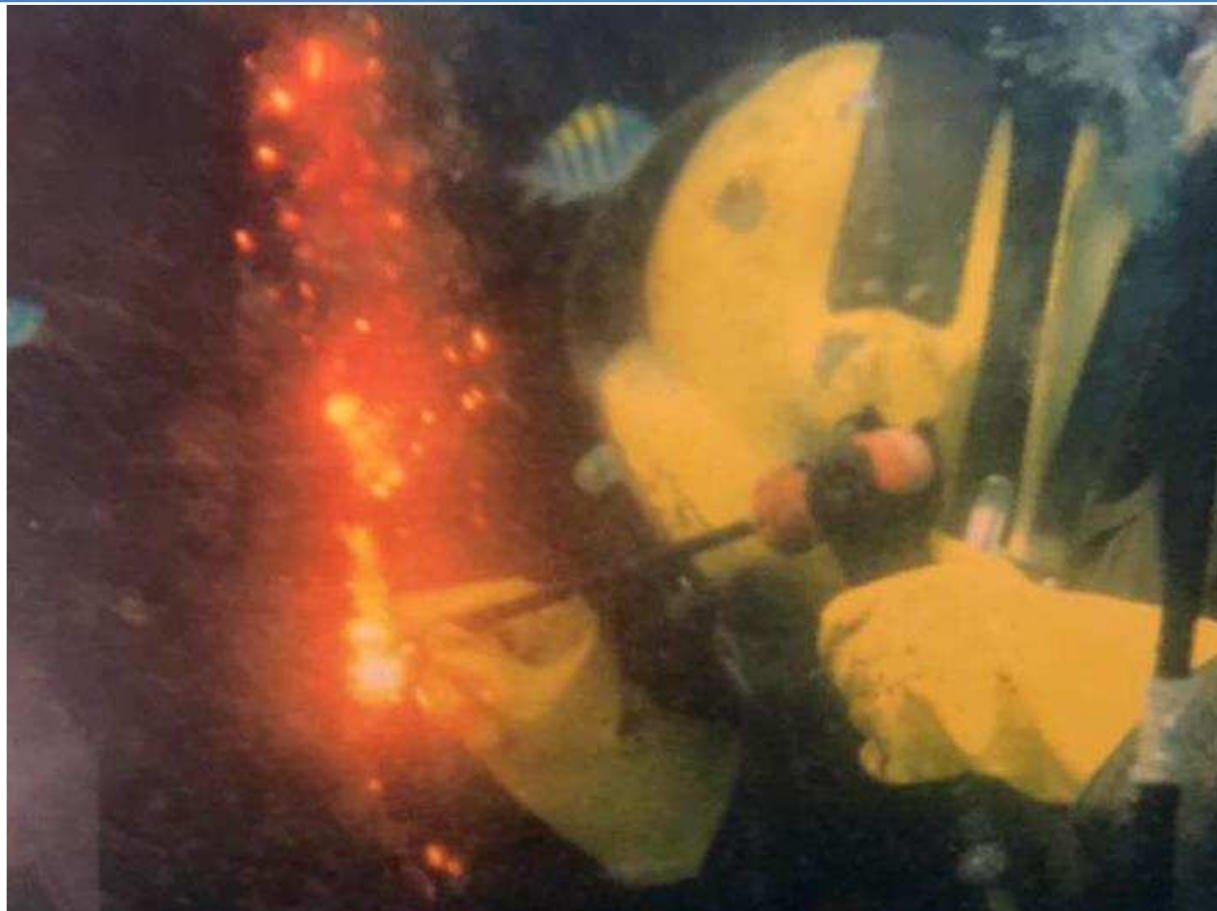


2017

HOW DO YOU CUT UNDER WATER SURVEY RESULT



Francis HERMANS
Retired Commercial Diver
27/10/2017

Prologue:

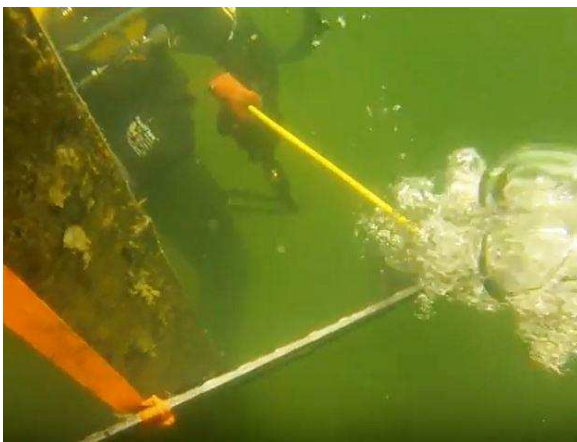
As can be seen, underwater cutting has declined sharply in recent years, especially in the offshore sector, where most of the cutting is now done mechanically.

This has for consequence that this technique is not as mastered as in the past.

In addition, for security reasons, some actors would now like to modify certain rules of learning and implementation.

Among these they would prefer:

- ✓ The cutting with only one hand without holding the rod.
- ✓ The dragging of the rod.
- ✓ The positioning of the body and head away of the cut.



Personally, I have to my credit the cutting under water of a few miles of sheet metal of all kinds and although I am still an active defender of safety, I must say that I am not really convinced of the merits of some of these proposals for change.

But who am I to think so? A retired commercial diver among a multitude of other colleagues who may have different opinions.

So I organized this little survey to find out how you, the current or former cutting divers do or have done, as well as to have your opinion on the suggested changes.

Duration of the survey:

The survey was conducted between September 22 and October 5, 2017

Survey Release:

To reach a maximum of commercial divers the questionnaire has been written in English, and French.

The dissemination of this survey was conducted via the various professional diving groups present on Facebook.

Answers to questionnaires:

150 Cutting commercial divers did reply to this survey.

Acknowledge:

Many thanks to you my colleagues who took the time to participate in this survey.

Cover photo:

Courtesy of Peter Lucarini

Inside Photos:

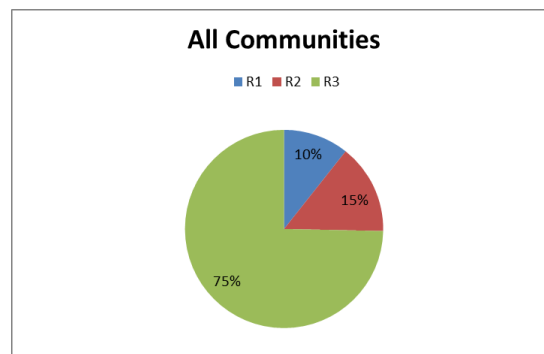
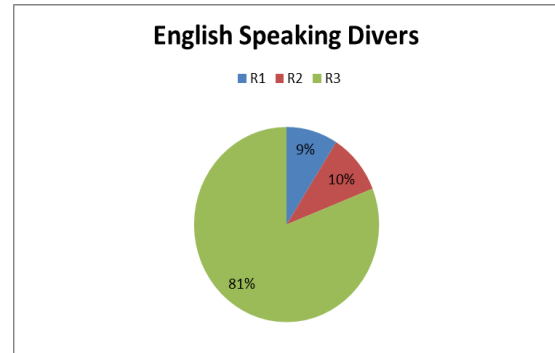
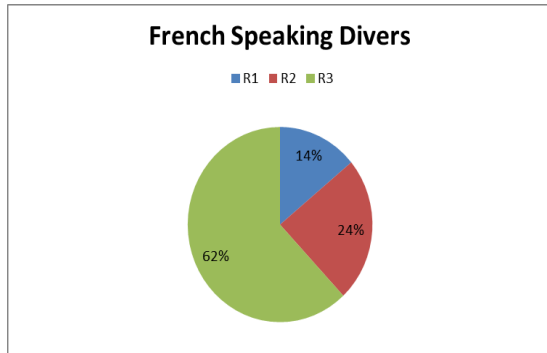
Courtesy of John Carl Roat, Cherwalker1 and taken from the Internet

Question n° 1: How many hours of underwater cutting do you have already done?

R1: - 10

R2: 10 - 30

R3: More



Why this question:

This first question is mainly intended to sort out the participants in order to know their level of competence in this area.

Analysis of replies n° 1:

As can be seen the total result shows that among the commercial divers who answered:

- ✓ 10% of the divers have only limited work experience with this technique.
- ✓ 15% already have a deeper practice of cutting.
- ✓ 75 % can be considered specialized.

To facilitate the understanding of the results, the three groups above will also be divided as such:

Inexperienced / Averagely Experimented / Experimented

Participant's comments question n ° 1:

- ✓ Je viens de terminer un chantier de démolition de pieux palplanches dans le port de Lyon 4 semaines de découpage.
- ✓ beaucoup de découpage en 30 ans de carrière.
- ✓ Une cinquantaine d'heure.
- ✓ plus de quelques centaines.
- ✓ Occasionnellement.
- ✓ formation uniquement (3-4h au total).
- ✓ Je débute dans la profession.

- ✓ Sorry to say over the years hundreds, been cutting from 78. We got the original gear from Reg Cluclas.
- ✓ Over 200.
- ✓ Several hundred at least.
- ✓ Had probably that on last short job.
- ✓ I have spent over 15yrs cutting and burning as well as using John Carl Roats training system to teach others to burn.
- ✓ Worked heavy after Katrina and Rita went through the GOM in 2005, 2006-2007 was around 290 days on a boat somewhere each yr.. Multiple burning tasks per dive per day. From risers twisted around platforms to caissons and platforms broken and crumpled on bottom. Was always my favorite tasks as a diver.
- ✓ In hundreds.
- ✓ 13 years diving. Not sure of the total hours.
- ✓ Burning commercially since 1969, I teach it!
- ✓ Hundreds of hours.
- ✓ 16 years of inland and offshore experience. I lost track.
- ✓ I've been commercial diver in the Gulf of Mexico over 21 years.
- ✓ I can safely say; based on daily logbook accounts spanning the years to date; starting in 1979. I have well over 120 days at a normal daily rotation of 6 to 8 hours sometimes longer. Few days were ever shorter in the water in a production mode. The work performed those days were logged in as burning: barge hulls, sheet pile, sheet pile, pipe, structural steel. Since that it's been a sporadic but constant demand. I can say I've consumed up to 60 to 80 boxes of exothermic rods and used maybe 5 gallons of gasoline with a Petrogen torch. There is a huge difference in Hours of burning vs boxes or weight in rods consumed.
- ✓ Graduated from DIT circa 1979.
- ✓ Cut for more 30 years.
- ✓ Lots and lots of sheet pile.
- ✓ I've burned pallets and pallets of rods.
- ✓ Around 270.
- ✓ Around 1000 hours.
- ✓ 27 years both inshore and offshore, it is still a useful tool went work scope, hazards, and environment warrant it's use.

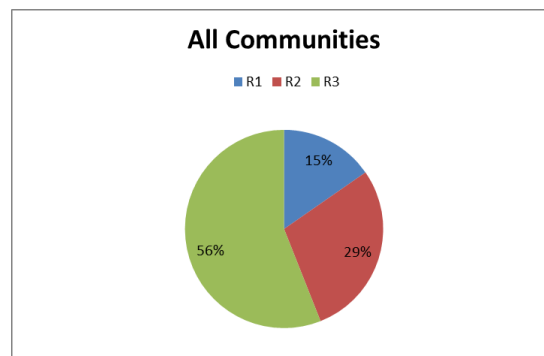
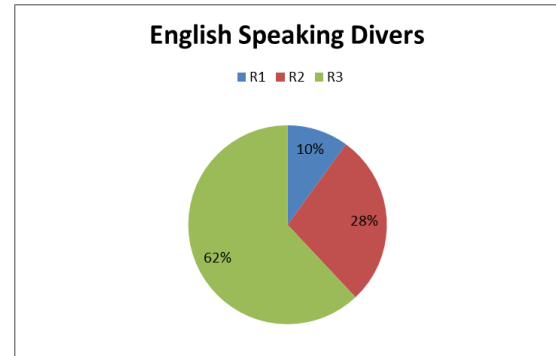
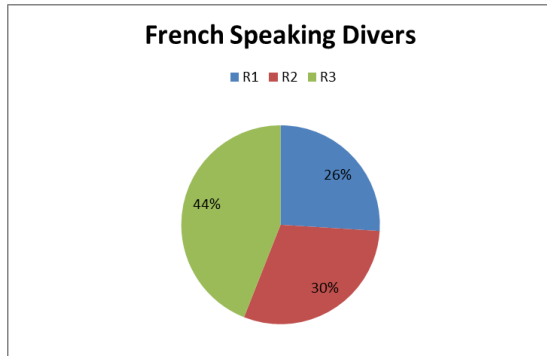
- ✓ Over a thousand.
- ✓ Burning team Thames barrier.
- ✓ Forty years diving 1% of time cutting.

Question n° 2: Have you ever used oxy-arc electrodes (steel tubular electrodes)?

R1: Never

R2: Sometimes

R3: Often



Why this question:

This second question is intended to determine the seniority in the trade of the various participants.

Analysis of replies n° 2:

This type of electrode is now largely abandoned in favor of thermal electrodes and yet as can be seen in the graphs above, only 15% of all the cutting divers reported never having used oxy-arc electrodes.

This result is quite challenging and we can therefore wonder if despite the fact that the question mentions well (steel tubular electrodes) there is no confusion between the two techniques.

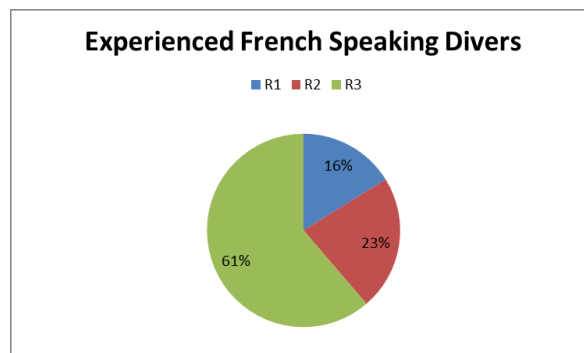
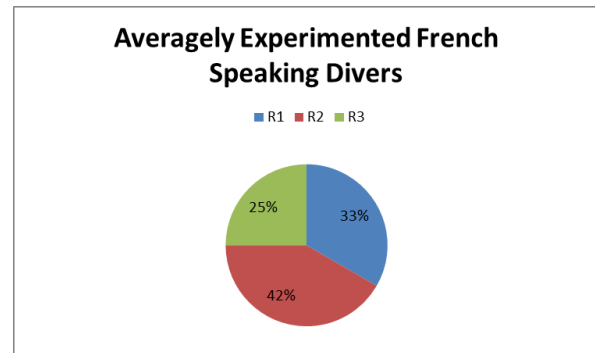
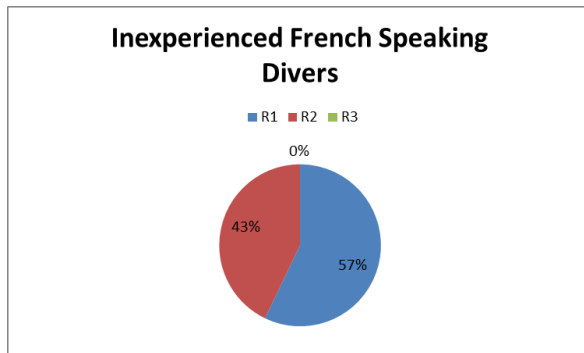
Question n° 2: Have you ever used oxy-arc electrodes (steel tubular electrodes)?

R1: Never

R2: Sometimes

R3: Often

French Speaking Divers



Complementary analysis of replies n° 2:

There seems to be confusion between the techniques especially with regard to inexperienced and averagely experimented cutters.

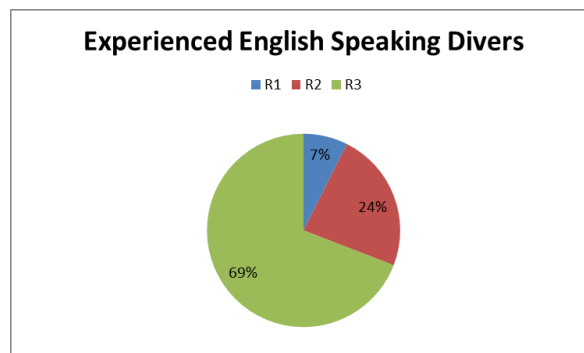
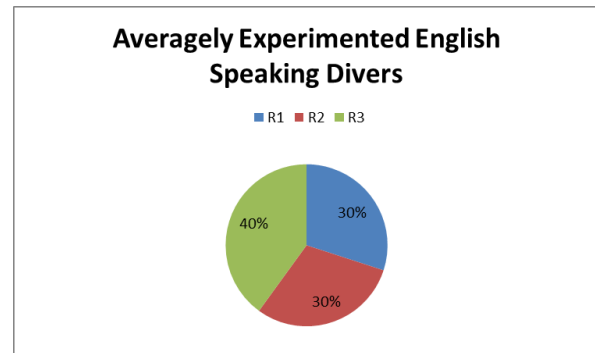
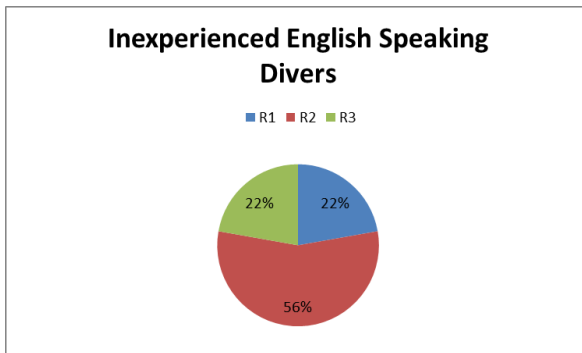
Question n° 2: Have you ever used oxy-arc electrodes (steel tubular electrodes)?

R1: Never

R2: Sometimes

R3: Often

English Speaking Divers



Complementary analysis of replies n° 2:

Here too, there seems to be confusion between the techniques, especially with regard to inexperienced and averagely experimented divers, because only 5 out of 19 cutters in these two groups say they have never used these rods.

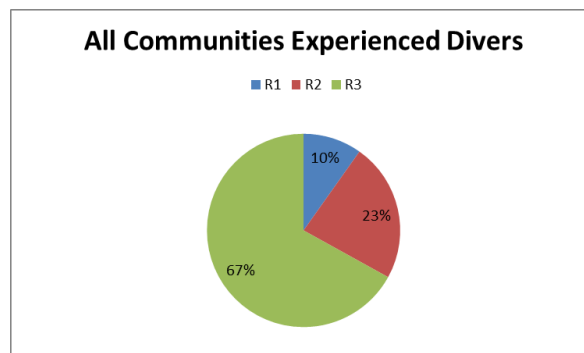
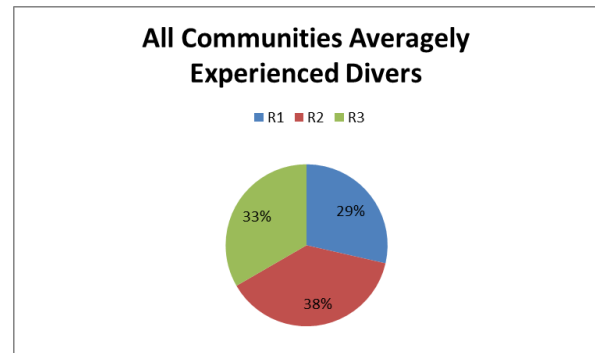
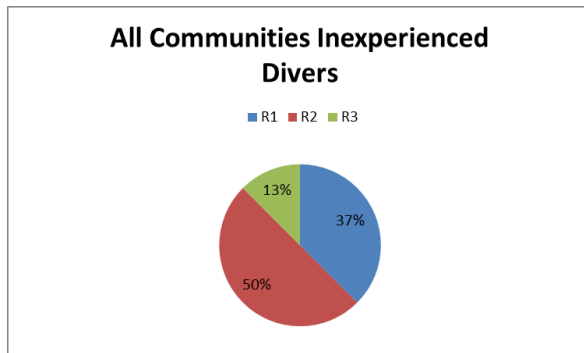
Question n° 2: Have you ever used oxy-arc electrodes (steel tubular electrodes)?

R1: Never

R2: Sometimes

R3: Often

All Communities



Complementary analysis of replies n° 2:

Responses indicate that in the group of inexperienced and averagely experienced cutters the percentage of divers who have used this type of electrode is still quite high, which seems to confirm that several cutting divers confuse the two types of electrodes.

With regard to the experienced divers only 11 out of 112 declare that they have never used oxy-arc rods.

Perhaps here too, some have confused the products, but the results would rather seem to show that a large number of answers come from already older divers who have practiced their craft in the 70's - 85's when this type of electrode type was still widely used.

This age group seems to be confirmed by the comments of some participants in questions n° 1 and n°2.

Participant's comments question n ° 2:

- ✓ Toujours.
- ✓ je ne connais pas ce modèle. j'ai toujours travaillé avec les traditionnelles Broco ou récemment les Exodus que je trouve vraiment bien (et moins cher que les Broco).
- ✓ coupe très fine pour des doigts d'hiver: perte de flamme: rapidité accrue comparée aux ultra-thermiques:
- ✓ coupe très fine pour des doigts d'hiver: perte de flamme: rapidité accrue comparée aux ultra-thermiques:

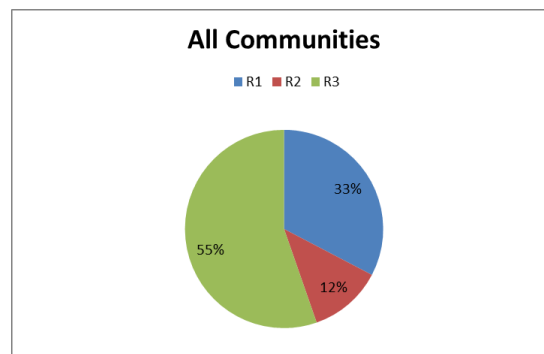
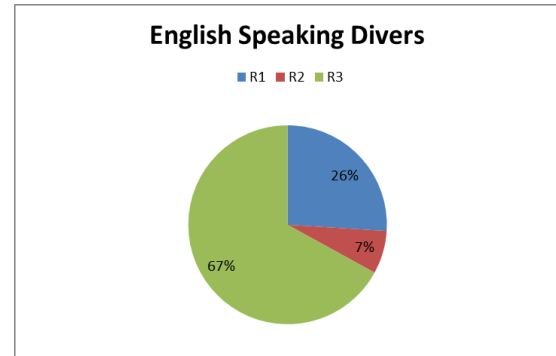
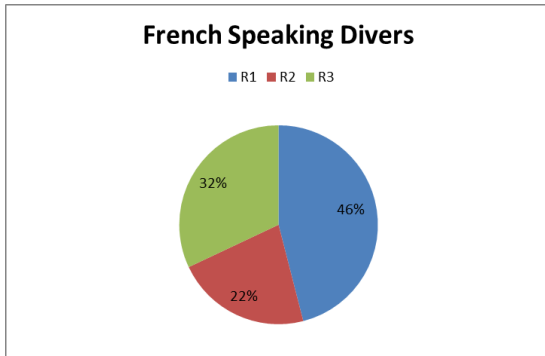
- ✓ The scapel against the chain saw.
- ✓ Broco and FireWire.
- ✓ Prefer tuff coat rods for deep water.
- ✓ Only ever used when cutting over 2" thick.
- ✓ At times it is the safest and fastest!
- ✓ Very good but the best I used were carbon.
- ✓ I use them for more than 30 years now an i think there is nothing better!
- ✓ These were 20' steel electrical conduit pipe thermal lances stuffed with welding rod electrodes.
- ✓ When burning the doors off the hyperbaric welding habitat for Comex.
- ✓ I used Oxy-arc constantly in the oilfield equipment repair business I had and many times on large earthmoving equipment.
- ✓ Used oxy-arc allways. Don't like Broco rods.
- ✓ Arc air, sea dragon, broco, even tried pretogen.
- ✓ They are the best rod to use when you can clean the metal.
- ✓ I have cut only with Broco black rods 500 & 1000 mm.
- ✓ Only type used.
- ✓ Mostly use this form of cutting. Also use carbon arc rods.

Question n° 3: Do you have already burned your hand (fingers) when cutting?

R1: Sometimes

R2: Often

R3: Never



Why this question:

The reason certain want to promote cutting with one hand is related to the fact that the risk of burn injury is important and this mainly since the use of thermic electrodes. It is therefore interesting to see if in reality, this risk is high or not.

Analysis of replies n° 3:

As can be seen, this risk is not negligible since 67 cutting divers out of 150 have already burned themselves during a cutting operation and apparently the French divers are the most prone to these inconveniences.

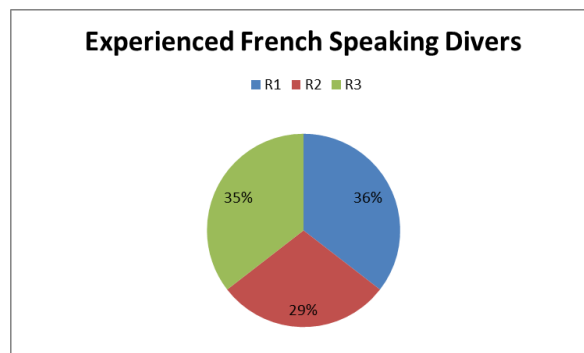
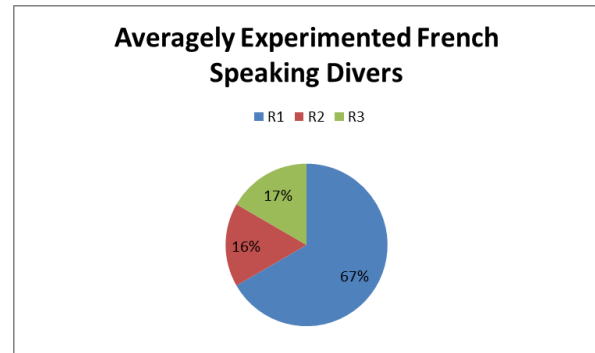
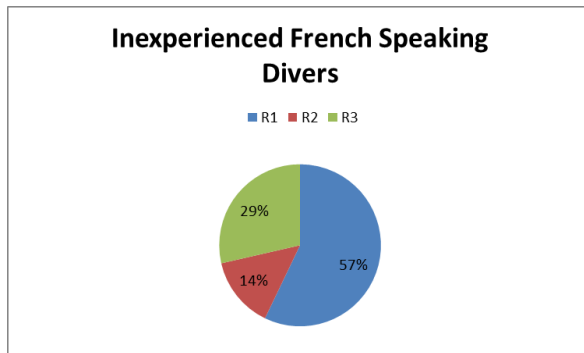
Question n° 3: Do you have already burned your hand (fingers) when cutting?

R1: Sometimes

R2: Often

R3: Never

French Speaking Divers



Complementary analysis of replies n° 3:

According to the graphs, the number of burns in French-speaking divers is quite significant, regardless of the level of experience.

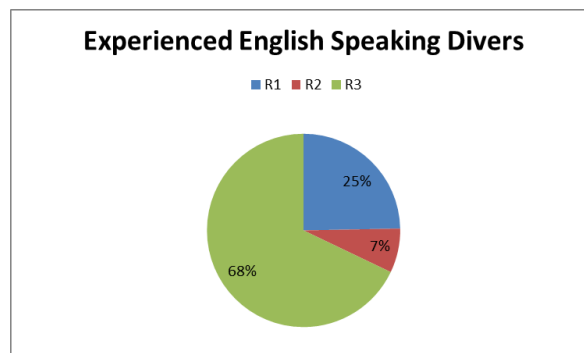
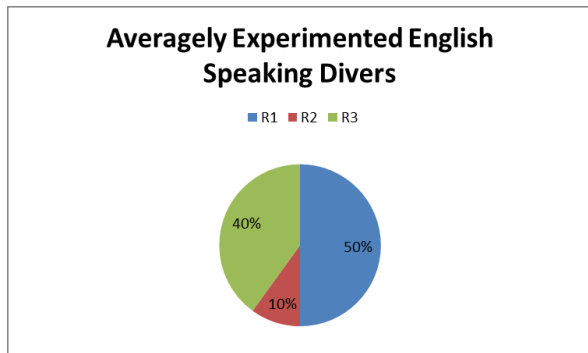
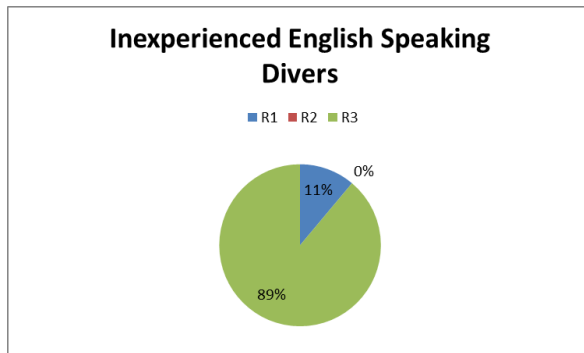
Question n° 3: Do you have already burned your hand (fingers) when cutting?

R1: Sometimes

R2: Often

R3: Never

English Speaking Divers



Complementary analysis of replies n° 3:

There is less burn among the English-speaking colleagues. Does that mean they are more cautious?

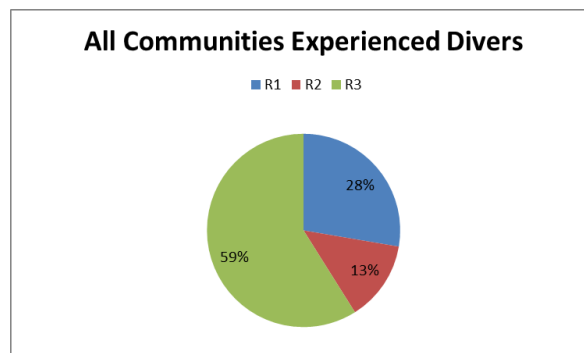
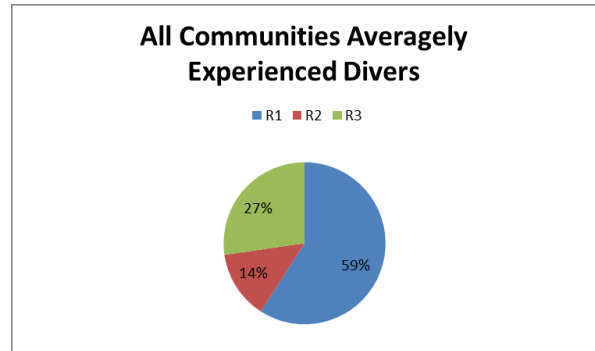
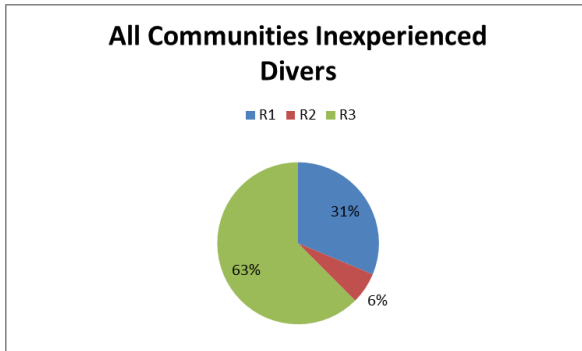
Question n° 3: Do you have already burned your hand (fingers) when cutting?

R1: Sometimes

R2: Often

R3: Never

All Communities



Complementary analysis of replies n° 3:

As reported, the French community seems to be more inclined to this type of inconvenience and whatever the level of experience.

As can be seen below (Figure 5), this is probably due to the fact that most of them hold the end of the electrode during cutting without visibility..

Participant's comments question n ° 3:

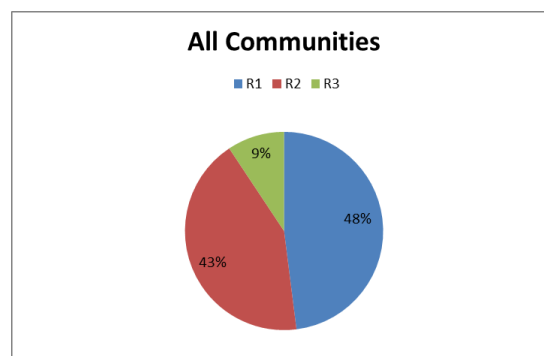
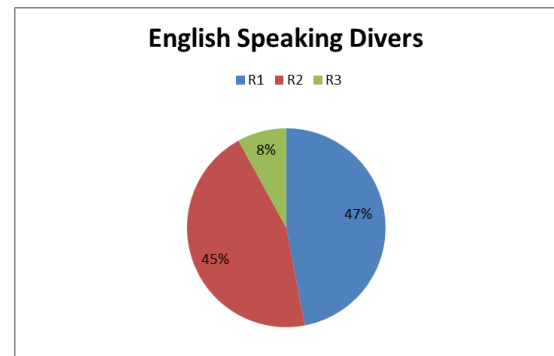
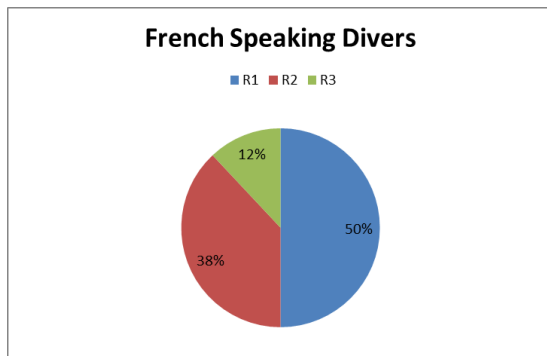
- ✓ je protégeais les doigts par quelques tours de sparadrap.
 - ✓ souvent, car beaucoup de découpage sans visibilité.
 - ✓ Je me protège toujours avec des gants et longues manchettes.
 - ✓ Pas la main la cuisse.
 - ✓ Cela arrivé surtout au début.
 - ✓ car sinon, on n'est pas un bon découpeur.
 - ✓ Découpe de doubles palplanches électrode brocco qui a arcé sur le côté : index brûlé.
 - ✓ Je porte toujours des gants de soudures en protection.
 - ✓ Oui une fois et je m'en souviens.
-
- ✓ Good gloves and a steady hand when feeding the rod through your fingers.
 - ✓ Small slag deposits.
 - ✓ I typically hold the rod lightly until it is about 1/3 consumed.
 - ✓ Especially when I try to use gloves that have been used to many times and have large amounts of burn holes.
 - ✓ Back of my hand when burning overhead.
 - ✓ Not always, most of the time.
 - ✓ I have done it smoking a Cigar as well.
 - ✓ Never got burns on fingers, but many pair of gloves has taken the toll :)
 - ✓ 2-3 times.
 - ✓ Once.
 - ✓ There is one time a diver should ever grab the working end of a rod and that might be the day he's introduced to the concept of burning underwater and he has not acclimated his sight and skills to the length of the rod and the rod. He may then physically put the rod tip in the vicinity or on the work to be burned. He should be prompted to do this without the aid of his free hand as; his free hand will more than likely be busy hanging on to his work or holding a deslagging tool.
 - ✓ But slag falls and lands on top of glove and feel some discomfort.
 - ✓ I like to hold my hand near the tip of the rod to control my cut.
 - ✓ Always wear neoprene gloves.
 - ✓ Once in zero visibility tie wire blew up rod.

Question n° 4: When cutting in clear water, does your free hand hold the electrode?

R1: Yes

R2: Sometimes

R3: Nevers



Why this question:

As one of the professionals wants to change the cutting technique, it is interesting to see how divers are cutting actually.

Analysis of replies n° 4:

The result is practically equivalent between the two communities with 136 divers out of 150 who hold the electrode with the free hand.

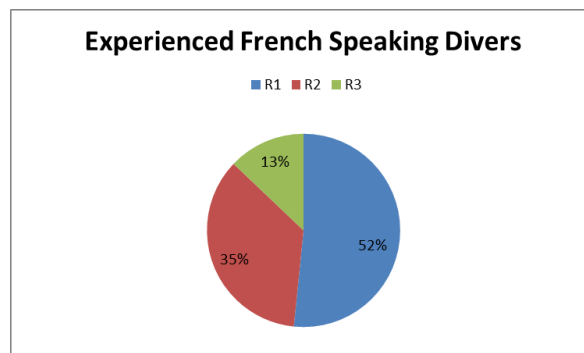
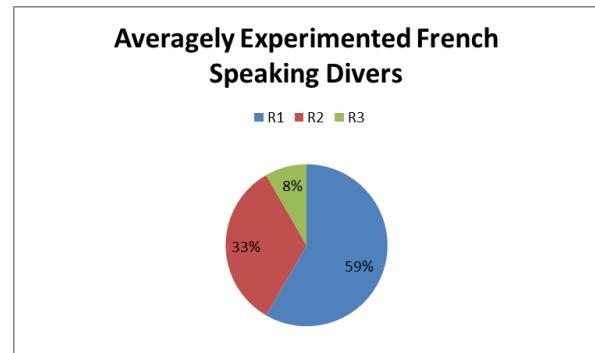
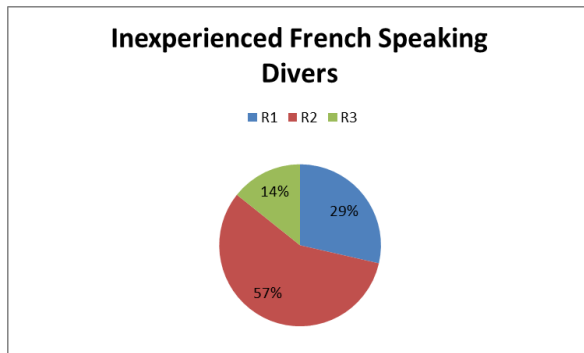
Question n° 4: When cutting in clear water, does your free hand hold the electrode?

R1: Yes

R2: Sometimes

R3: Nevers

French Speaking Divers



Complementary analysis of replies n° 4:

As can be seen, only a small number of French-speaking divers never hold the electrode when they cut in clear water.

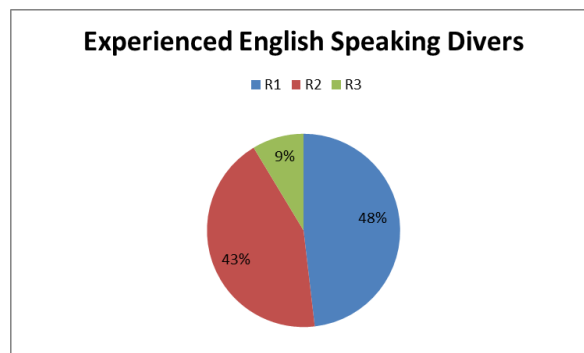
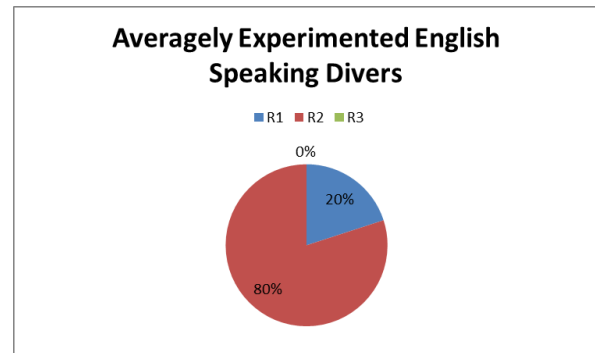
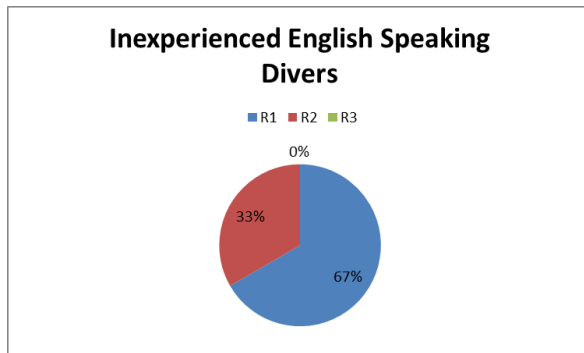
Question n° 4: When cutting in clear water, does your free hand hold the electrode?

R1: Yes

R2: Sometimes

R3: Nevers

English Speaking Divers



Complementary analysis of replies n° 4:

One-hand cutting is practically not used by the English-speaking divers because only a few experienced cutters use this technique.

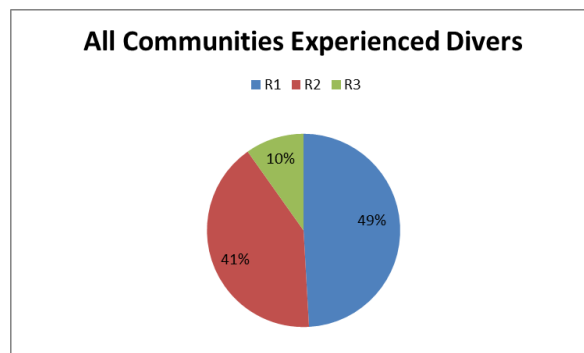
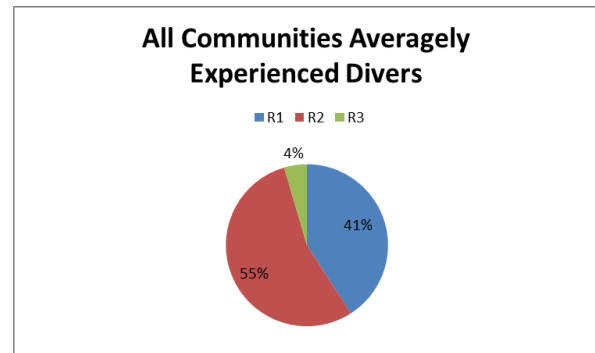
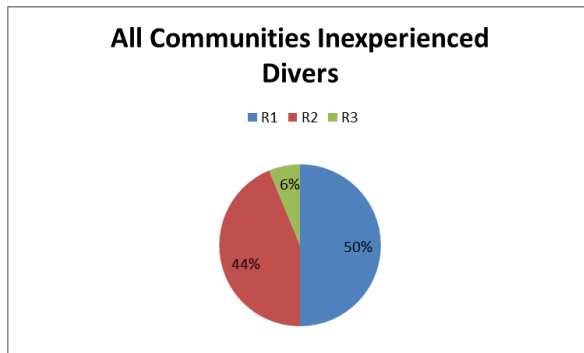
Question n° 4: When cutting in clear water, does your free hand hold the electrode?

R1: Yes

R2: Sometimes

R3: Nevers

All Communities



Complementary analysis of replies n° 4:

While in these conditions of visibility, it could easily be understood that the cutting is done with one hand, we see that regardless of the level, almost all the cutting divers hold the electrode.

This can easily be understood by the fact that it stabilizes the displacement of the electrode, but also that the combustion thereof can be visually controlled and limits the risk of burns.

Participant's comments question n ° 4:

- ✓ mais pas aussi près de l'extrémité.
- ✓ obligatoire pour un découpage précis.
- ✓ Je n'ai que rarement eu l'occasion de découper en eau claire.
- ✓ les 2 autres réponses valent pour les débutants.
- ✓ jamais vu d'eau claire :D
- ✓ Sauf si la position ne le permet pas.
- ✓ Suivant la pièce à découper en début d'électrodes.

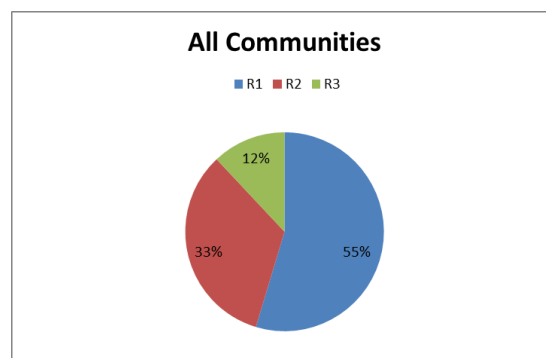
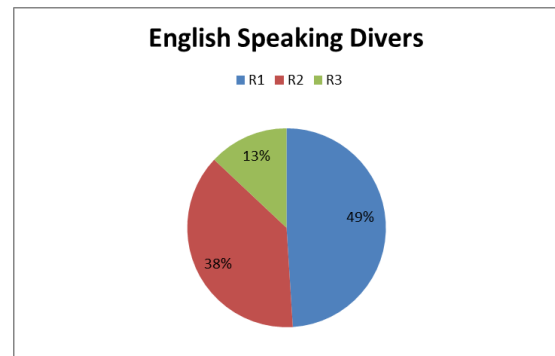
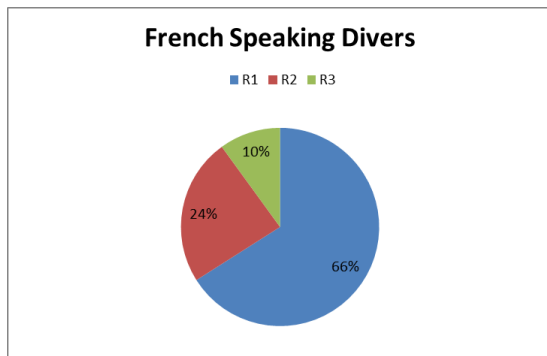
- ✓ With the grip of a pen in the left hand.
- ✓ It's like welding you only need a confident hand.
- ✓ It depends on what I am cutting.
- ✓ Just depended on where the cut was located or position of body.
- ✓ Depends on body position and Rod control.
- ✓ Yet to have any visibility.
- ✓ 95% of the time.
- ✓ That is a training method only. Not to be used in practice. Mainly because the diver is handicapping his skill when single handed manipulation of the rod is all he can do because of circumstances which are typical in an underwater environment.
- ✓ It depends on the situation.
- ✓ Only when I need to hold myself with the other hand, cut a little pipe... I like to have a clean cut and always try to be precise.

Question n° 5: When cutting without visibility, does your free hand hold the electrode?

R1: Yes

R2: Sometimes

R3: Never



Why this question:

Before a possible change of technique it is good to know the current trend of cutting without visibility.

Analysis of replies n° 5:

Apparently, the lack of visibility does not change much the behavior of the cutters since they are only 18 out of 150 to never hold the electrode.

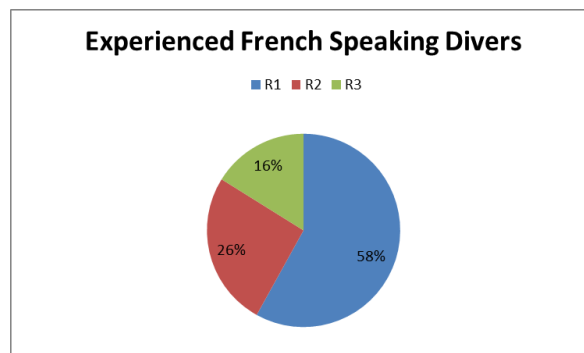
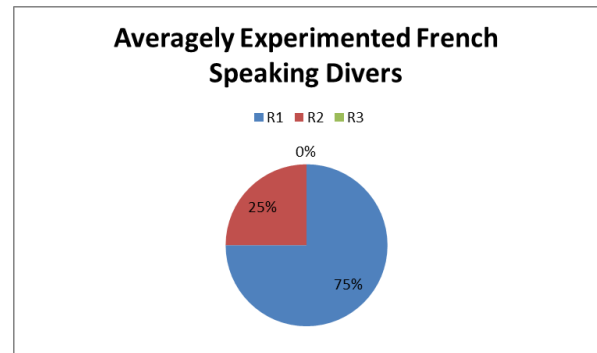
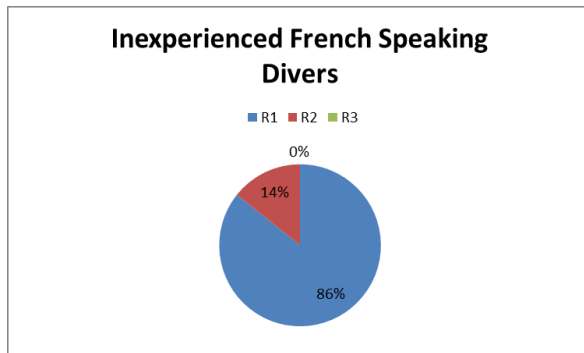
Question n° 5: When cutting without visibility, does your free hand hold the electrode?

R1: Yes

R2: Sometimes

R3: Never

French Speaking Divers



Complementary analysis of replies n° 5:

The fact that the number of divers who never uses their free hand comes exclusively from the experienced group seems pretty weird.

Perhaps do they have exceptional dexterity Or do they use a guiding template.

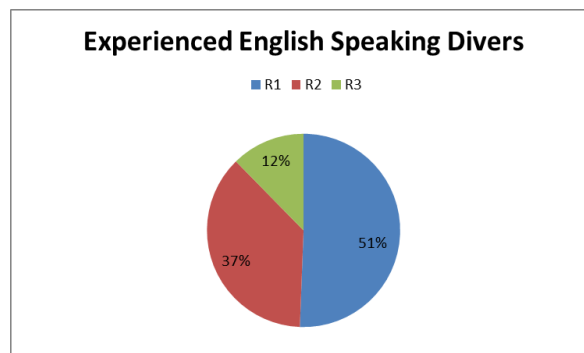
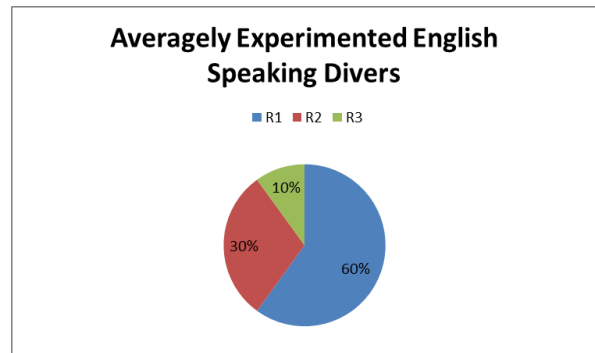
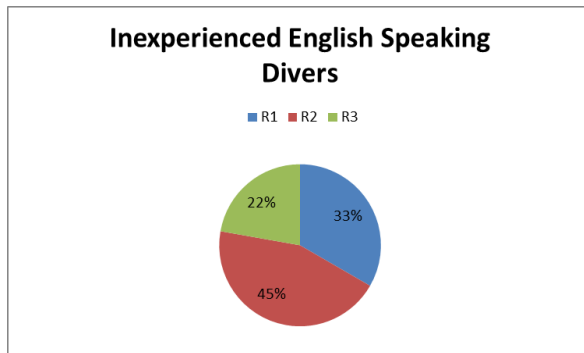
Question n° 5: When cutting without visibility, does your free hand hold the electrode?

R1: Yes

R2: Sometimes

R3: Never

English Speaking Divers



Complementary analysis of replies n° 5:

When the visibility is reduced, the English cutters hesitate a little more to hold the electrode. As can be seen with the replies in question n° 3, this probably justifies the least percentage of burn in this community.

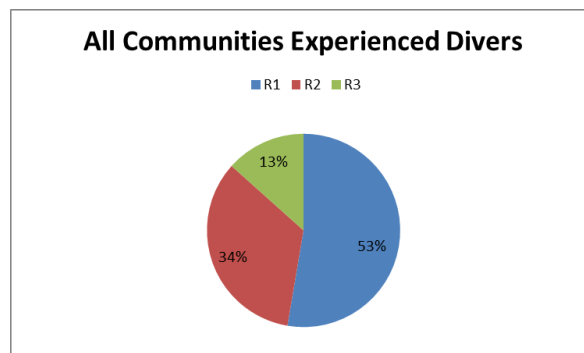
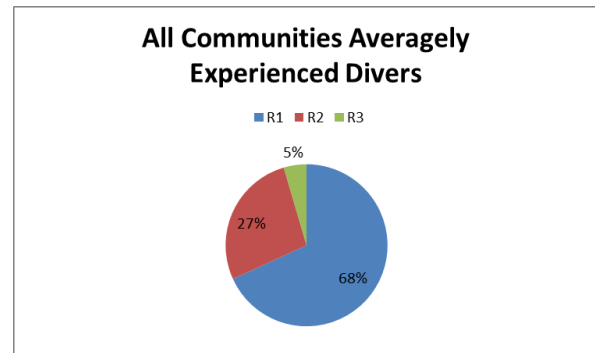
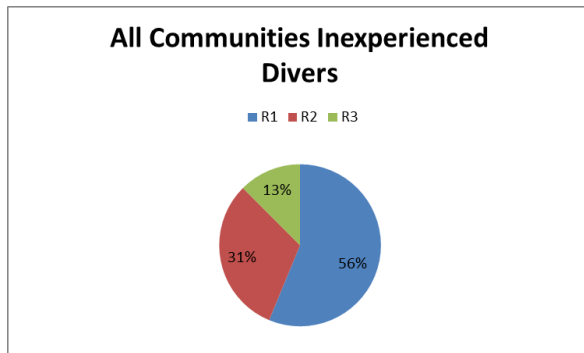
Question n° 5: When cutting without visibility, does your free hand hold the electrode?

R1: Yes

R2: Sometimes

R3: Never

All Communities



Complementary analysis of replies n° 5:

For cutting without visibility the number of cutters who do not use the free hand increases slightly by 4 units (18 out of 150) compared to cutting with good visibility.

Participant's comments question n ° 5:

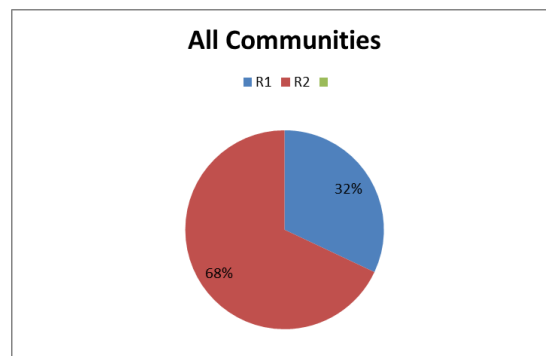
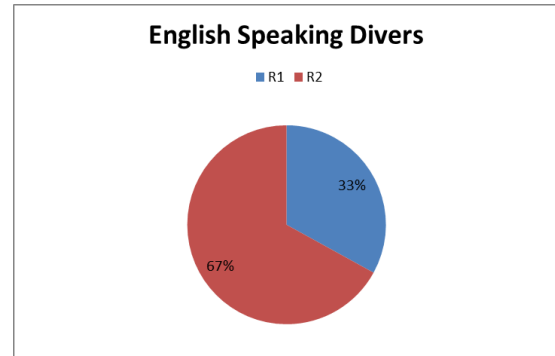
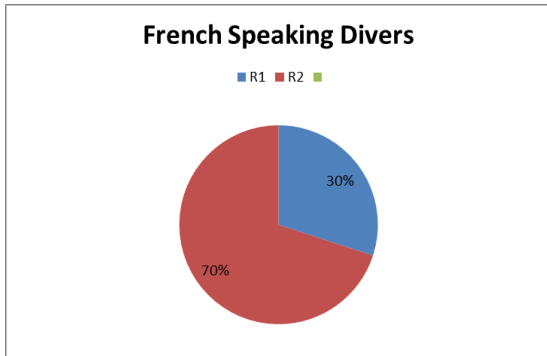
- ✓ à +/- 5 cm de l'extrémité. Cela me permet de contrôler le trajet de l'électrode.
- ✓ encore plus nécessaire que dans l'eau claire.
- ✓ C'est pas vraiment tenir avec l'autre main c'est juste reposer sur le doigt.
- ✓ Toujours et parfois suivant les appuis et la stabilité.
- ✓ c'est une évidence élémentaire.
- ✓ stabilité de l'électrode, vitesse plus régulière.
- ✓ Sauf si la position ne le permet pas.

- ✓ Keeps you steady and concise.
- ✓ Looking for trouble if you do this.
- ✓ I generally start the rod off with free hand holding the electrode for greater accuracy, and time the burn to remove my hand before it gets burnt. Always err on side of caution.
- ✓ Sometimes to start the rod burning.
- ✓ Just to begin the cut.
- ✓ I like to use my fingers as a guide when burning in dark water.
- ✓ "Always" when possible.
- ✓ Depends on body position & Rod Control.
- ✓ Most of the time.
- ✓ Have never cut in zero vis.
- ✓ I say never in this case because there are seldom reasons a diver can't direct the tip of a rod to the work zone with the aid of his light. Another trick I've used for 40+ years is to use a fresh water larger hose with low volume and displace the turbid water. Cutting blind is not production when it only takes 10 minutes to set up a freshwater hose. This can be tied off on the work or attached to the divers chest with a few connections. The Cold fresh water creates a thermic space.
- ✓ To get the cut established.
- ✓ No need!
- ✓ Chingadara is the trick.
- ✓ But as it consumes the hand is removed because at that point it's no longer needed to steady and control.
- ✓ It depends on the situation.
- ✓ As a example, when cannot reach easily the cutting point... 95% two hands.
- ✓ Only to start.
- ✓ Just to get it in position.

Question n° 6: Do you think that when cutting without visibility it is possible to realize a good and straight cut without holding (guiding) the electrode with your free hand?

R1: Yes

R2: No



Why this question:

Personally I really cannot imagine that in black water we can make a correct cut with one hand. Already cutting correctly a simple slinging hole in a plate is not obvious, so I do not see very well how you can for example while lying in the mud make a horizontal cut a sheet pile curtain with one hand without making big shit.

Analysis of replies n° 6:

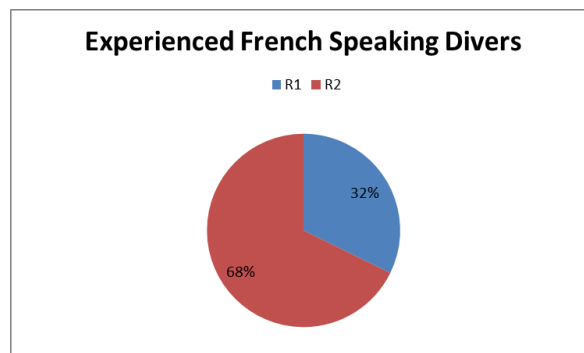
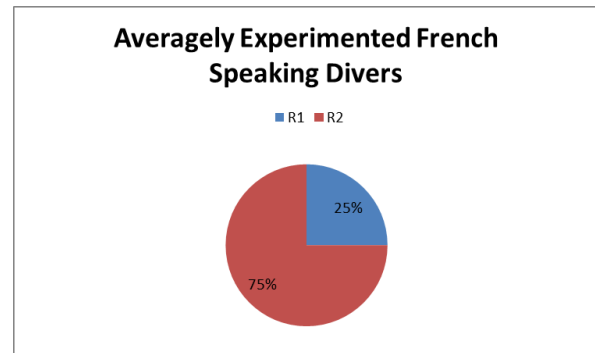
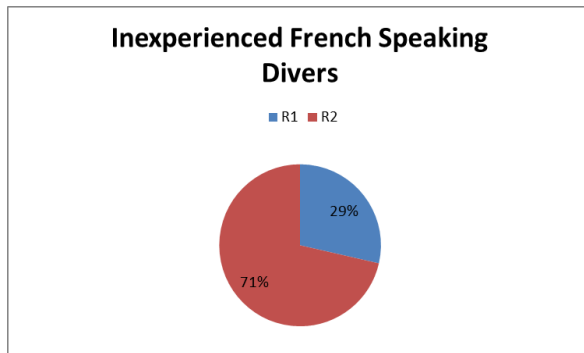
Despite the difficulties that can present this type of cutting, nearly a third of divers are more optimistic than me and say they can get a good result without holding the electrode to guide it.

Question n° 6: Do you think that when cutting without visibility it is possible to realize a good and straight cut without holding (guiding) the electrode with your free hand?

R1: Yes

R2: No

French Speaking Divers



Complementary analysis of replies n° 6:

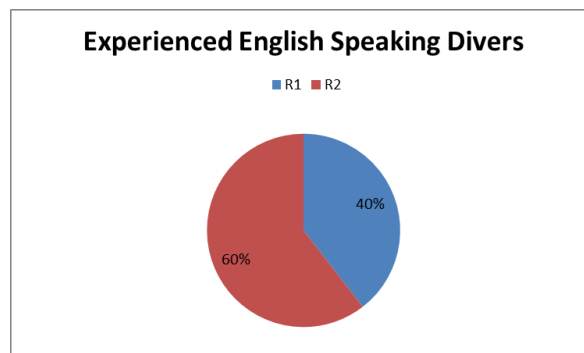
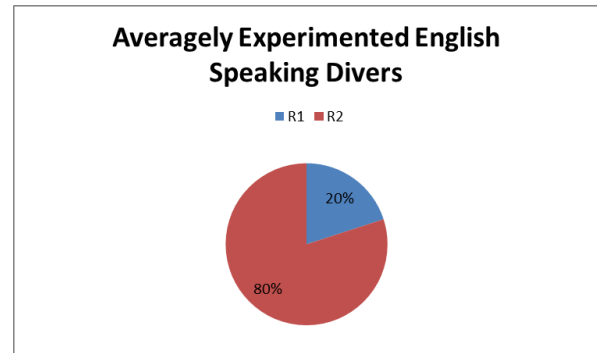
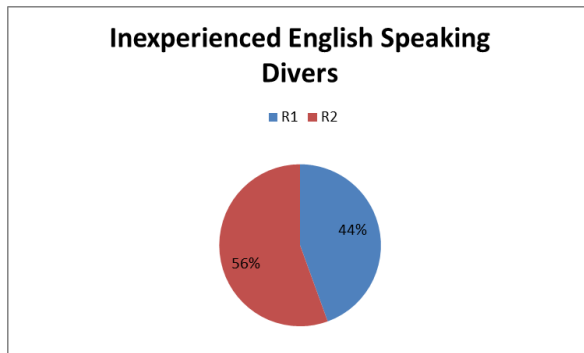
35 out of 50 cutters say they cannot cut properly with one hand.

Question n° 6: Do you think that when cutting without visibility it is possible to realize a good and straight cut without holding (guiding) the electrode with your free hand?

R1: Yes

R2: No

English Speaking Divers



Complementary analysis of replies n° 6:

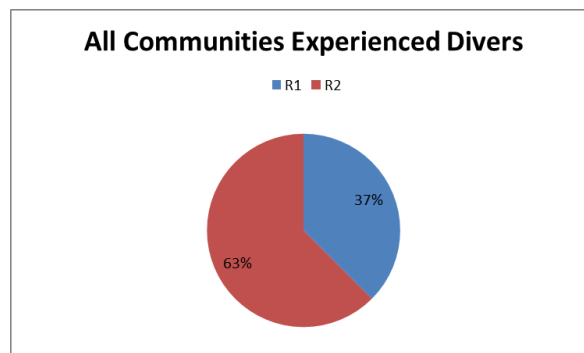
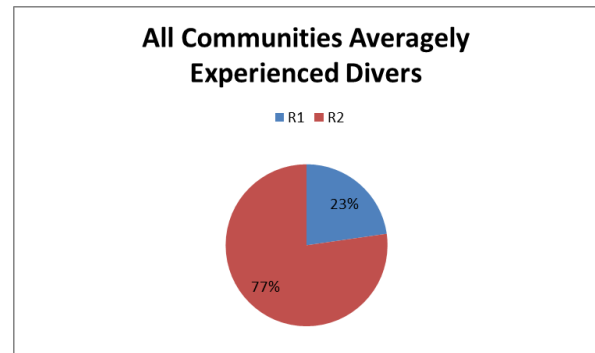
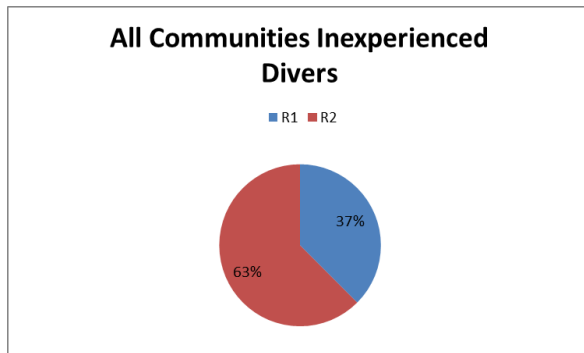
67out of 100 cutters say they cannot cut properly with one hand.

Question n° 6: Do you think that when cutting without visibility it is possible to realize a good and straight cut without holding (guiding) the electrode with your free hand?

R1: Yes

R2: No

All Communities



Complementary analysis of replies n° 6:

48 out of 150 cutters claim to be able to make a correct cut in black water with one hand, but reading the comments we realize that many of them provide a guide which truncates a bit answers.

The use of a guide is obviously a good solution, but in many situations its use is not conceivable from the point of view of profitability.

Participant's comments question n ° 6:

- ✓ Je n'imagine pas pouvoir faire une BELLE coupe droite sans ponts sans tenir la baguette.
- ✓ pour une belle découpe, la main sert à savoir où se situe la baguette.
- ✓ Il arrivait que je m'aide d'un guide.
- ✓ Je n'y suis pas encore parvenu.
- ✓ Cela n'est que mon avis, certains y arrivent très bien.
- ✓ Chacun sa méthode.
- ✓ c'est toujours la main "libre" qui dirige la coupe.
- ✓ Si vous avez du courant et en pleine eau, peu probable.
- ✓ tout est une question d'habitude.
- ✓ Avec un guide et de l'entraînement.

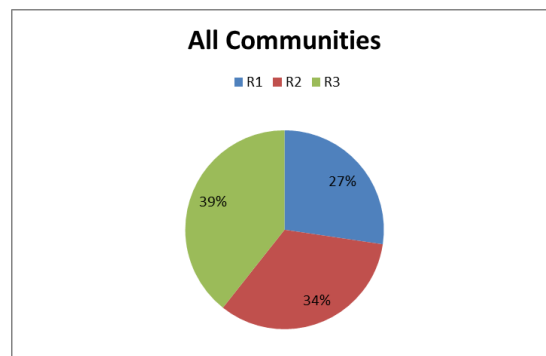
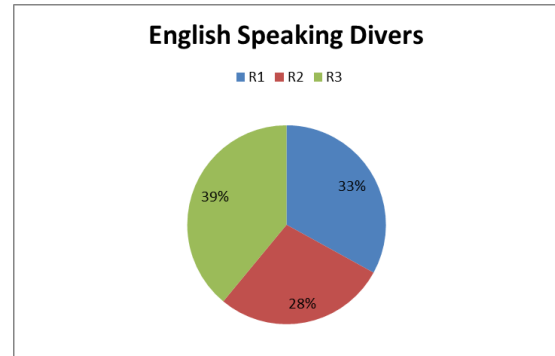
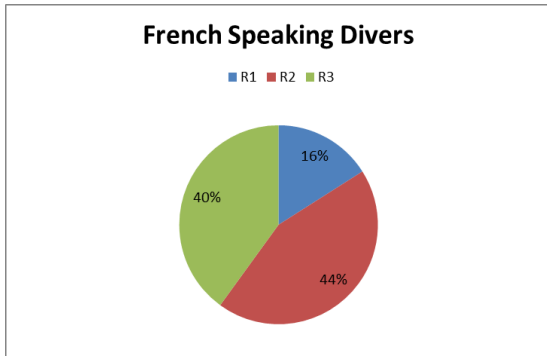
- ✓ When I worked a bad cut got you an extended holiday without pay.
- ✓ Even in zero viz you can guide the rod by other means rope round pipes etc.
- ✓ Yes, but probably only with an aid, e.g.: wire guide, jig etc.
- ✓ Absolutely. For a straight cut in zero vis I use a template.
- ✓ It takes patience and skill, but it can be done. Some of cutting and sending in current is one handed.
- ✓ For me personally, with enough consistency.
- ✓ I do not have that skill level.
- ✓ At Times but most usually not!
- ✓ Use a guide.
- ✓ When cutting vertical it is easy to make a straight cut.
- ✓ Difficult.
- ✓ Depends if you can use something as a guided.
- ✓ Difficult to achieve but not impossible!
- ✓ The diver should simulate the movements he will make he can use guide aids like using the rod to actually attach a guide angle, bar or anything to keep him on track. Burning for three seconds off the cut line equates to a total screw up. Using chilled fresh water is the trick I've counted on in an instant when burning in pure shit.
- ✓ Most times you cut below the mud line, there for who gives a flip
- ✓ Not enough experience.
- ✓ Depends your experience.
- ✓ I usually drag a knife or some sort of slag checker behind my cut as I'm cutting. Usually right after I change a rod.
- ✓ If you have a good stability, position... may be.... Not me, I'm a newbie.
- ✓ Worksite access, work scope, environmental conditions all factors affecting cut performance.
- ✓ You can make cutting guides for any burning job and you don't have guide the rod with your hand.
- ✓ You can do so with a guide set in place.
- ✓ This is a personal experience; I've never cut without using my free hand.

Question n° 7: Do you think you could easily learn to cut with one hand in water without visibility?

R1: Yes

R2: No

R3: Maybe



Why this question:

Some would like to change the traditional two-handed cutting method to a one-handed cutting to avoid or reduce the risk of burns.

Analysis of replies n° 7:

Apparently, just under a third of divers think they can change their cutting method.

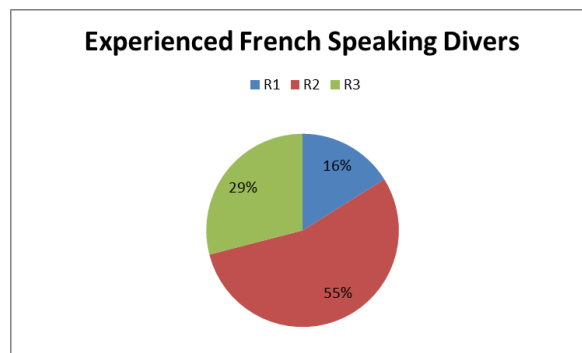
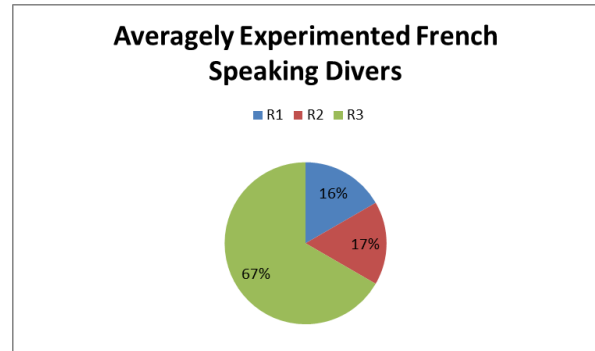
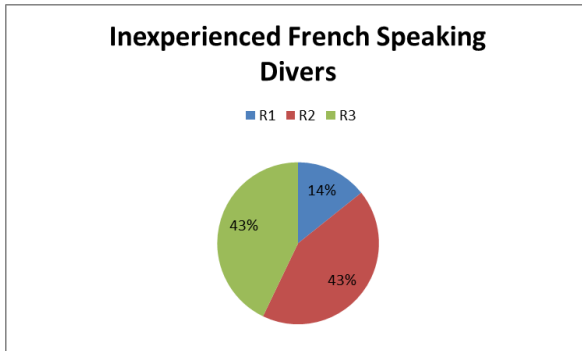
Question n° 7: Do you think you could easily learn to cut with one hand in water without visibility?

R1: Yes

R2: No

R3: Maybe

French Speaking Divers



Complementary analysis of replies n° 7:

As we can see, French-speaking divers are more skeptical and only 8 out of 50 think they could learn it.

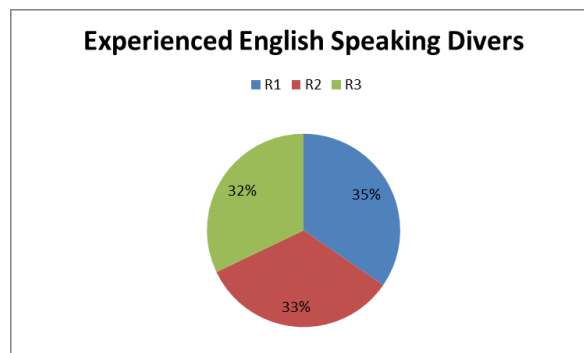
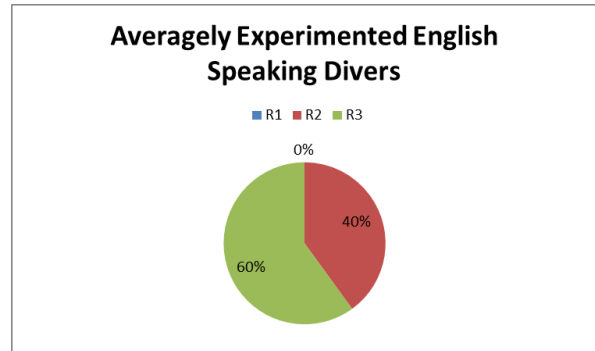
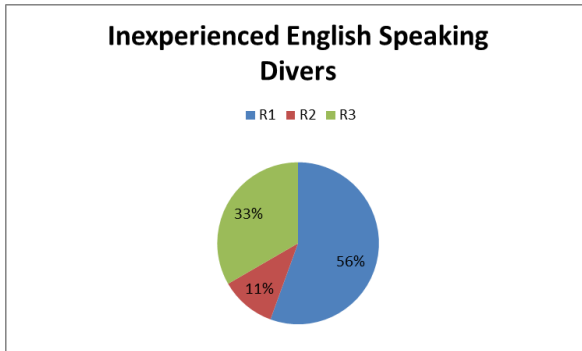
Question n° 7: Do you think you could easily learn to cut with one hand in a water without visibility?

R1: Yes

R2: No

R3: Maybe

English Speaking Divers



Complementary analysis of replies n° 7:

Only 33 cutters out of the 100 think they can change their way of doing it and learn this easily.

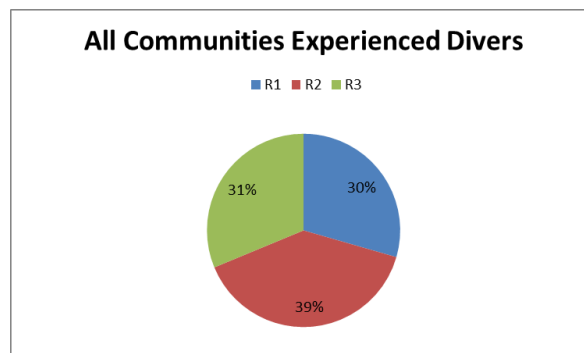
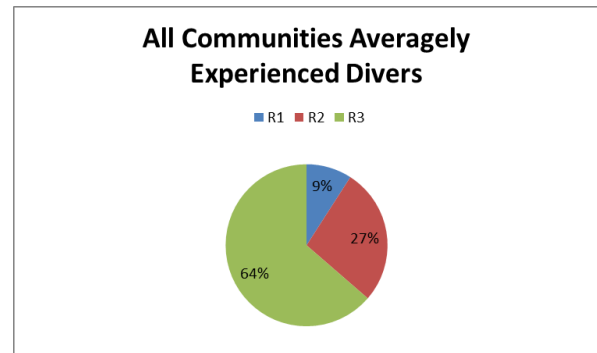
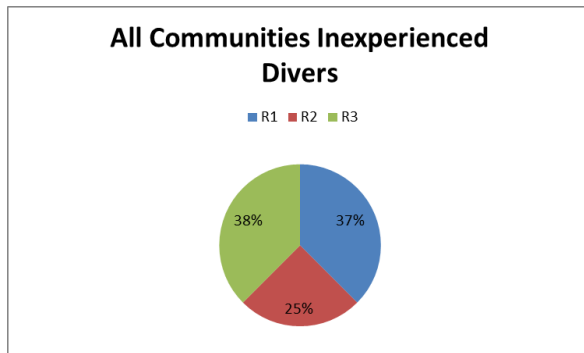
Question n° 7: Do you think you could easily learn to cut with one hand in a water without visibility?

R1: Yes

R2: No

R3: Maybe

All Communities



Complementary analysis of replies n° 7:

Apparently the less experienced cutters are the most convinced that they could learn this technique quite easily.

Participant's comments question n ° 7:

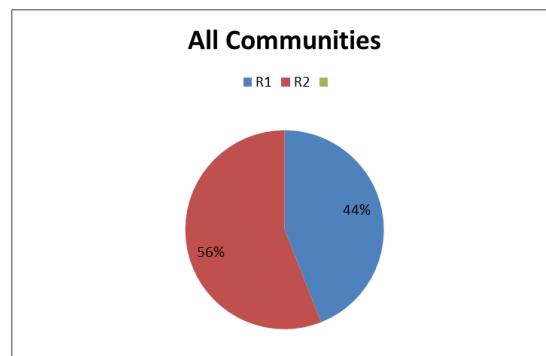
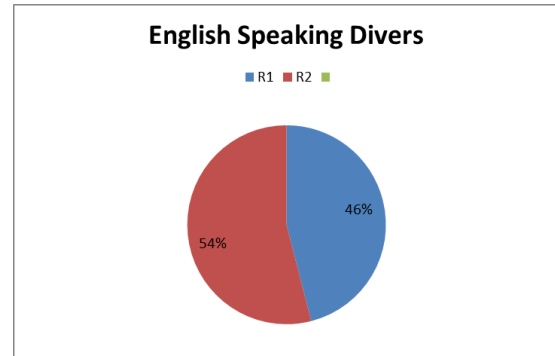
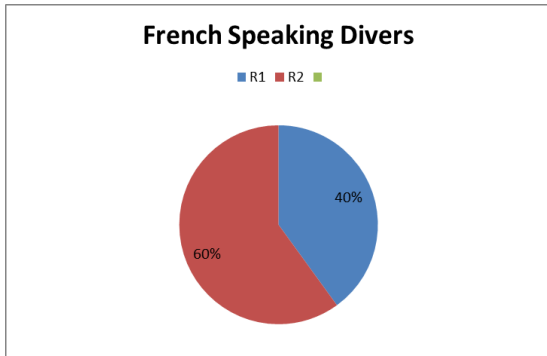
- ✓ et je n'en vois pas l'intérêt.
- ✓ Je suis prêt à apprendre.
- ✓ c'est toujours la main qui n'enfoncé pas la gâchette d'oxy qui dirige la manip.
- ✓ l'essentiel a mon avis est la stabilité de l'électrode et le toucher fin ... certain on naturellement une main qui ne tremblote pas et peuvent facilement guider leur électrode (voir certains soudeurs terrestres qui sont des artistes). d'autres ont la tremblote ... et sans la seconde main, ils font de la dentelle.
- ✓ Tous s'apprend la technique vient avec la pratique.
- ✓ Mais faut savoir appliquer la technique enseignée.
- ✓ Oui mais pas facilement.

- ✓ Seen the aftermath of many who have tried.
- ✓ Burning takes a lot of experience on the job.
- ✓ As I stated, I often cut one-handed. But I use a template in zero vis whenever possible to achieve a straight cut.
- ✓ To me it's time and repetition to get the feel.
- ✓ For me personally, with enough consistency.
- ✓ You should know how to do it. That comes with burning many practice rods.
- ✓ I've done it.
- ✓ With the proper equipment!
- ✓ It depends the circumstances.
- ✓ Never tried. I'm new and have some cutting experience but think that a guide hand is like a safety, why stray from a good practice.
- ✓ I can and do regularly.
- ✓ A diver is not the qualified diver if he is learning anything brand new while in the water. PERIOD! A diver not skilled in manipulating a rod singlehanded is a danger to himself, to the project and a total liability to the company he's working for or the owners he's contracted to.
- ✓ It's all about whichever you find the most comfortable.
- ✓ Cut with bad visibility is a matter of experience.
- ✓ I've done it.
- ✓ Burning like welding . Some are really good , some not so good, You can make a welder a Diver but not all the time can you make a Diver a welder or burner.
- ✓ I don't understand cutting with one hand. In my opinion you should always have control of the rod and cutting speed.
- ✓ In a perfect world.
- ✓ Why would I?

Question n° 8: To avoid the risk of burning, do you think this one-handed cutting method should be taught to new trainees?

R1: Yes

R2: No



Why this question:

Some would like to teach this technique from the beginning of the cutting training. However, when we see the poor results obtained in some schools after a two-handed apprenticeship, we may wonder what the one hand test piece would look like.

Analysis of replies n° 8:

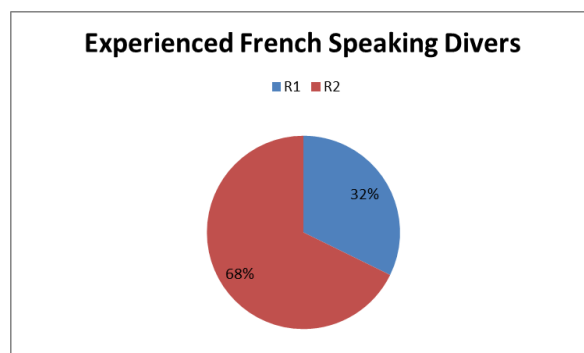
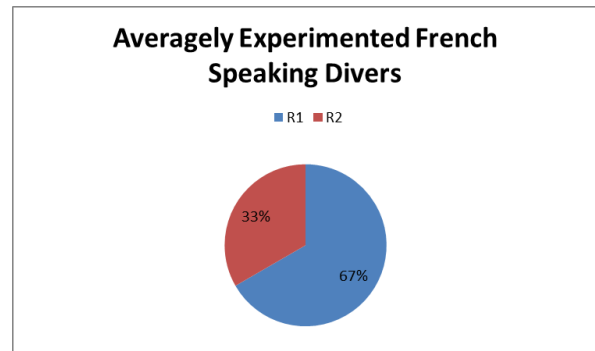
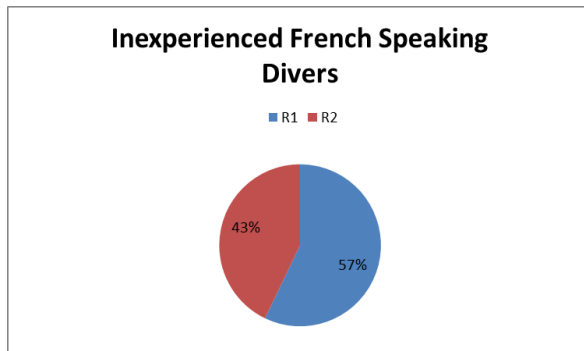
As can be seen, 66 cutters out of 150 are in favor of this type of training.

Question n° 8: To avoid the risk of burning, do you think this one-handed cutting method should be taught to new trainees?

R1: Yes

R2: No

French Speaking Divers



Complementary analysis of replies n° 8:

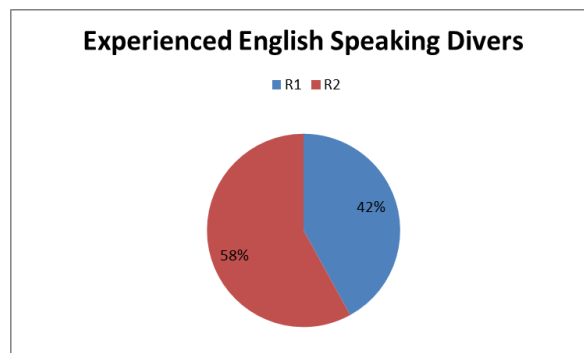
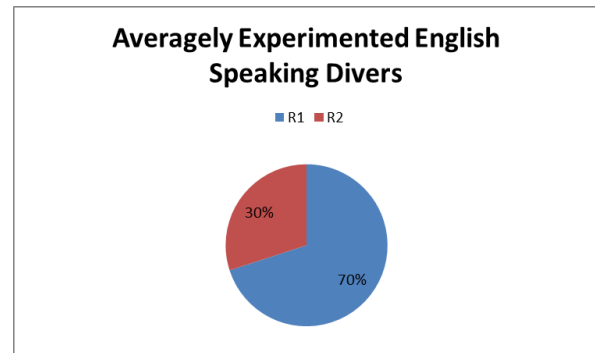
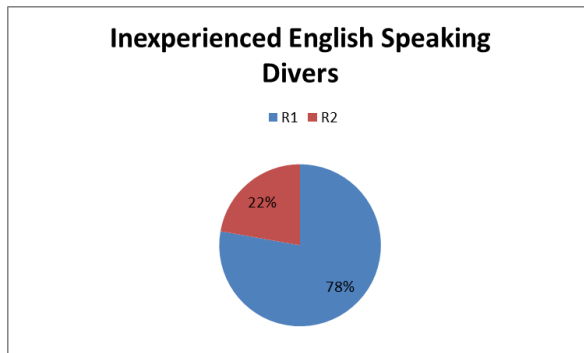
Apparently, it's a wish that emanates more from less experienced cutting divers.

Question n° 8: To avoid the risk of burning, do you think this one-handed cutting method should be taught to new trainees?

R1: Yes

R2: No

English Speaking Divers



Complementary analysis of replies n° 8:

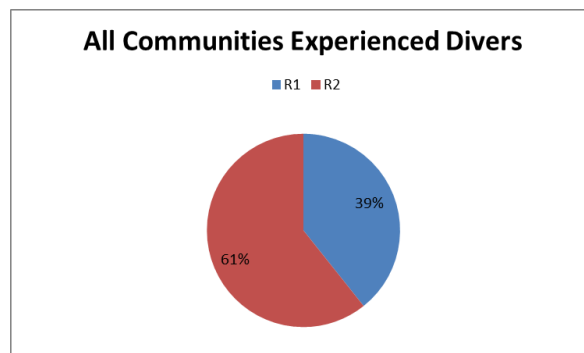
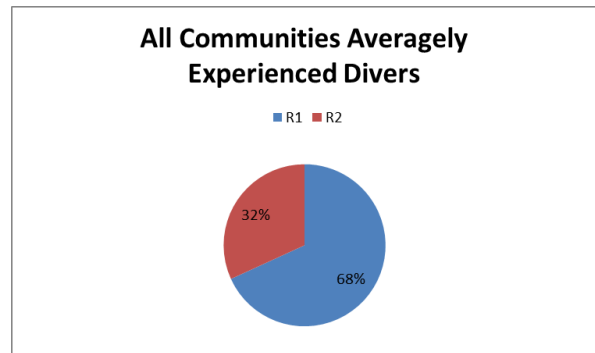
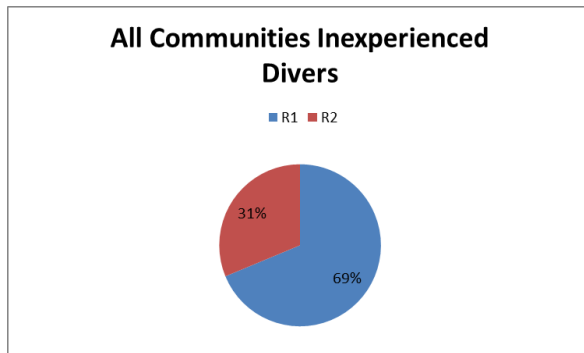
Here too, the demand for this type of training comes from the two less specialized groups.

Question n° 8: To avoid the risk of burning, do you think this one-handed cutting method should be taught to new trainees?

R1: Yes

R2: No

All Communities



Complementary analysis of replies n° 8:

68 experienced cutting divers out of 112 reject this type of training.

Participant's comments question n ° 8:

- ✓ Ils doivent plutôt apprendre à déplacer la main au fur et à mesure que la baguette se consume
 - ✓ je ne vois pas en quoi cela pose problème d'utiliser les deux mains
 - ✓ Pas convaincu, chacun à sa méthode pour découper. J'utilise mes 2 mains pour découper et je ne me brûle plus, il faut savoir bien les positionner
 - ✓ Oui et Non car il y a tant de facteurs
 - ✓ Pourquoi pas toutes les méthodes sont bonnes à assimiler
 - ✓ car sinon, ils ne deviendront jamais de bons découpeurs
 - ✓ déjà assez difficile avec 2 mains, surtout au vu des résultats obtenus :D
 - ✓ Faudra avoir des heures en plus ainsi que des baguettes
 - ✓ Il est bien d'apprendre plusieurs techniques.
 - ✓ Laisse-les se brûler! Y comprendront.
-
- ✓ I think that this is not a Y or N question. The cutting technic you chose is mostly about the job you are planning to do.
 - ✓ Costs too much ~~fffff~~ to do trial and error, steady and controlled.
 - ✓ If they can teach it and it's as effective. I highly doubt it would be
 - ✓ And tell them if they do steady the rod with the other hand, only hold it LIGHTLY
 - ✓ They should begin by using their fingers as guides while keeping a feel for the burn rod position
 - ✓ My observation was it's not if your using 2 hands, it's how you position your second hand. I knew divers who constantly had burned hands while I knew other including myself who never fought the issue.
 - ✓ If learning in visibility. I learnt in zero viz
 - ✓ Wear a Leather glove.
 - ✓ Both methods as they need to use what is safest and most effective!
 - ✓ Teach them to feel the flame when it get close to the glove.
 - ✓ Maybe yes.
 - ✓ The risk of burning seriously is very small. I can't imagine somebody making a good cut single handedly.
 - ✓ Gradually once they are proficient!
 - ✓ If your burning your hand weather guiding or not, your dump ass needs to find a different career. There are time and positions that two hands are helpful
 - ✓ Absolutely; again; this method was first introduced as an introduction to underwater burning or welding. Because of the infrequency of the use; the diver adapted that as a standard methodology because he was introduced to that method as a trainee. If a diver continues to use two hands; he will eventually burn his hand. The question is; just a matter of how bad. Lastly; a good diver will automatically drop the two handed method if he actually burns on a daily basis,. He'll realize he has more control and it's easier to do it correctly without the added distraction of where that hand is in relation to that 10,000 degree heat.

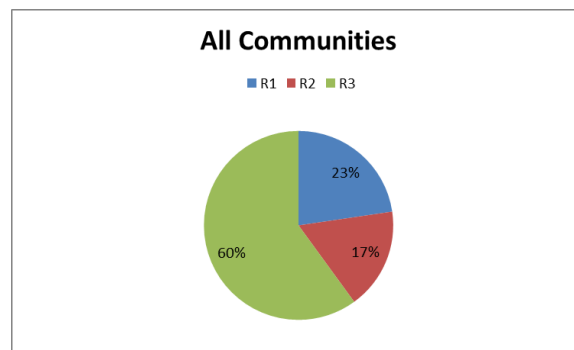
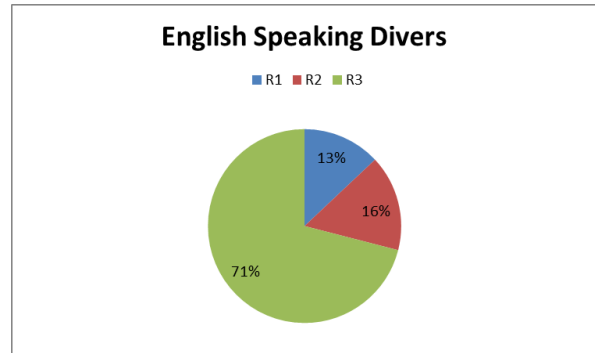
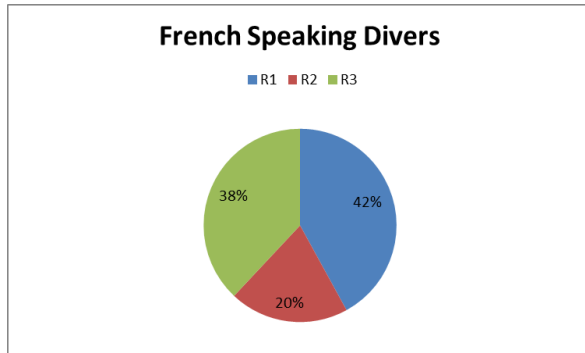
- ✓ Proper repetitive training in the dangers of burning to prevent injuries. and not worry about the cost of the f'n ROD This is a dangerous tool and has to be respected. We are specialized craftsmen using dangerous tools.
- ✓ Depending on the method.
- ✓ Depends on whichever method the student becomes comfortable with.
- ✓ Never received formal training.
- ✓ But I've never heard of people burning themselves before. Not that it hasn't happened. Just never has been an issue in the 15 years in the business.
- ✓ I'm not sure why we are focusing on one handed burning? If my hand isn't on the rod , it's on the piece I'm cutting so I can feel how it's moving(make sure it's not going to spring or come at me) sometimes steel will shoot in a direction you did not Think it could go .
- ✓ They must learn how to cut without burning their hands. At first I have burned a bit my left glove not with the torch but with hot metal.
- ✓ Competency is a progression it is developed over time. A walk before you run approach.
- ✓ Use guides easy to fab.
- ✓ I do not know of the one handed technique.
- ✓ I personally never burned myself, always used good pair of gloves and I could only see a risk of burn while cutting something on a 5 to 7 o'clock angle and the slag could fall on you.
- ✓ One hand will work with a template to follow. Customers already crumble over cost; this leaves no time for training or templates.

Question n° 9: How do you move your cutting electrode?

R1: Pushing

R2: Dragging

R3: Both methods



Why this question:

One of our most famous cutter and trainer is a fervent defender of the rod dragging method because according to him it is the only way that prevents the body and head to be in front of the cut which in case of accidental explosion would limit the adverse effects.

Personally I have whenever possible always favor the "pushing" of the electrode and even in this case it is quite possible to not be in front of the cut.

In addition, pushing the electrode with a little angle has the advantage in my opinion and in case of visibility to see (if one hold a very short arc) the progress of the melting steel, and thus optimize the speed of progression.

Analysis of replies n° 9:

Apparently, the sole dragging of the electrode is not very practiced because only 26 out of the 150 cutters use this technique.

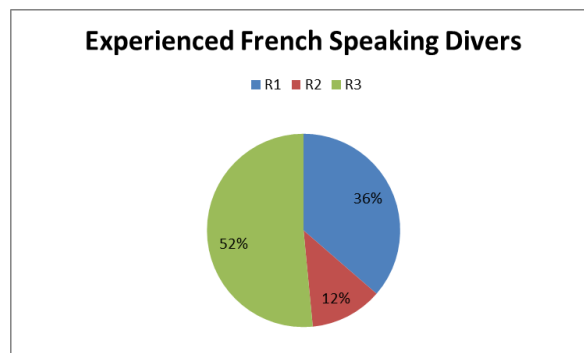
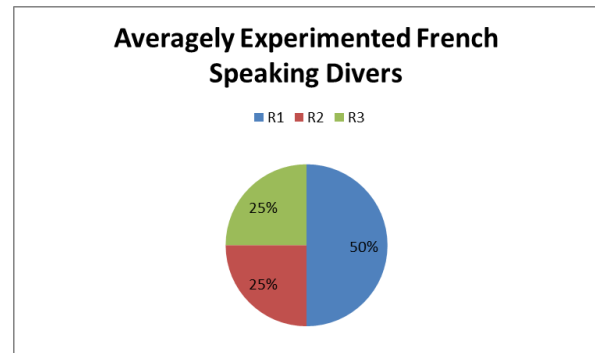
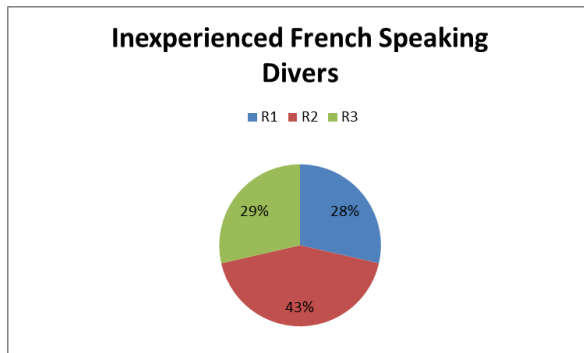
Question n° 9: How do you move your cutting electrode?

R1: Pushing

R2: Dragging

R3: Both methods

French Speaking Divers



Complementary analysis of replies n° 9:

Apparently the French cutting divers seem to prefer the pushing method.

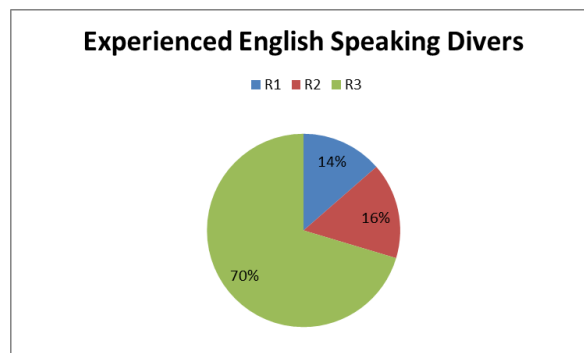
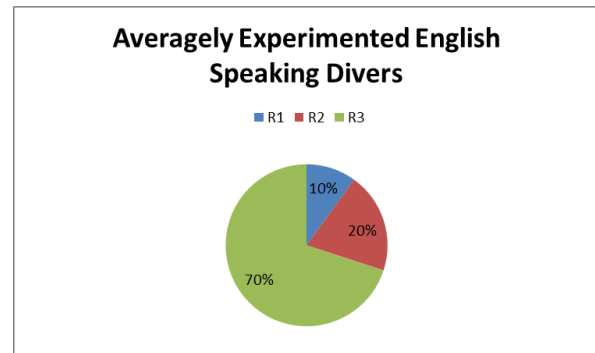
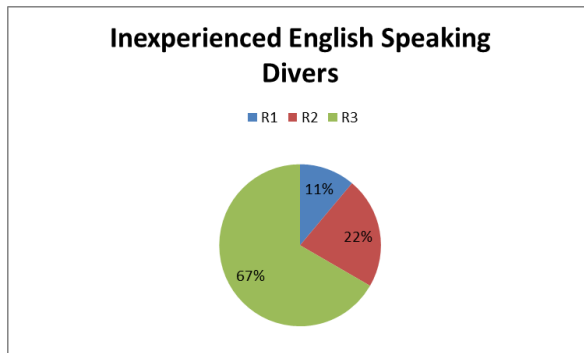
Question n° 9: How do you move your cutting electrode?

R1: Pushing

R2: Dragging

R3: Both methods

English Speaking Divers



Complementary analysis of replies n° 9:

No more success with the English cutting divers

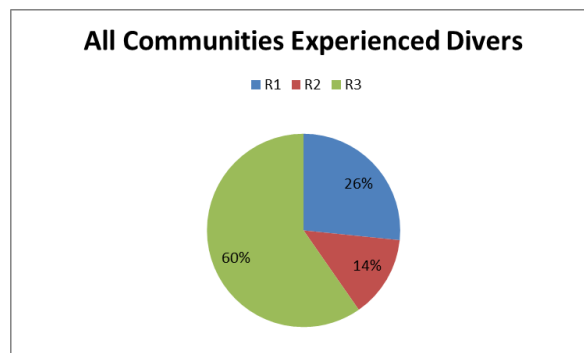
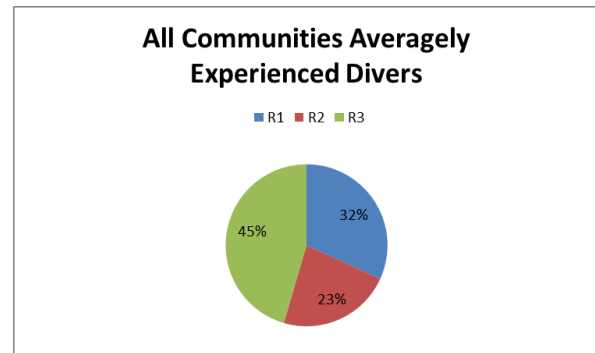
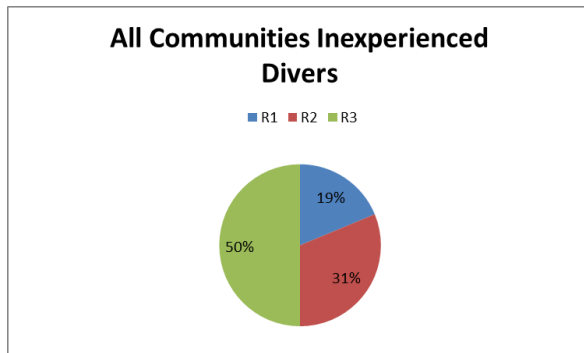
Question n° 9: How do you move your cutting electrode?

R1: Pushing

R2: Dragging

R3: Both methods

All Communities



Complementary analysis of replies n° 9:

Only inexperienced cutting divers favor the electrode dragging technique a little more, but on the whole it can be seen that in practice it is common to use both methods.

comments question n ° 9:

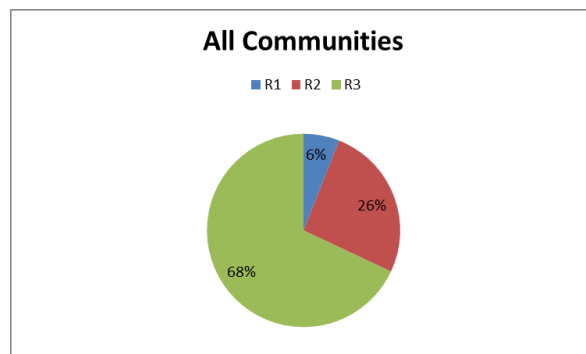
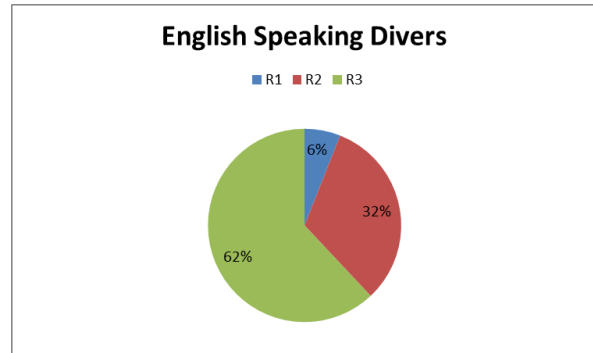
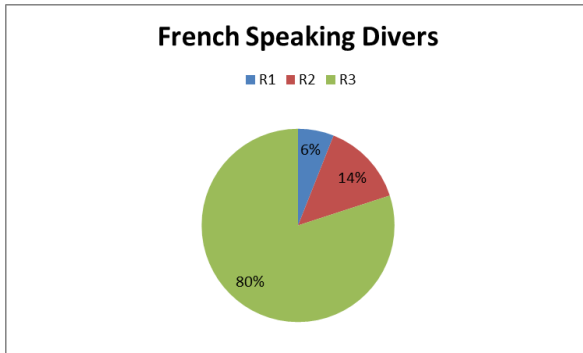
- ✓ en fonction de la situation.
 - ✓ principalement en la poussant, mais les deux peuvent être utilisés suivant la configuration.
 - ✓ Je préfère en la tirant comme quand je soude.
 - ✓ selon la position de la déraille a découpé.
 - ✓ En fonction de la pièce à découper et de l'endroit où elle se trouve il est possible que je pousse.
 - ✓ Cela dépend de ma position et de l'épaisseur.
 - ✓ Ca dépend de mon amplitude sous l'eau et de mon espace de travail La plus par du temps en tirant mais en poussant l'orsque j'ai des épaisseurs plus grosses.
-
- ✓ Clutches and damaged metal require both styles RIGHT OR WRONG on paper.
 - ✓ 95 percent of the time I push.
 - ✓ Depends on the type of cut.
 - ✓ Whatever the cut required.
 - ✓ I only push when I am sure there is no possibility of Explosion. I teach that as well.
 - ✓ Use other methods also. Depends on conditions.
 - ✓ It al depends the circumstances you are working in.
 - ✓ Usually dragging either towards me or away. Keeping the same angle of cut regardless.
 - ✓ Depends on access.
 - ✓ Dragging if at all possible, however there are cuts that pushing sis used. Depending on material being cut, position of the cut. Etc.
 - ✓ Cutting/ burning should be exact, aggressive and know how deep, how far and your direction before calling it hot. The gas pressure, the angle of the cut, the amount of rods should be known +- 1 rod.
 - ✓ Depending on the cut, material, access etc.
 - ✓ Depends on steel thickness, growth space around area to beck.
 - ✓ It depends but I liked pushing. But can do both.
 - ✓ I usually keep my rod almost 90 degrees from the material I'm cutting. Just depends on what is behind it, what the material is, what sort of stress the steel is in etc.
 - ✓ Depends on the situation.
 - ✓ Mostly dragging.
 - ✓ Depends on access.
 - ✓ The rod melts the metal the O2 pushes the metal after melding out and away.
 - ✓ As always it depends on the job.
 - ✓ Small circles moves.
 - ✓ Primarily drag.

Question n° 10: When you are cutting, how do you position yourself in relation to the cut?

R1: I stay in front of the cut

R2: I put myself away of the cut

R3: I put myself where it is the more comfortable



Why this question:

As we have read at the previous question our cutter advocates the dragging of the electrode to always be able to keep the head and body away of the cut so that in case of explosion only hands are affected.

This is unfortunately not always the case (see end of document).

Analysis of replies n° 10:

As expected, 102 out of the 150 cutters choose the most comfortable position.

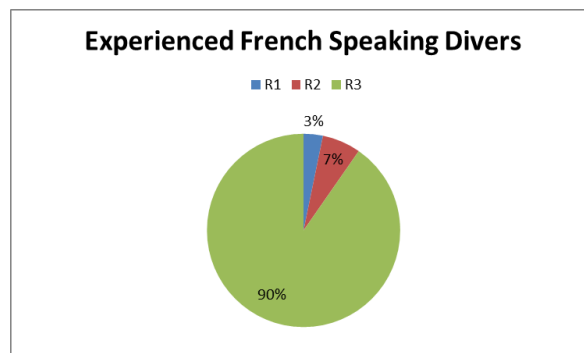
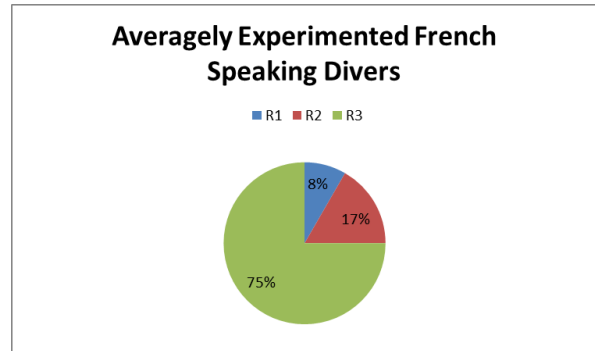
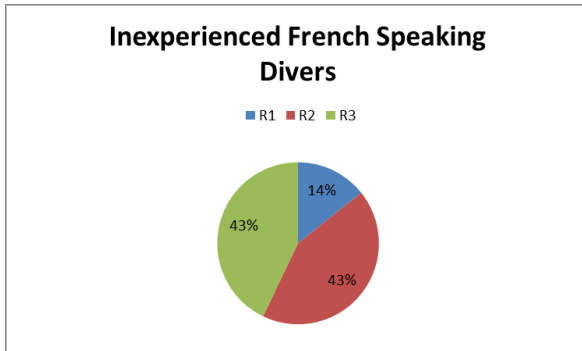
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R1: I stay in front of the cut

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R3: I put myself where it is the more comfortable

French Speaking Divers



Complementary analysis of replies n° 10:

Only the inexperienced cutters seem a little more prone to put themselves away of the cut.

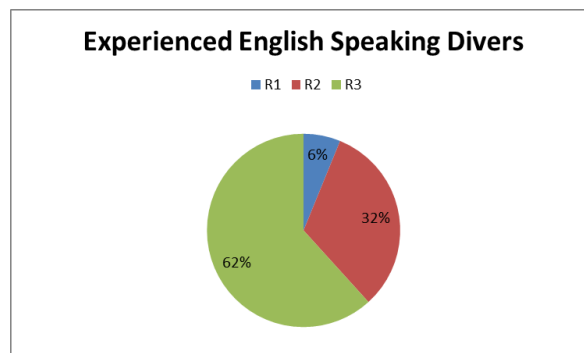
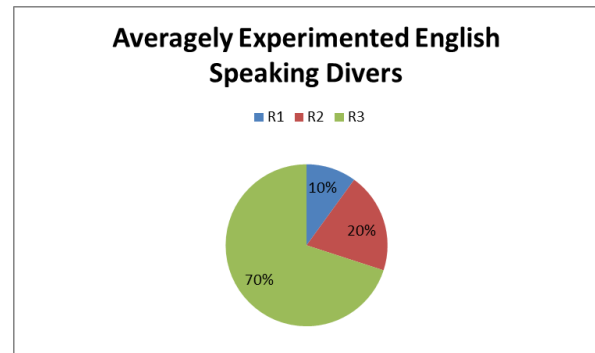
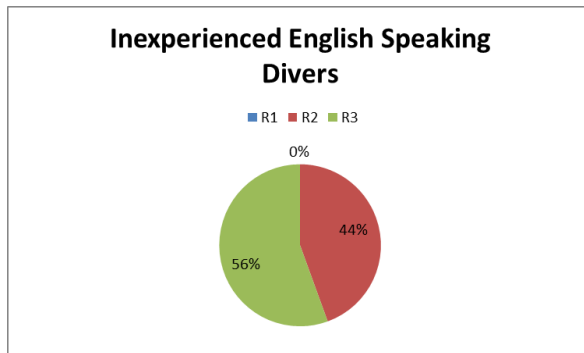
Question n° 10: When you are cutting, how do you position yourself in relation to the cut?

R1: I stay in front of the cut

R2: I put myself away of the cut

R3: I put myself where it is the more comfortable

English Speaking Divers



Complementary analysis of replies n° 10:

The whole cutters seem a little more inclined to choose this so-called security position.

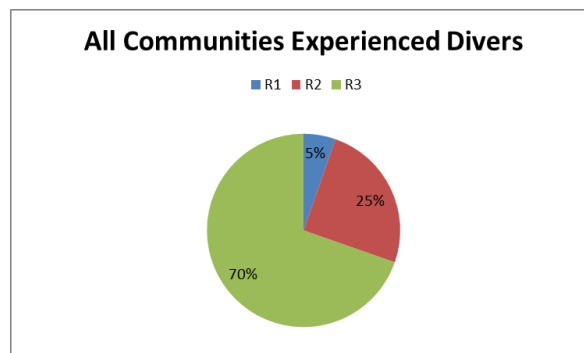
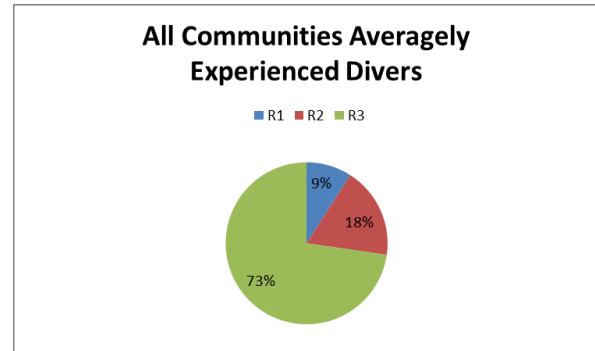
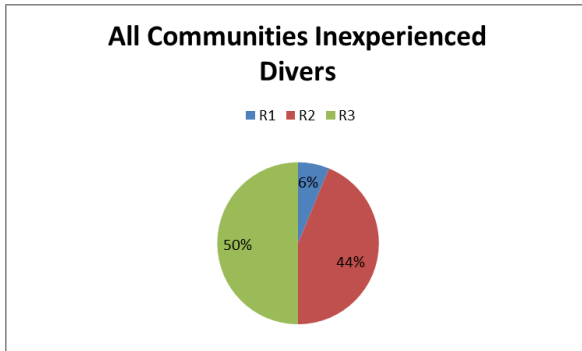
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R3: I put myself where it is the more comfortable

All Communities



Complementary analysis of replies n° 10:

As we can see, the so-called security position is more used by all the inexperienced cutters than by the other two groups.

Chance or adequate training?

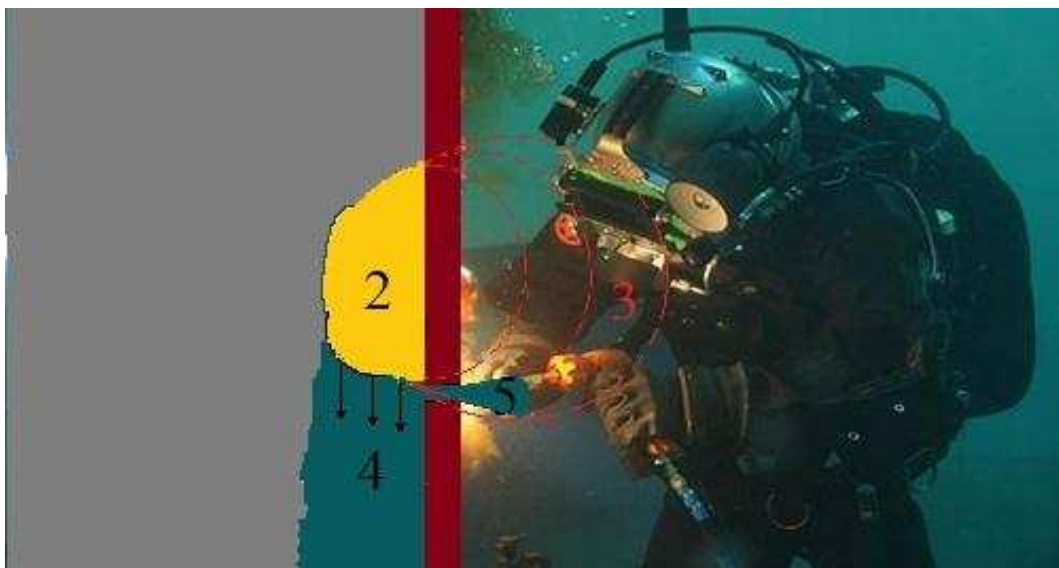
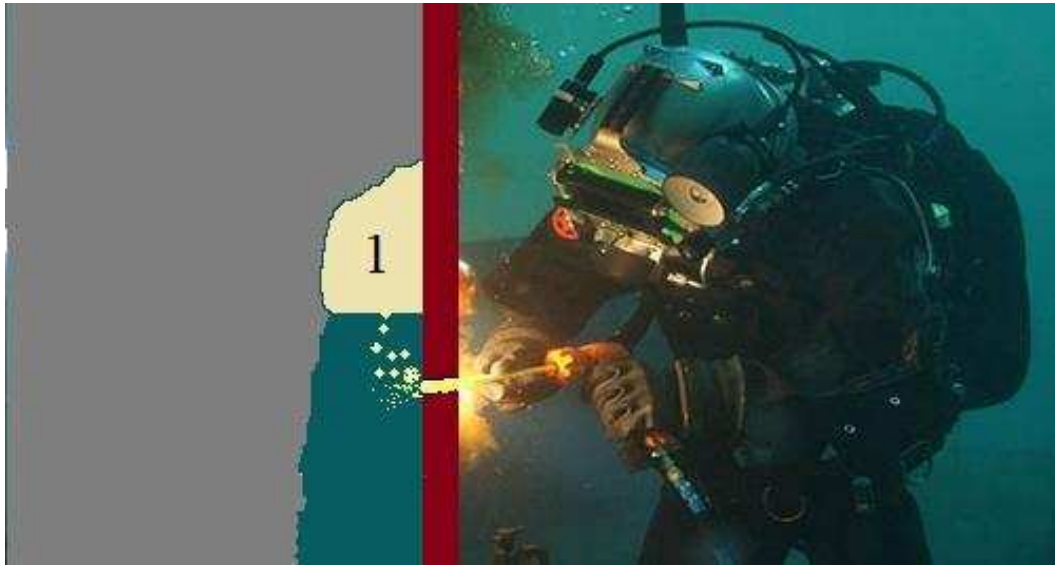
Participant's comments question n ° 10:

- ✓ tout en restant en sécurité.
- ✓ Toujours positionnent mon corps en dessous de ma découpe, à la diagonale de mon départ... Autant que possible...jamais en face à moins d'être sûre à 100 % que l'hydrogène remonte sans explosion ! Bonne chance !
- ✓ Ce qui m'importe le plus c'est de regarder ma flamme si elle est droite et qu'elle soit derrière le métal si la voie perpendiculaire au métal c'est que ma vitesse est trop lente si je ne la vois plus je suis trop rapide j'aime la voir droite et je la regarde en q avant une fois qu'elle a traversé le métal.
- ✓ Je me positionne en fonction de la stabilité et d'accomplir une très bonne découpe.
- ✓ Cela dépend de la hauteur de la coupe, du courant.. j'essaye de me positionné au mieux
- ✓ le confortable n'est pas un bon critère, car après quelques heures c'est toujours inconfortable.
- ✓ en avant si possible ... épaule contre le rideau (pour la stabilité).
- ✓ De façon à m'assurer de pas faire de dentelles.
- ✓ Tout dépend de l'accessibilité.

- ✓ It depends on the job you are trying to do. Sometimes you need to work in strange positions...And you need to lurn to "cut" in any position.
- ✓ Just remember ...I am POSITIVE its the EARTH..35 years of enjoyable way to make a living.
- ✓ Proper planning and preparation prevents piss poor performance, all good cutting takes double the preparation time.
- ✓ Always looking sure I have a vent. If I can't vent then always away.
- ✓ I try to optimize my sight, feel and cut path.
- ✓ I made countless cuts that I was more concerned with the way the pipe was moving after separation than best cutting form.
- ✓ Dependent on access.
- ✓ This depends on what I'm cutting and location of the cut.
- ✓ Was always taught, the more comfortable, the better the cut.
- ✓ The cut will focus an explosion to what is in front of it. Do not be there!
- ✓ Position where I've a good view at the tip of the rod / at the cut.
- ✓ I always try to keep the cut in my view. Due to the flow of oxygen that is best done from an angle of view below the cut.
- ✓ Most of the time you have to push yourself in a uncomfortable position to get access to the work place.
- ✓ I used a clog clip and hogging line and usually remained behind the cut if dragging towards me and in front if dragging away from me.
- ✓ I try to stay out of the way of a blow back.
- ✓ That's an unfair question. In whatever position you can to get the job done safety. Various positions you can't always be in the idle position. This is diving after all.
- ✓ My face is on side of the cut.

- ✓ Where you can see and move in a totally controlled fashion without decreasing your safety or umbilical. Weld or cut station and diver set up is critical to do a good job, productive job and safe job. The diver should be qualified to know this prior to being assigned or accepting the task. No diver should aim the damn torch towards his person or umbilical. I've seen divers burn their own damn umbilical. ????
- ✓ Most times I attached my ground to my left, so moved to the right.
- ✓ Best access, vision (when there's viz) etc.
- ✓ Even stood on my head in 2ft not comfortable.
- ✓ In front and ahead to anticipate travel.
- ✓ Comfort to me is usually where the safest place is.
- ✓ Under Neath the cut.
- ✓ Always safety is the first is considered when positioning for a cut.
- ✓ And not in the electrical path between ground and rod.
- ✓ I put myself in the safest possible spot.

Effects of an explosion



Suppose that the diver is busy cutting off any steel plate behind which there is a cavity. As can be seen, the cutting gases will accumulate in this pocket (1) until an incandescent spark reaches it and causes the explosion (2). This explosion will have two effects: Firstly the gas pocket will expand, rise in pressure and generate a shock wave (3) which will have the ability to pass through the steel sheet without virtually losing its energy and will then continue to spread in the water until it will hit and cross the body of the diver causing more or less serious damage on the hollow organs.

Almost simultaneously, the expansion of this gaseous bubble will compress the water that is on the periphery of it (4) which in turn will cause a more or less violent water displacement some of which will pass through cut (5).

If it is true, as our colleague points out, that the effects on the head and body of the diver will be less important if he is away of the cut, it is because he is in fact at a greater distance from

the source of the danger and therefore in case of a small explosion (a few cm³) the peak pressure of the shock wave (6) has already decreased and the diver will feel less of it.



But the intensity of the explosion will depend on the volume of gas that is trapped in the cavity.

If the explosive gas is trapped in a cavity of a few liters, the explosion will take the form of a deflagration during which the decomposition rate will be about 500 to 600 m / s and in this case the overpressure of the BLAST can be estimated at around 7-10 bar.

On the other hand, if the cavity is filled with a larger volume of explosive gases (≥ 100 liters), the blast regime can evolve towards a detonation mode with a VOD (detonation velocity) of about 2800 m / s and in this case the peak pressure of the shock wave will be much higher, and the effects of the explosion will be much more serious and can then be compared with the explosion of a certain amount of TNT which will have more deadly consequences.

Unfortunately for the diver in the latter two cases the fact of putting his head and body away of the cut or not will not change much because the overpressure of the shock wave will always be greater than the limit that can support the diver.

Following test made on animals and a few volunteers, we know that under water the non-dangerous limit of a shock wave is +/- 3, 5 bars.

We realize therefore that it does not take much for this level to be exceeded, hence the importance of a good prevention plan to prevent explosions.

DIVE SAFE