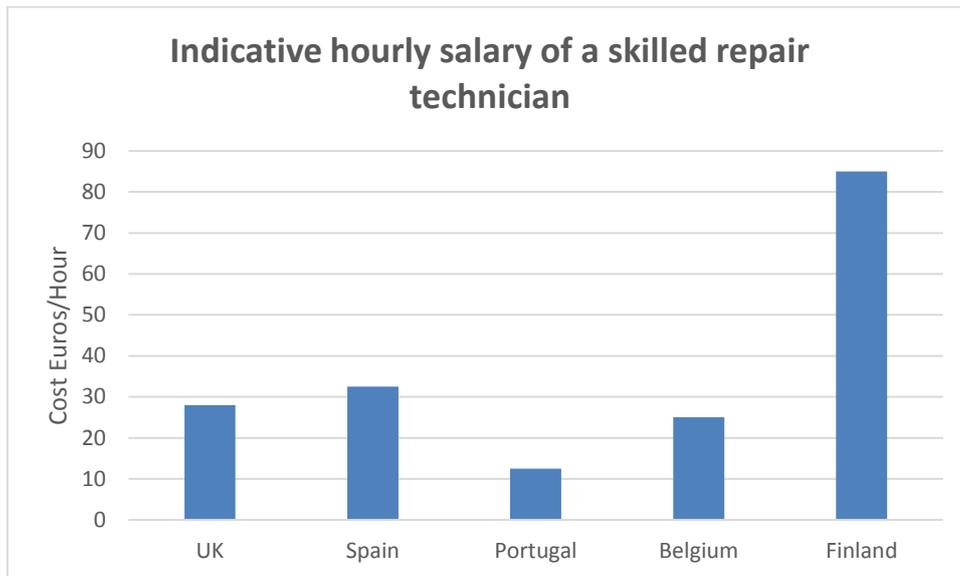
When questioned about what the cost of training should be for the training of repair technicians, responses varied greatly. Some responses were 'for free' or 'as low as possible'. But in general the majority of stake holders believed training should cost less than 1000Euros per year per technician. Only a small number of stakeholders suggested higher costs should be paid. It is important to note that the repair garages themselves (who will pay the costs) wanted the lowest price of training and the training centres (who stand to make a profit) wanted the highest training prices.



*Figure 7. Response chart of the cost of training stakeholders are prepared to pay per year.*

## 7.9 Hourly technician salary rate across the European repair sector

Responses on the salary of a skilled repair technician were only obtained from 5 countries, the hourly rates of pay varied from around 12 Euros/hour in Portugal up to 85 Euros/hour in Finland, figure 8. The repair sector is generally perceived to be low paying and, in the case of nearly all the national responses, this appears to be accurate. Although in Finland the particularly high quoted rate indicates that the repair technician's job could be quite lucrative in this particular market.



**Figure 8. The hourly salary of skilled repair technicians.**

## 8 Overall Summary of Findings

When asked whether they were in favour of the creation of the ECBRT training profile, the centres of expertise and training answered very positively, with 80% being in favour or strongly in favour. This response is very significant for the CarboRep project as buy in and cooperation from training providers and centres of expertise will be critical for the successful dissemination of the ECBRT training. The comments of these expert stakeholders should be considered in the development and approval of the ECBRT training modules, to ensure the ECBRT content is in line with the best possible industry practices.

Feedback from the repair garages indicated that they believe their own technicians may lack the skill to perform high quality repairs on modern vehicles. This demonstrates that there is certainly a skills gap to be filled by the ECBRT profile. The repair garages had very varied opinions on the quality of training available to them, some believing they could receive excellent training, others believing there was nothing suitable available. It is important for the dissemination of the ECBRT training profile, that garages who feel unable to obtain quality training are specifically supported. Others who feel they already have access to effective training will be less likely to adopt the ECBRT. Nearly all the repair garages were in favour of the development of the ECBRT training profile, they all saw a benefit in terms of skills and quality of their work. Only one garage was against the ECBRT and this is because they believed they already had access to effective training. The positive response to the ECBRT survey is extremely important to the CarboRep project, as the final customers will be the repair garages and their uptake of the ECBRT will be critical to its success.



In general, the response of the national associations was the least positive of all stakeholders regarding the CarboRep project and ECBRT profile. It will be necessary to engage with this particular group of stakeholders throughout the project to generate some support as the eventual uptake of the ECBRT will greatly benefit from support from the national bodies. Also, the bodies from other European countries must be contacted and engaged.

## 9 Implications for the ECBRT Syllabus

Joining technologies and other aspects that should be considered for the ECBRT syllabus:

- MIG / MAG welding
- MIG Brazing
- Resistance spot welding
- Blind/self-pierce riveting
- Structural adhesives

Joining of high tech materials such as aluminium, magnesium and carbon fibre only appear to occur in garages affiliated to an OEM and the OEM's provide dedicated specialist training for their most high tech vehicles. This means the materials where training is needed are:

- Conventional low carbon forming steels (mild steels)
- High strength steels, specifically awareness of the different types of high strength steel and how they should be treated differently to mild steels.
- Some common aluminium alloys; AA5xxx and AA6xxx specifically for riveting and bonding.

It may also be necessary to classify repairs according to the importance of the component for passenger safety:

- General structural repairs
- Repairs to crash critical areas; front or rear longitudinal, bumped, roof pillar, door ring, etc.

According to some centres of expertise the level of checks on joint quality should be far more stringent for the safety critical areas. It may also be prudent to adopt the approach of EN287/EN ISO 9606, where each individual joint is scrutinised, although there may be resistance to this from UK-based repairers.

At present repairers in Europe use a range of information sources as instruction to perform repairs, these vary from personal knowledge and experience, through to following national



standards and also include detailed instructions given by car companies for specific components. It is highly important that these information sources are reviewed as part of the CarboRep project to make sure the training syllabus of the ECBRT profile is up to date with the best possible practices and information. Information sources listed by the stakeholders were:

- OEM specific instructions
- Instructions from national centres of expertise
- Modules from large certified training organisations
- OEM procedures and instructions (not available to independent SME's)
- Training and instruction from welding equipment suppliers
- Standards (e.g. BS1140, BS4872 and EN287/EN ISO 9606)
- Experience of technicians from on the job training