

A safer finishing procedure

Accompanying article to the 2020 IGC Proposal from the Belgian National Aeroclub to change the current finishing procedure to a safer alternative.

During the fourth competition day of the World Gliding Championships of 2010 in Szeged, Hungary, a competitor in the 15m class had barely sufficient energy to make it to the airfield. Due to his lack of speed, he could not pull up over the traffic that was driving on the road adjacent to the airfield. His left wing hit the cabin of a truck, and the glider tumbled on the airfield. Luckily all people involved survived, but the accident left the truck driver with a disability.

The major factor that contributed to creating the circumstances of this accident, was the competition finish line procedure. This procedure gave pilots too little margin to perform safe approaches, and it caused many accidents and incidents in the decades before. The accident in Szeged was the final straw, and the IGC decided to abandon the finish-line procedure in favor of a finish ring procedure.

We believe that, despite the good intentions of this decision, the current finish ring procedure has not significantly decreased the dangers and accident rate. We believe that it does not go far enough in taking away the inherent risk of low energy approaches, and that there are better solutions that can vastly decrease contest accidents during the final glide and approach to the airfield.

This article is a lot longer than most proposals presented to the IGC, because we know that there is a lot of hesitance towards changing the current procedure. We do think this issue is urgent and important.

A FEW EXAMPLES OF RECENT ACCIDENTS

The following list of accidents, is a non-comprehensive selection of accidents and incidents in the past few years (2015-2019) during large international competitions:

- A pilot was in a final glide to the airport during an AAT. The weather that day was very windy (40-50km/h), but thermals were sufficient to get enough altitude to obtain safe final glide altitude. The last final leg of the course was just 5km long, but full into the 50km/h headwind. The pilot crossed the finish ring at 150m AGL (at the minimum altitude limit), with 4.5km to go to the airport threshold. The high wind caused a much poorer than normal glide ratio, and the pilot decided to start its engine below 100m AGL, which was insufficient to get it to thrust. The pilot then crashed into a small field 1.6km away from the airfield, very extensively damaging the glider, and having to retreat from the competition. The pilot received full speed points for the day, and no penalty points. Landing out just before the finish ring would have cost 300 more points.
- A pilot was in the relatively normal end-part of a normal competition day. The weather was ok, and windspeed around 10-15km/h. The pilot started the final glide at a very normal glide ratio from 45km distance of the airport. During the final kilometers to the finish ring the pilot suddenly experienced much stronger than expected sink, and suddenly was not within reach of the airport anymore. After crossing the finish ring at 50m AGL, an emergency landing in a very small field took place. The airplane was very extensively damaged, and the competitor had to retreat from the competition. The pilot received full speed points for the day, and a few finish altitude penalty points. Landing out just before the finish would have cost 340 more points.
- A pilot was performing a 35km final glide, starting with a normally sufficient required L/D. There was 30km/h headwind. At 12km from the airport, only a 20:1 glide ratio was required to make it to the airfield. But then the pilot experienced much stronger than normal sink for the next kilometers. That, combined with the significant headwind component, quickly eroded all margins. The pilot crossed the finish ring in 51m AGL and had no other choice to land straight-in into a field less than 1km from the airport. The plane was heavily damaged, and the pilot had to retreat from the competition. The pilot received full speed points for the day, and a few finish altitude penalty points. Landing out just before the finish ring would have cost 200 more points.
- Under very similar circumstances as the previous accident, a pilot crossed the finish ring at 21m AGL, immediately made a 90 degree turn and landed in a field at the edge of the ring. The glider was damaged. Repairs were performed overnight, and the glider was ready just a few minutes before launching started the next day. The pilot received full speed points, and a few finish altitude penalty points. Landing out just before the finish ring would have cost 240 more points.

- A gaggle of 21 gliders was struggling to get home. The last dying thermal was 31km from the airport. Wind was 15-20km/h, for the most part coming from the side. The air was virtually dead, so no large sink rates were experienced during the glide. The gliders left the final thermal, all starting at different altitudes, and thus different required LDs. The highest glider was the only one who made it home without crossing the finish ring below the minimum altitude. 9 more gliders reached the finish ring, but without sufficient altitude and thus received penalty points. The ones who did reach the airfield, did so with very limited energy. Some gliders did last-ditch straight in landings in their fields, some into high crops. Other gliders used their engines at extremely low altitudes. One of those got his engine to thrust at 7m above a high-crop field, and several others did so as well at very low altitudes.

All these accidents happened with the finish ring procedure during major international competitions in the past 4 years, and they involved all very well-known and experienced competition pilots, including world champions and a former OSTIV/IGC safety panel member.

If it happens to these people, it can happen to anyone.

This makes it clear to us, that this is not about just a few really bad pilots making some really poor decisions. This is about even the very best pilots getting stuck in tunnel vision, tempted into very dangerous situations by our current rule and scoring system.

WHEN DO THESE ACCIDENTS HAPPEN?

These accidents happen when a pilot sinks below glide path, most often due to encountering stronger than normally expected sink. We do not encounter those very often during our final glides. But sometimes we do, and when that happens even healthy margins disappear quickly.

As an example, an 18m glider (50:1 LD at 125km/h) that experiences 2m/s sink, has its max glide ratio reduced to 15:1 at 200km/h.

A prolonged stretch of such sink eats up altitude very fast.

If this sink happens during a final glide close to the finish ring with a very low minimum finish altitude above ground (in the recent past, some were even set at sub 100m AGL altitudes), the glider finds itself in big trouble.

In a very short span of time, the airport is not within reach anymore, and at very low altitudes decisions have to be taken to find a landing/crashing spot (or use the engine).

This is exactly why the accidents before 2010 with the finish line happened. The new procedure just moved the location from the accident from close to the runway threshold, to close to the edge of the finish ring.

Other factors that can contribute to these accidents are strong headwinds, starting the final glide at a narrow glide slope due to lack of thermals, and also peer pressure when flying in a small group or in a gaggle ("The others are doing it so it must be OK").

WHY DO THESE ACCIDENTS HAPPEN?

Under the current finish-ring procedure, the minimum finish ring altitude is mostly set somewhere between 70m-150m AGL.

Pilots receive full speed points when they pass at an altitude higher than the minimum finish ring altitude minus 100m. In most competitions that is thus somewhere between the ground, and 50m AGL. Pilots can thus do a straight-in finish or even rolling-finish into a field just over the edge of the finish circle to get their speed points. They do receive 1 finish point per meter lower than the minimum finish altitude, but that is much lower than the loss in speed points in the case that they would not finish.

Our point system punishes outlandings severely. If you land out even 1m short of the

finish on a day that many competitors get home, you will lose hundreds of points (up to 667 points). Since our contests are very competitive, those hundreds of points make the difference between winning the competition and ending up outside of the top10 or even top20.

Those few meters will end your chance of a good overall result in the competition. No wonder pilots try to avoid it at all means.

If you then take into account that pilots and their crew spent thousands of euros, weeks of vacation time from their jobs, competing in many other competitions to get selected, and perhaps a lifetime of anticipation to be at these competitions, it becomes very clear why this happens.

The pilots get stuck in a "racing mindset". The finish is so close, and when you cross it, all is fine. When you don't, you lose big.

Only when the danger suddenly becomes very big, the pilot awakens from this racing mindset, and goes into "Oh, I need to find a spot to land"-mindset.

Too often, this happens too late. One of the pilots who had an accident like this, told afterwards that they were completely focused on reaching the finish and all seemed completely normal. They had no worries regarding safety at all. Suddenly the margins were gone, and they realized the danger they were in. It all happened so incredibly fast.

FAIRNESS

The previous argumentation directly leads to the conclusion, in regards of this issue of low energy final glides, that those pilots who take a very large safety risk (for instance by doing a rolling straight-in finish into an unexplored field on the edge of the finish ring) have an enormous competitive advantage over the pilot who in this exact same situation makes the safe & right decision of stopping his competition flight beforehand by showing good airmanship by landing out or using the engine a bit beforehand.

The number one principle of the FAI reads:

*The FAI is the sole international body in control of air sports and aeronautic and astronautic records in the interests of **good sportsmanship and fair competition.***

FAI Sporting Code General Section,
1.1 Principles of the FAI.

The objectives of Gliding World Championships are to:

*e. Encourage the development of **safe operational procedures, good sportsmanship, and fairness** in the sport of soaring.*

FAI Sporting Code Annex A to Section 3 Gliding: Rules for the World and Continental Gliding Championships,
1.1 Objectives of the Championships.

We are thus discussing an issue related to the foremost principles of the gliding sport, the FAI, the IGC, and international gliding championships.

Our opinion is, that due to the large safety risk involved with the current finishing procedure, this issue is important and urgent. Action needs to be taken.

It also must be recognized that the IGC can not legislate all safety, even when those safety risks lead to competitive advantages.

For instance, if a pilot decides to glide to a good climb over unlandable territory, he has a competitive advantage over the pilot who stays within reach of landable field options. We understand that the IGC in this case, and similar cases, has no way of making rules that can be used in practice to counter this.

However, we do believe that there are simple alternatives to the current finish procedure that are much safer, which eradicate all unfairness, and which do not reduce the essence of our competitions.

We thus think it is of primary concern that the IGC acts.

OUR PROPOSED SYSTEM

So, what can be done about this?

Our conclusion is simple: the only way to prevent this from happening, is by changing the finish ring procedure in a way that pilots are not forced into these low-level emergency decision making moments anymore:

We increase the minimum finish altitude.

We increase it to an altitude, so that pilots can safely reach the airport at normal circuit level altitude under normal circumstances.

The chosen minimum finish altitude depends on the circumstances of the airfield, and on the competition classes.

We also increase the radius of the finish ring to an appropriate size, so that pilots can under normal circumstances make it safely to the airfield.

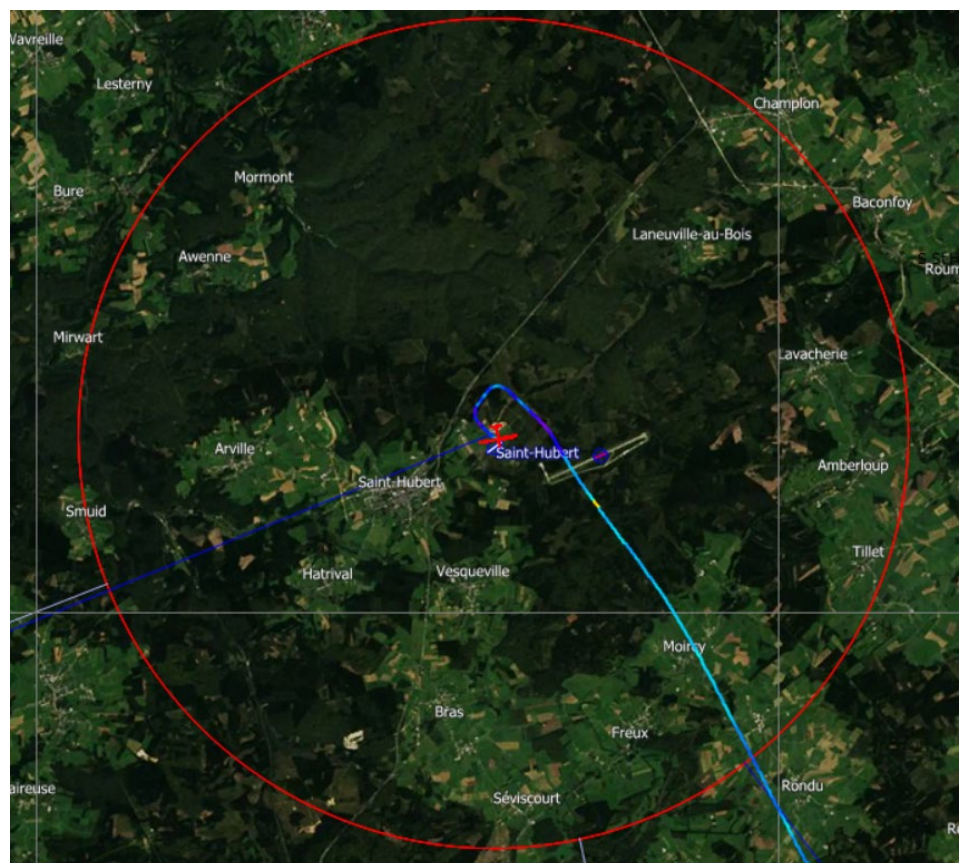
The chosen radius also depends on the circumstances of the airfield, and on the competition classes. There should also be landable fields along or close to the edge of that finish ring. Normally, this radius is between 7 and 10km (14-20km diameter).

If a pilot crosses the finish ring below the minimum finish altitude, but above the 100m penalty buffer limit, the pilot will receive full speed points, but 1 penalty point per meter.

If the pilot crosses the ring below the finish penalty buffer altitude, there are no speed points given.

The finish ring is a ring and not a cylinder. Pilots can not enter the finish zone from below (so no pull-ups or use a low thermal to climb into the finish zone).

When pilots legally finish (incl 100 penalty points), they are at all times able to reach landable fields.



Our finish procedure at St. Hubert during the OBN in 2019: 10km radius; 437m-537m above airfield min. finish altitude, competitors use normal traffic patterns.

After the finish, the pilots are suddenly completely relieved from all competition pressure, and they can fully focus on good airmanship to find the safest way to bring their glider to a landing.

They have the time and altitude to make safe and good decisions without being in the "racing mindset"-anymore.

If they do not believe they have sufficient altitude to reach the airport at once, they can either land out in a field, take another thermal, or use their engine if available.

For the pilots who are too low to make it to the minimum finish altitude minus the penalty buffer, they will recognize they are not near to finishing the task. They are thus not in this target fixation, that they perhaps can just make it. But they still have sufficient altitude to find a good field to land.

An additional benefit to our system, is that pilots now have the option to postpone their landing. For instance, when there are rain showers or thunderstorms over the airfield, or in high-traffic situations (mass finishes and landings), pilots can take a thermal (or use their engine) after crossing the finish and wait until the danger is gone.

Alternatively, they can now deviate to another landing spot.

A positive aspect of our proposal is that required rule changes in the sporting code are minimal. Also, neither pilots' instruments nor scoring software have to be changed.

OUR EXPERIENCES WITH THIS SYSTEM

During the Open Belgian Gliding Championships at St. Hubert of 2018, we had a week of thunderstorms, and were forced to use a much larger and higher finish ring. Our experiences with it were so good, that it was decided to use it even on the less stormy days. For the OBGN 2019 these rules were thought through and formalized, and we used it for the full competition.

We have settled on a finish ring with a radius of 10km (20km diameter). In this way the edge of the finish circle was over landable fields and not over the large forest surrounding the airfield. A minimum altitude of 537m above the airfield for club class (1:18.7LD) was set, and 437m for all other classes (1:22.9LD). Those altitudes are 1000m and 1100m MSL respectively.

As landing procedure, we used normal traffic patterns, with an option of straight-in landing if people came in too low. The vast majority of the landings used the normal traffic patterns.

As is to be expected because people are hesitant to change, there was a bit of initial concerns among a few pilots about this procedure. But all in all, that was fairly limited.

During these 2 competitions there were no incidents nor accidents during final glides, finishes or landings.

For the OBGN 2019, there were no landouts close to the finish line. Only 3 finishes passed the ring in the penalty buffer zone, and those infractions were small. Out of all the finishers, not a single one led to a landout after crossing the finish ring. 4.6% of finishers took a thermal or used their engine after crossing the finish line to make it safer to come home. An additional 9.2% of finishers took a thermal or used their engine after crossing the finish for other reasons than getting enough altitude to make it to the airfield (too high landing traffic, weather, or other).

Not even one of the finishers had a close or tight arrival to the airfield.

In a survey performed after the OBGN 2019, 81% of the participating responding pilots answered that they were satisfied with the new large and high finish ring procedure.

When asked if they preferred to go back to the small 3km finish ring versus staying with the new large 10km finish ring, the split was 24% to 76% in favor of the new large finish ring.

When asked if they preferred to go back to the finish line (abandoned in Belgium more than 10 years ago) versus staying with the new

large 10km finish ring, the split was 10% to 90% in favor of the new large finish ring.

SIMILAR SOLUTIONS

We see signals that other groups are thinking in the same direction.

After some of the accidents above, the competition directors increased the minimum finish altitude. These changes were made ad-hoc, and there was no time to completely figure out new better procedures. Nevertheless, the tendency was in the right direction.

As another example, the Sailplane Grand Prix, which still uses a finish line, has in recent years increased the minimum finish altitude to 150m AGL. Under that altitude severe time penalties apply.

After an accident at the finish in the famous Hahnweide competition, the finish line was put over and next to nearby hilltop. Hahnweide has the luck of having another airfield closeby between itself and the hilltop. Low energy finishes can land at this in-between airfield. The procedure seems great, and comments after the first use of this new system in 2019 are good. But the system is dependent on the highly unique geographic situation of this airfield.

A pressure group in Germany has recently pushed through legislation in the rules for all sanctioned gliding contests (SVO), that gliders in competitions will have to maintain an altitude of minimum 150m AGL until they are in the standard landing pattern. These will be implemented next year, and we are very interested in their experiences with this system.

POTENTIAL QUESTIONS, OBJECTIONS AND CONCERNS

This is not fun / racing anymore.

Our experiences disagree. Our survey of pilots who used this system, shows that the very large majority prefer this new system. No one cited it as a reason not to participate in our competitions anymore.

We acknowledge that there is a thrill and adrenaline rush associated with the dash for the finish line of the past. But, in the end, this short duration thrill of a few minutes, does not matter at all in finding out who the best gliding pilot is. And finding this pilot in a fair, safe and sportsmanlike way, is the prime objective of gliding competitions.

This system is not paramountly safer.

It is fully clear that even under our system, there will be accidents during landing, and perhaps even during the last kilometers to the airport. Accidents will always happen.

But the simple logic behind it is sound, and our experiences with using this system are very positive.

We would welcome it if more competitions would adopt this, increasing experiences for refinement.

It's not fair that someone who completes the full distance, but is just a bit too low, does not get any speed points.

As long as the finish is in the same location for all pilots, it is fair. There is no obligation for this finish to be at the ground level.

If a pilot is too low, he has not flown the whole distance, because altitude = distance in gliding.

We also argue that it is exactly the opposite: the current system is unfair, because it massively rewards pilots taking safety risks.

It reduces the spectacle for the spectators and crews.

Since the introduction of the small finish circle, that has been the case anyway.

However, it is now potentially possible to reintroduce low-passes (within compliance of the legal limits applicable in the given country), giving the spectators something to look at. These low-passes would not be coupled anymore with the competition finish, and performed by relaxed pilots when they have more than sufficient energy.

Only bad pilots make these types of accidents. Why should all of us responsible pilots have to be punished for their actions?

The data shows differently. Some of the pilots who had accidents like this are the top of the top, including world champions.

Saying that it can't happen to you under the current rules, is a very dangerous mindset.

It is also not punishment. It is a rule change with a very clear objective to significantly reduce competition gliding accidents. If we do not make changes that reduce accident rates during our competitions, it is very possible that governments or insurance companies will enforce much stronger "punishments".

Low thermaling gliders near the finish ring will obstruct the paths of finishing gliders.

There is no reason to think this is more of an issue than during any other part of the flight.

We haven't experienced this during our competitions. But admittedly, the data might be too sparse for full conclusions.

Also, the very wide finish circle, actually increases the space for finishing gliders.

Good lookout (and mandatory Flarm) are always a must.

Bring back the ground level finish line!

That would be the absolute worst idea.

ADDITIONAL REMARKS

Change requires some time for people to adapt, and also for new best practices to be established.

The radius and minimum finish altitude, will depend on the geographical specificities of each airfield, and needs a bit of serious thinking and discussion for the competition direction.

Similarly, good local procedures including safe and robust traffic patterns that can accommodate many gliders arriving and landing in short amount of times, will depend on local specifics as well.

Pilots will have to be educated. During one of the first uses of this system, there was a rain shower over the airfield. Pilots now had the option of waiting until the shower had passed. And indeed, some pilots used this option, just as intended. However, other pilots still flew into the rain shower and landed in it. Afterwards these pilots claimed they did this just because that was how they were used to it (finish -> land immediately), but they now understood it was not necessary anymore. Education during the initial pilot briefing helps with preventing this.

Our experiences were with average amount of participants in the contest (42). Larger participant numbers might lead to slightly different experiences, especially regarding congestion during mass arrivals. However, due to the new option of pilots to postpone their landing when they see a mass arrival, we think this will actually alleviate some of the landing congestion issues. In fact, during our contests, some pilots used this option during high arrival traffic. They waited 5-15minutes until traffic and runway were cleared.

Due to the increased options, arrival to the airfield from different directions is possible. This can be minimized by setting a line-up point as is usual procedure. Pilots are also not in racing mindset anymore. They have altitude and time, so they are more relaxed and open to lookout. Local procedures can set behavioral guidelines within the finish circle (for instance an advisory airspeed of eg

150km/h, no extreme altitude or direction changes like pull-ups or suddenly deploying full airbrakes).

Gliders having the option to stay airborne after finishing longer than now is usual, also creates the possibility of cheating by helping their teammates find a good last climb.

Finished gliders should thus be regarded as outside of the competition. Other gliders / teammates receiving help from them thus are acting against the rules and can be penalized. Only safety and traffic information can be relayed between them. Pilots also have the duty to land as quickly as possible (thus when there are no traffic or weather concerns). If infractions are noticed, there can be penalties.

CONCLUSION

The accidents during the final stages of gliding competition flights keep happening. It's a severe detriment to our sport. It is time to seriously address this issue. We believe we have a system that can significantly reduce this type of accidents, without changing the sportive dynamics of our competitions. We have implemented and tested the system in the Belgian National Championships with good results.

We hope the country delegates of the IGC will take the time to deliberate on this subject and take this proposal under serious consideration.

Thank you for your attention,

The Belgian Gliding Committee