= Ski flying =

Ski flying is an individual sport discipline derived from ski jumping , in which much greater distances can be achieved . It is a form of competitive Nordic skiing where athletes descend at very fast speeds along a specially built takeoff ramp using skis only ; jump from the end of it with as much power as they can generate ; then glide ? or ' fly ' ? as far as possible down a steeply sloped hill ; and ultimately land in a stable manner . Points are awarded for distance and stylistic merit by five judges , and events are sanctioned by the International Ski Federation (FIS) .

The rules and scoring in ski flying are mostly the same as they are in ski jumping , and events under the discipline are usually contested as part of the Ski Jumping World Cup season , but the hills (of which there are only five , all in Europe) are constructed to a different standard in order to enable jumps of up to two thirds longer in distance . There is also a stronger emphasis on aerodynamics and harnessing the wind , as well as an increased element of danger due to athletes flying much higher and faster than in ski jumping .

From its beginnings in the 1930s , ski flying has developed its own distinct history and given rise to all of the sport 's world records . The first hill intended specifically for ski flying was built in Slovenia in 1934 , after which both Germany and Austria built their own hills in 1950 . This was followed by Norway in 1966 , the United States in 1970 , and the Czech Republic in 1980 . In the 1960s to 1980s , a friendly rivalry between the European venues saw world records being set regularly , together with evolutions in technique to fly longer distances .

Ski flying remains very popular in Slovenia and Norway , where the most recent world records over the past two decades have been set in front of audiences numbering 30 @,@ 000 ? 60 @,@ 000 .

= = History = =

= = = 1930s ? 40s = = =

= = = = Breaking the 100 metre barrier and the birth of ski flying = = = =

The origins of ski flying can be traced directly to 15 March 1936 in Planica , Slovenia (then a part of the Kingdom of Yugoslavia) , when 18 @-@ year @-@ old Austrian Josef " Sepp " Bradl became the first man in history to land a ski jump of over 100 metres (330 ft) . His world record jump of 101 @.@ 5 m (333 ft) was set at Bloudkova velikanka (" Bloudek giant ") , a new hill designed and completed in 1934 by engineers Stanko Bloudek and Ivan Ro?man , together with Joso Gorec . With jumps now in the triple digits , Bloudek enthused : " That was no longer ski jumping . That was ski flying ! " It was with these words that ski flying took on a life of its own . Such was the awe and disbelief at these massive jumps , the units of measurement were trivialised by the media , who suggested that the metre used in Yugoslavia was shorter than elsewhere in Europe .

Bradl later spoke fondly of the jump which made him an icon in the sport :

The air pushed violently against my chest ; I leaned right into it and let it carry me . I had only one wish : to fly as far as possible ! ... [After landing the jump] , many thousands of curious eyes looked up at the judges ' tower . I could hardly believe it when an additional ' 1' popped up on the scoreboard !

= = = = Dispute between the FIS and Planica = = = =

In the early 1930s , prior to the construction of Bloudkova velikanka , the FIS had deemed ski jumping hills with a K @-@ point (German : Konstruktionspunkt) of 70 m (230 ft) to be the absolute largest permissible . Athletes who chose to compete on hills with a K @-@ point of more than 80 m (260 ft) were outright denied a licence to jump , and events allowing for distances beyond 90 m (300 ft) were strongly discouraged ? even denounced ? on the grounds that they

were unnecessarily dangerous and brought the sport into disrepute . Bloudek and his team nonetheless went ahead and flouted the rules in creating a so @-@ called " mammoth hill " specifically designed for previously unimaginable distances . Bloudkova velikanka originally had a K @-@ point of 90 m , by far the largest of any hill at the time , but was upgraded in less than two years to 106 m (348 ft) in eager anticipation of the 100 + m jumps to come . In 1938 , exactly two years to the day of his milestone jump , Josef Bradl improved his world record by a wide margin to 107 m (351 ft) .

After a period of wrangling and increasing public interest in the novelty of this new ' extreme ' form of ski jumping , the FIS relented . In 1938 , a decision was made at the fifteenth International Ski Congress in Helsinki , Finland to allow for " experimental " hill design , thereby officially recognising ski flying as a sanctioned discipline . Despite this reluctant recognition , the FIS still frowned upon the practice of aiming predominantly for long distances over style , and to this day refuse to publish lists of world records in an official capacity . Furthermore , the rules for ski flying would not be fully established until after World War II .

In 1941 , with the K @-@ point increased further to 120 m (390 ft) , the world record was broken five times in Planica : it went from 108 m (354 ft) to 118 m (387 ft) in a single day , shared between four athletes . After World War II had passed , Fritz Tschannen matched the K @-@ point with a jump of 120 m in 1948 . This marked the last time Planica would hold the world record for almost two decades , as emerging new hills would soon provide stern competition .

= = = 1950s ? 60s = = =

= = = = New hills across Europe = = = =

A challenger to Planica arrived in 1949 with the construction of Heini @-@ Klopfer @-@ Skiflugschanze (" Heini Klopfer ski flying hill ") in Oberstdorf , West Germany . Designed by former ski jumper turned architect Heini Klopfer , as well as then @-@ active ski jumpers Toni Brutscher and Sepp Weiler , the hill had a K @-@ point of 120 m to match that of Bloudkova velikanka . The FIS , still wary of the rising popularity of ski flying and wanting to keep it in check , refused to sanction the construction of the hill , having previously denounced the 1947 and 1948 events in Planica .

The stance of the FIS eased once again , as the inaugural event in Oberstdorf was given approval to be staged in 1950 . During this week @-@ long event , an estimated crowd of altogether 100 @,@ 000 witnessed the world record fall three times , with Dan Netzell claiming the final figure of 135 m (443 ft) . Tauno Luiro eclipsed it the following year by jumping 139 m (456 ft) , a world record which would stay in place for almost ten years until Jo?e ?libar jumped 141 m (463 ft) in 1961 . The past two decades of Planica holding a near @-@ monopoly over the world record now seemed a distant memory , as it would instead be Oberstdorf 's turn to do exactly the same .

Also in 1950 , a ski flying hill was built at Kulm in Tauplitz / Bad Mitterndorf , Austria . Peter Lesser first equalled the world record there in 1962 , improving it three years later to 145 m (476 ft) . Another hill entered the scene in 1966 , when Vikersundbakken (" Vikersund hill ") in Vikersund , Norway was rebuilt to ski flying specifications , having originally opened as a ski jumping hill in 1936 . On this newly rebuilt hill the world record was first equalled , then broken twice to end up at 154 m (505 ft) in 1967 . Although hills in Norway were still at the forefront of ski jumping , their prominence in ski flying was short @-@ lived , as it would be the last time Vikersund would hold a world record until four decades later .

Seeking to co @-@ operate on hill design and event organisation , the venues at Kulm , Oberstdorf and Planica formed the KOP working group in 1962 (KOP being an abbreviation of Kulm / Oberstdorf / Planica) . This group would go on to consult with the FIS in all aspects of ski flying , celebrating their 50th anniversary in 2012 . In 1953 , Kulm hosted the first International Ski Flying Week , which would be the premier event in ski flying until 1972 .

= = = = Breaking the 150 metre barrier = = = =

In 1967 , in Oberstdorf , Lars Grini became the first to reach 150 m (490 ft) . Planica triumphantly reclaimed its world record in 1969 with a new hill named Velikanka bratov Gori?ek (" Giant by brothers Gori?ek ") . This was the brainchild of Slovenian brothers Janez and Vlado Gori?ek , both engineers , who opted to design a new hill with a K @-@ point of 153 m (502 ft) instead of enlarging the adjacent Bloudkova velikanka , which was showing signs of deterioration . Today , Janez is affectionately called the " father " of modern ski flying and a revered figure in Slovenia . Bloudkova velikanka was subsequently recategorised as a ski jumping hill .

At the opening event of Velikanka bratov Gori?ek , five world records were set : Bjørn Wirkola and Ji?í Ra?ka traded it among themselves four times , until Manfred Wolf ended their run with a jump of 165 m (541 ft) . It can be said that competition between hill locations , all vying for world record honours , truly began at this time . The 1960s remains the decade with the highest amount of world records since the advent of ski flying , with seventeen in total being set on the hills in Oberstdorf , Planica , Kulm and Vikersund . By contrast the 1950s had the fewest with four , all being set in Oberstdorf .

= = = 1970s = = =

= = = = Planica vs. Oberstdorf = = = =

The world record stayed in Planica for four years , during which the K @-@ point at Velikanka bratov Gori?ek was upgraded to 165 m in time for the inaugural Ski Flying World Championships in 1972 , which eventually superseded International Ski Flying Week . This new event was sanctioned a year earlier by the FIS at their 28th International Ski Congress in Opatija , Croatia (then a part of Yugoslavia) . Much like in 1938 when the discipline received official recognition from the FIS , another milestone had been reached as ski flying was now granted its own world championship @-@ level event on par with the Ski Jumping World Championships , having spent almost four decades as a mere ' special attraction ' alongside its older and more prestigious sibling .

With no world records set at the 1972 event , the organisers in Oberstdorf got to work by upgrading their hill to a K @-@ point of 175 m (574 ft) for the 1973 Ski Flying World Championships . Janez Gori?ek was brought in to oversee the project following Heini Klopfer 's death in 1968 . With the gauntlet laid down , the results were showcased immediately when Heinz Wossipiwo set a world record of 169 m (554 ft) in Oberstdorf . Determined to claim the world record for himself , Walter Steiner ? the reigning Ski Flying World Champion ? jumped 175 m (574 ft) and 179 m (587 ft) but crashed heavily on both attempts , sustaining a concussion and a fractured rib . He would finish the event with a silver medal , behind winner Hans @-@ Georg Aschenbach .

A year later in Planica , in front of a 50 @,@ 000 @-@ strong crowd , Steiner finally achieved the world record he had been striving for , landing a jump of 169 m to equal that of Wossipiwo in 1973 . Spectators were astonished and the event organisers momentarily bewildered , as Steiner had landed well beyond the markers used to indicate distance alongside the hill , which only went as far as the existing K @-@ point of 165 m . For the first time since their respective hills had been built , the competition was levelled between Oberstdorf and Planica . On the next day of the event in the latter , Steiner tried to go even further : he landed at 177 m (581 ft) but fell down on what was almost flat ground , although this time he managed to walk away (albeit on unsteady legs) with only cuts to his face .

= = = = Safety issues arise = = = =

All these increasingly long distances came at a price , as illustrated by filmmaker Werner Herzog in his 1974 documentary The Great Ecstasy of Woodcarver Steiner . During both the aforementioned events in Oberstdorf and Planica , several athletes including Steiner had far exceeded the limits of

the hill by simply ' running out of slope ' or ' out @-@ jumping ' the hill . Jumps were much further than in the 1950s , during which the old Kongsberger technique was still in use . The results were now potentially fatal each time : athletes were coming only metres away from landing on completely flat ground , or the equivalent of falling from a multi @-@ storey building . Furthermore , only a wool cap and goggles ? or no headgear at all ? were worn ; an antiquated feature left unchanged from the very earliest days of ski jumping more than 150 years prior . In 1979 , at their 32nd International Ski Congress in Nice , France , the FIS mandated helmets to be worn by athletes at all ski jumping and flying events .

In Herzog 's documentary , Steiner is shown to reflect with trepidation in Oberstdorf :

Ski flying has reached the point where it 's beginning to present real dangers . We 've just about reached the limit , I believe , as far as speed is concerned . ... Maybe I 'd prefer to turn back [and] go back to flying off 150- or 130 @-@ metre hills , but it 's the thrill of flying so far that nevertheless gives me a kick .

Further down the hill and pointing to a wooden marker indicating Steiner 's failed efforts , Herzog explains solemnly :

This mark is , in fact , the point where ski flying starts to be inhuman . Walter Steiner was in very great danger . If he 'd flown 10 m (33 ft) more , he 'd have landed down here on the flat . Just imagine , it 's like falling from a height of 110 m (360 ft) onto a flat surface : to a certain death .

In Planica , Herzog quoted Steiner as having said that he felt like he was in an arena with 50 @,@ 000 people waiting to see him crash . On the third day of the event , while talking to journalists after a jump , Steiner appeared jaded at the organisers ' pressure on him to set more world records at the expense of his well @-@ being : " They let me jump too far four times . That shouldn 't happen . It 's scandalous of those Yugoslav judges up there who are responsible . "

The stalemate between the venues did not last long , as four world records were set in Oberstdorf within a span of four days in 1976 , bringing the official figure up to 176 m (577 ft) set by Toni Innauer at the end of the event . Three years later , Planica drew level once again when Klaus Ostwald equalled the world record . Elsewhere , in the Western Hemisphere , the United States opened its own ski flying venue in 1970 : Copper Peak in Ironwood , Michigan had a K @-@ point of 145 m , therefore not designed for world record distances from the outset . It is the only ski flying hill to have been built outside of Europe .

= = = 1980s = = =

= = = = Harrachov joins in , Planica vs. Oberstdorf continues = = = =

Planica and Oberstdorf briefly had a new challenger when the ?er?ák K165 hill in Harrachov , Czech Republic (then a part of Czechoslovakia) was opened in 1980 . For one year , all three venues shared the world record when Armin Kogler jumped 176 m at Harrachov 's opening event . He improved this to 180 m (590 ft) in 1981 , this time in Oberstdorf . Notably , at the 1980 Harrachov event , 16 @-@ year @-@ old rookie Steve Collins won all three competitions with jumps consistently close to world record figures . At the 1983 Ski Flying World Championships , Pavel Ploc brought the world record back to Harrachov (which had since been upgraded to K185) by jumping 181 m (594 ft) ; this remains the last time a world record was set in Harrachov .

The issue of safety in ski flying became a serious talking point at the aforementioned 1983 event . In only a single day , the hill in Harrachov ? a location named " Devil 's Mountain " ? became notorious for causing violent accidents . Horst Bulau crashed and suffered a concussion , while Steinar Bråten and Jens Weißflog had their own crashes . Ploc also crashed heavily in 1980 and 1985 . All escaped serious injury , but it was a chilling precursor of more to come .

Over the next few years , the one @-@ upmanship continued as the world record was again traded between Planica and Oberstdorf . In 1984 , Matti Nykänen jumped 182 m (597 ft) twice on the same day in Oberstdorf . By improving this to 185 m (607 ft) the next day , Nykänen became the first athlete since Reidar Andersen in 1935 to set three world records in the space of 24 hours . It

would be the end of an era as this was the last time a world record was set in Oberstdorf ; altogether twenty were set there .

In 1985 , to coincide with that year 's Ski Flying World Championships , Planica underwent another upgrade to increase the K @-@ point to 185 m . World records were again shattered as a result . Mike Holland first jumped 186 m (610 ft) to become the first American world record holder since Henry Hall in 1921 . Nykänen would follow this up by landing a metre further . In the final round of that event , and in a show of dominance as he closed in on his second Ski Jumping World Cup title , Nykänen wowed the crowd with a jump of 191 m (627 ft) to punctuate his title win and effectively bring the Planica ? Oberstdorf rivalry to a close .

Mike Holland later described his own jump :

The world record jump was very smooth . It felt like I was lying on my stomach on a glass coffee table , watching a movie projected on a screen underneath the table . Although the flight was very smooth , it seemed like the movie projector was running the film faster than intended .

= = = = Safety issues reach their peak = = = =

The 1986 Ski Flying World Championships in Kulm highlighted the dangers of the sport in a most graphic way . In the second competition of the event , Andreas Felder equalled the world record to win the gold medal , ahead of Nykänen who won bronze . However , this was overshadowed by a series of horrific accidents which took place earlier . In treacherous crosswind conditions , Masahiro Akimoto lost control moments after takeoff , falling suddenly from a height of 9 m (30 ft) onto his back . He suffered a fractured ankle in addition to chest and shoulder injuries . A few minutes later Rolf Åge Berg frighteningly lost control at the same height , at an estimated inrun speed of 112 kilometres per hour (70 mph) , but was able to land safely on both skis .

Immediately afterwards , Ulf Findeisen fell out of the air on his jump , crashing down head @-@ first from 9 m and flipping head over heels repeatedly along the slope , only coming to a stop several seconds later . Al Trautwig , commentating for American TV network ABC , described Findeisen as looking " like a ragdoll " after the fall . Former ski jumper Jeff Hastings , co @-@ commentating , said : " I 'm feeling a little sick to my stomach , Al ... I can 't believe this . I 've never seen ski flying like this ... So many falls . " Findeisen was barely conscious and had to be stretchered away , later going into cardiac arrest but surviving .

In the next round of the competition , Berg attempted another jump but was not as fortunate this time : he fell out of the air , just as before , and crashed almost identically to Findeisen . One of Berg 's skis , which had come loose after impact and was still attached to his foot , flailed around and hit him in the face ? exposed due to his goggles detaching ? as he was sliding to a stop . His injuries , including concussion and a broken ACL , were career @-@ ending . At this point , Trautwig began calling into question the nature of the sport : " Jeff , we talk about the fear and why the ski flyers are scared ... I 'm really starting to ask , why we 're here and why they 're doing it . "

Ski flying endured a tentative era beginning in 1987 , when Piotr Fijas set a world record of 194 m (636 ft) in Planica . With height over the hills and inrun speeds at an all @-@ time high (Pavel Ploc reached 115 @.@ 6 km / h (71 @.@ 8 mph) off the table in Harrachov in 1983) , as well as distances approaching 200 m (660 ft) , the FIS took a stance against record @-@ hunting for safety reasons . From Felder 's world record in 1986 onwards , the FIS implemented a rule in which distance points would not be awarded beyond 191 m ; the jump would still count , but no points further than that could be achieved . Per this rule , Fijas ' jump was officially scaled down to 191 m by the FIS , but the KOP group (led by the organisers in Kulm , Oberstdorf and Planica) independently recorded the actual figure . Neither Kulm nor Planica would hold a ski flying event for several years , leaving Oberstdorf and Vikersund to host the Ski Flying World Championships in 1988 and 1990 , respectively . At those events , world record distances and major incidents were avoided .

= = = 1990s = = =

= = = = New safety measures = = = =

The dangers of the sport were still on full display at the 1992 Ski Flying World Championships in Harrachov , where Andreas Goldberger suffered a similar crash to the ones which occurred in Kulm in 1986 . On the first day of the event , a few seconds into his jump , dangerous wind conditions forced Goldberger to lose control at a height of around 9 m and a speed of more than 107 @.@ 4 km / h (66 @.@ 7 mph) , sending him plummeting face @-@ first onto the hill below . He was taken by helicopter to a hospital , having sustained a broken arm and collarbone . Franti?ek Je? also crashed , but was able to walk away with some help .

The second and final day was stopped and cancelled due to worsened weather , culminating in a high @-@ speed fall on the outrun by Christof Duffner after he landed an unofficial , world record @-@ equalling jump of 194 m . Goldberger 's efforts from earlier in the event were enough to earn him a silver medal behind eventual winner Noriaki Kasai , who became the first non @-@ European Ski Flying World Champion . Goldberger was able to return to top @-@ level competition within less than a year .

Protective wind nets by the side of the hill were later installed in Harrachov for 1996 to minimise the effects of crosswind , along with major reprofiling of the slope to comply with FIS safety regulations . This reprofiling ? particularly at the hill 's highest point , known as the ' knoll ' ? was critical in reducing the fearsome height reached by athletes after takeoff , estimated to be 15 ? 18 m (49 ? 59 ft) in 1980 . Thanks to these modifications , athletes no longer jumped with as much height as before and no major accidents have occurred in Harrachov since 1992 .

Speaking about his experience at the 1983 Ski Flying World Championships in Harrachov , Mike Holland said :

Climbing over the knoll , I thought ' this is SO damned high , I shouldn 't be this high . ' Since I wasn 't ready for such height and speed , I threw out my arms at the end of the flight and let myself down 4 m (13 ft) short of the world record .

= = = = Technique changes : parallel to V @-@ style = = = =

It was during this time that the entire sport of ski jumping underwent a significant transition in technique . Until the early 1990s nearly all athletes used the Däscher technique or parallel style , in which the skis were held close together and parallel to each other . This had been the norm since the 1950s , evolving into a modified variation in the 1980s with the skis pointed diagonally off to the side in a crude attempt to increase surface area . However , this came largely at the expense of stability and balance , akin to ' walking a tightrope ' in mid @-@ air and leaving athletes at the mercy of the elements . Akimoto , Findeisen , Berg and Goldberger 's accidents were all caused by unpredictable gusts of wind which made them lose control at the highest and fastest stage of their jumps , exacerbated by an outdated technique ill @-@ suited to the new extremes of ski flying , as well as the prevalence of older hills featuring very steep slopes .

In the late 1980s and early 1990s , Jan Boklöv pioneered the V @-@ style : skis were instead spread outwards in an aerodynamic " V " shape , with the athlete 's body lying much flatter between them . This created more surface area and lift , instantly enabling distances of up to ten per cent further . It also had a favourable effect of granting more stability in the air , although the peak speed was some 10 km / h (6 @.@ 2 mph) slower than the parallel style . At first this new technique was looked upon unfavourably by the judges , who made it an issue to downgrade style points for those who used it . Nevertheless , within a few years , with Boklöv having won the 1988 ? 89 Ski Jumping World Cup season and other athletes promptly adopting the technique , the judges ' stance quietly eased and the V @-@ style became the standard still used today .

The technique itself had a transitional period of its own , going from a narrower " V " in the early 1990s ? retaining some features of the parallel style ? to a much wider one at the end of the decade . Some athletes (such as Tommy Ingebrigtsen) preferred to cross the back of the skis to exaggerate the " V " angle , while others (such as Kazuyoshi Funaki and Jakub Janda) leaned

even more forward so that their body lay almost flat between the skis ; both variations remain in use . The V @-@ style was still not immune to failure if the air pressure under one ski was lost , but the results were much less catastrophic than with the parallel style ; the latter had resulted in more head @-@ first landings , whereas the V @-@ style saw somewhat ' safer ' landings on the back or shoulders .

= = = = Breaking the 200 metre barrier = = = =

In 1994 , ski flying returned to a newly independent Slovenia , where the hill in Planica had been reprofiled with the aim of allowing for jumps of more than 200 m . The FIS was strongly against this and initially threatened to cancel the event on the grounds that its regulations on hill design had been violated . Negotiations between the organisers in Planica and the FIS managed to defuse the situation , allowing that year 's Ski Flying World Championships to take place . Before the event , Espen Bredesen said : " Of course I want to be the first [to reach 200 m] , but I think that 210 m (690 ft) or 215 m (705 ft) are also possible . "

With all athletes having switched to the V @-@ style , the sport was about to reach one of its biggest ever milestones . During the training round on the opening day of the event , Martin Höllwarth jumped 196 m (643 ft) to edge the world record ever closer to 200 m . This was the first time a world record had been set using the V @-@ style , meaning Piotr Fijas ' was the last to use the parallel style . Andreas Goldberger then got tantalisingly close to the magic number when he landed at 202 m (663 ft) but failed to maintain his balance as he squatted down and touched the snow with his hands , rendering his jump an unofficial world record . The official honours went to Toni Nieminen only a short time later , who cleanly landed a history @-@ making jump of 203 m (666 ft) to claim both the world record and the achievement of being the first ever ski jumper to break the 200 m barrier .

On the next day during the second training round , Christof Duffner almost had his moment of glory when he jumped 207 m (679 ft) , but fell upon landing just as he had done two years earlier in Harrachov . In that same training round , Espen Bredesen claimed the world record for himself with a clean jump of 209 m (686 ft) . The restrictive rule concerning jumps beyond 191 m , in place since 1986 , was subsequently abolished by the FIS . However , as the rule was still in place at the time of Nieminen and Bredesen 's jumps , their additional distances were nullified . This handed Jaroslav Sakala the Ski Flying World Championship at the end of the event , which was shortened to only a single competition round due to strong winds forcing cancellation of the other .

In 2014 , Nieminen spoke about the jump that cemented his name in the history books :

It was the kind of jump in which , even when arriving [at the bottom of the hill] in the landing position and not knowing at all what lies ahead , I remember that my legs were trembling . That 's how terrified I was . ... Overcoming your own fears is the best feeling . The nature of the sport is that one has to challenge themselves . That 's why this jump has remained a highlight of my career .

= = = = Planica dominates = = = =

Beginning with Fijas 's world record in 1987 , Planica enjoyed a very long period of exclusivity . Much like in the 1930s and 1940s , no other hills would come close to reclaiming the accolade for 24 years , despite nearly all receiving K @-@ point upgrades to 185 m . Only Ironwood remained unchanged at K145 , staging its last event to date in 1994 with a hill record of 158 m (518 ft) shared between Werner Schuster and Mathias Wallner . Since then , the hill has served as a popular tourist attraction in which sightseers are able to access the top of the inrun via an elevator . In 2013 , following almost two decades of disuse as a sporting venue , it was announced that the hill at Copper Peak would be renovated as the world 's largest ski jumping hill , additionally capable of staging summer events .

With eight years between Fijas and Höllwarth 's world records , it was the longest drought of unbroken records since that of Tauno Luiro from 1951 was broken by Jo?e ?libar in 1961 . The margin between Höllwarth and Nieminen 's world records was 7 m (23 ft) , the largest since Sepp

Weiler and Dan Netzell in 1950 , which was 8 m (26 ft) . In Planica the world record was broken a further four times in the 1990s , ending with Tommy Ingebrigtsen jumping 219 @.@ 5 m (720 ft) in 1999 to send ski flying into the new millennium .

= = = 2000s ? present = = =

Further changes in technique , equipment and hill profiles have seen the world record increase by almost 50 m (160 ft) within 21 years . In 2000 , the world record in Planica was improved by 5 @.@ 5 m (18 ft) , with jumps of 224 @.@ 5 m (737 ft) by Thomas Hörl and 225 m (738 ft) by Andreas Goldberger . The latter stood for three years until being equalled by Adam Ma?ysz in 2003 , but his achievement was only temporary . On the same day , and in a span of the next four , Matti Hautamäki set three consecutive world records of 227 @.@ 5 m (746 ft) , 228 @.@ 5 m (750 ft) and 231 m (758 ft) , much like Matti Nykänen had done in 1984 . When interviewed soon after the event , Hautamäki said that " The longer one stays in the air , the more fun it is . "

Before the 2004 Ski Flying World Championships , the hill was renamed to Letalnica bratov Gori?ek (" Flying hill by brothers Gori?ek ") . In 2005 , Planica continued its dominance of ski flying when the world record was shattered four times on the same day . Tommy Ingebrigtsen , Bjørn Einar Romøren and Matti Hautamäki all traded records , with Romøren emerging victorious with a jump of 239 m (784 ft) to claim the final figure . Some minutes after that , having already captured his second consecutive Ski Jumping World Cup title , Janne Ahonen went for broke by stretching out a jump of 240 m (790 ft) but fell from a dangerous height and landed hard on flat ground ; his world record was rendered unofficial . Ahonen half @-@ jokingly said in a 2009 interview that had he not brought his jump down earlier than intended , he would have reached 250 m (820 ft) , at which point " I would be a dead man . [laughs] " In the aftermath of the event and following numerous near @-@ flat ground landings , it became clear that ski flying had once again outgrown an older hill ? which last saw an upgrade twelve years prior ? and needed enlarging in the years to come .

= = = = Hill renovations and breaking the 250 metre barrier = = = =

In 2005 , almost immediately after the Planica event , talks were under way to upgrade the hill in Vikersund . This became a reality in mid @-@ 2010 , when the FIS announced major rule changes at the 47th International Ski Congress in Antalya , Turkey to allow for even larger ski flying hills to be constructed . Vikersund was the first to undergo renovation to increase its K @-@ point from 185 m to 195 m (640 ft) , making it the largest flying hill in the world and the only one equipped for floodlit night events . Janez Gori?ek , known for his expertise in ski flying hill design , was the leader of this project . The new facility was given a rousing introduction at its opening event in 2011 , when Johan Remen Evensen jumped 243 m (797 ft) and 246 @.@ 5 m (809 ft) , returning the world record to Vikersund for the first time since 1967 . This was a ' trial ' event staged before the 2012 Ski Flying World Championships , which went on to draw a crowd of 60 @,@ 000 .

Another modification in Vikersund (this time to K200) resulted in the coveted 250 m barrier being reached in 2015 , with Peter Prevc landing a clean jump right on the mark to claim another historic milestone in the sport . Prevc 's glory was short @-@ lived when Anders Fannemel broke this figure only a day later , landing a jump of 251 @.@ 5 m (825 ft) to set the current world record . At the same event , prior to Fannemel 's jump , Dmitry Vassiliev crashed hard at 254 m (833 ft) after exceeding the hill size boundary in an almost identical way to Janne Ahonen in Planica a decade earlier ; this gave Vassiliev unofficially the furthest distance ever reached in ski flying to date .

Also in 2015 , both Kulm and Planica finished upgrading their hills from K185 to K200 . All three aforementioned hills ? Planica , Kulm and Vikersund ? are now equipped for jumps exceeding 240 m , as well as having improved facilities for athletes and spectators . Although the new hills are much larger than ever before , most of them feature longer and less steeply angled slopes , designed purely for the V @-@ style and with the knowledge of 80 years ' worth of world record progression . Inrun tables have also been placed further back from the knoll and flight curves made shallower in order to allow athletes to glide more efficiently along the contour of the slope . This has

significantly reduced such precarious heights over the knoll as was the case in the early 1990s and prior : in that era , athletes who knew only of the parallel style would aim to jump in an upward trajectory off the table , reaching vast heights but at the expense of distance . Furthermore , rather than glide , they instead plummeted towards the slope . However , compared to Vikersund , Planica is still extremely steep in the flight phase .

Anticipating a renewed world record rivalry , organisers in Vikersund have welcomed the healthy competition with Planica . Regarding the new hill in Kulm , Andreas Goldberger remarked that world records should not be expected there because of its different design and shorter hill profile . Oberstdorf is scheduled to receive an upgrade from K185 to K200 in time for the 2017 World Cup season and 2018 Ski Flying World Championships , leaving Harrachov (K185) as the only hill having not been renovated since the 1990s .

At the end of the 2015 World Cup season , FIS race director Walter Hofer commented that the world record had reached its limit on the newest hills , and that no further expansion to their size was expected in the near future . He also noted in 2011 that the FIS rules on hill sizes would likely remain unchanged for another decade . Despite this , Janez Gori?ek is said to have made plans for a 300 m (980 ft) hill in Planica , albeit put on hold until the FIS rules are again changed . Anders Fannemel has said he believes 252 m (827 ft) is the limit in Vikersund , but that the world record can be broken again in Planica .

= = Differences to ski jumping = =

Unlike ski jumping , which can be contested in the summer on specially equipped hills , ski flying is strictly a winter sport and not part of the Winter Olympics ; no world records have therefore been set at the games . Also in contrast to ski jumping , athletes are not able to practice on ski flying hills out @-@ of @-@ season as they are used only for competition events . Among the Alpine countries , there is an unwritten gentlemen 's agreement forbidding athletes under the age of eighteen to participate in ski flying events .

Rather than being considered a separate sport on its own , ski flying is essentially an offshoot of ski jumping involving larger hills and longer distances . According to former US ski jumping coach Larry Stone , " It 's the same thing , just bigger . You 're going faster and flying higher . ... Basically , it 's just a real big jump . " Today , the term " ski flying " itself has evolved to be used only for jumps in the region of 170 m (560 ft) or further , with 200 ? 240 m (660 ? 790 ft) being the competitive standard . By comparison , the longest ever distance from a ski jumping hill is 152 m (499 ft) , set at Mühlenkopfschanze (" Mühlenkopf hill ") in Willingen , Germany . Distances of around 90 ? 140 m (300 ? 460 ft) are the standard on most ski jumping hills .

= = = Hills = = =

The main difference between ski flying and ski jumping pertains to hill design , as mandated by the FIS . Historically , hills with a K @-@ point (German : Konstruktionspunkt) or main landing zone of more than 145 m (476 ft) were classed as ski flying hills . As jumping distances increased by the decade , so did a small number of unique hills at locations seeking to outdo each other in a friendly rivalry for world record honours . Since 1980 , there have only been five of these hills in Europe and one in the US .

On all modern ski flying hills the K @-@ point is set between 185 ? 200 m (607 ? 656 ft) , with a hill size of 205 ? 225 m (673 ? 738 ft) ; far greater than the largest ski jumping hills , which only have K @-@ points of up to 125 ? 130 m (410 ? 427 ft) and a hill size of 140 ? 145 m (459 ? 476 ft) . The angle of the hill in the landing zone is between 33 @.@ 2 ? 35 degrees . Seven ski flying hills in total were constructed between 1934 and 1980 . Six are currently active , but only five of them as flying hills :

There have been a number of proposed ski flying hills , most of which never reached the construction stage . Two were planned in Finland , in Kemijärvi and Ylitornio , but neither projects were realized after their inception in 2007 . In Norway , prior to the renovation of Vikersund , there

were serious talks about constructing a new ski flying hill at Rødkleiva in Oslo . The most recent proposal has come from China , together with German architects Graft , who are in the development stages of a ski jumping and flying hill complex at the Wangtiane ski resort in the Changbai Mountains .

= = = Events = = =

The first Ski Flying World Championships were held in Planica in 1972 and have been staged biennially at all hills (except Ironwood) since 1988 . The event replaced various incarnations of International Ski Flying Week , which ran from 1953 to 1989 . Gold , silver and bronze medals are awarded after two competitions , with the total points winner receiving the title of Ski Flying World Champion . A team competition was introduced in 2004 , in which medals are also awarded .

Ski flying events outside of the World Championships are a regular feature on the Ski Jumping World Cup calendar , usually taking place on two or three hills only . Because athletes almost always participate in both disciplines , points scored in ski flying also count towards the Ski Jumping World Cup standings . Since 1991 , an additional title and trophy ? the Ski Flying World Cup ? has been awarded at the end of each season to the overall points winner of solely ski flying competitions , even if only one was contested . In contrast to the Ski Flying World Championships , the Ski Flying World Cup is a season @-@ long contest . The former can be considered equivalent to the Ski Jumping World Championships , in that both are one @-@ off events staged during the Ski Jumping World Cup season , but are isolated from it ; therefore , points from neither are included as part of the World Cup standings .

= = Rules and technique = =

Ski flyers take off at speeds of 98 ? 109 km / h (61 ? 68 mph) , flying as high as 6 ? 9 m (20 ? 30 ft) above the hill , accelerating to around 120 ? 130 km / h (75 ? 81 mph) before landing , and spending up to nine seconds in the air ; all these figures are considerably less in ski jumping . David Goldstrom , longtime commentator for British Eurosport , once described the appearance of ski flying as that of " flying like a bird " .

= = = Event organisation = = =

The FIS ' race director ' and ' jury ' are a core team of personnel in charge of the entire event . Walter Hofer has been the FIS chief race director of ski flying and ski jumping events since 1992 . Miran Tepe? , himself a former ski jumper , is the assistant race director and second @-@ in @-@ command to Hofer . Spectators at the venue watching from large screen displays , as well as viewers watching on TV , are able to see on @-@ screen graphics provided by the FIS . These graphics , which have significantly evolved in detail over the decades , display a multitude of information : an athlete 's name and nationality , their photo , bib number , traffic light status , wind speed and direction , distance jumped , personal best distance , judges ' scores , points achieved , and competition rank .

= = = The inrun = = =

A ski jump or ski flight begins from the ' inrun ' , a ramp structure at the top of the hill in the form of a tower or set naturally against the hill formation . Access to this area is via ski lift or on foot . The inrun is 113 ? 133 @.@ 8 m (371 ? 439 ft) in length , inclined at an angle of 35 ? 39 degrees . Since the late 1980s , when the V @-@ style began enabling jumps dangerously close to flat ground , the full length of a ski flying inrun has never been used due to safety reasons . At the bottom of the inrun ? specifically the very tip or edge of the structure ? is the ' table ' , which is set at a height of 2 @.@ 42 ? 4 @.@ 75 m (7 @.@ 9 ? 15 @.@ 6 ft) above the hill surface . Contrary to popular misconception , the table is actually declined downwards instead upwards , with the angle of decline

set between 10 @.@ 5 ? 11 @.@ 25 degrees .

= = = Pre @-@ takeoff phase = = =

Near the top of the inrun , there is a ' start gate ' ? a metal or wooden beam ? on which an athlete sits and awaits their signal to jump via a set of traffic lights (green , yellow and red) . These lights are operated directly by Miran Tepe? . An athlete may enter the gate when yellow is shown . If red is shown after this point , the wind conditions will have been deemed unfavourable for a safe jump : the athlete must then carefully exit the gate as they had entered it and await another opportunity to jump . Failure to dismount the gate within ten to fifteen seconds of being shown a red light , or jumping without having been given the signal to go , will disqualify the athlete .

Wind speed is measured in metres per second (m / s) in the form of head- , tail- and crosswind components . In ski flying there are ten separate wind sectors that are measured along the hill , with five on each side ; in ski jumping there are seven or less sectors . A hard limit , or " corridor of tolerance " , of 3 m / s (9 @.@ 8 ft / s) is permitted at any time : if this is exceeded , all pending jumps are halted until the wind settles to an acceptable level . Weather conditions must be optimal in order to jump competitively and safely , therefore they are actively monitored by the jury , who continuously collaborate with the race directors in making decisions on how an event will progress . The resulting delays may last anywhere from under a minute , to many minutes depending on how variable the conditions are observed to be .

The position of the start gate determines the inrun speed , creating a difference of as much as 10 km / h (6 @.@ 2 mph) depending on whether the gate is set higher (thereby lengthening the inrun) or lower (shortening the inrun) ; the difference in height between individual gates is 0 @.@ 5 m (1 @.@ 6 ft) . Based on the jury 's decision , the gate position ? of which there are several available numbers ? is subject to being adjusted accordingly , including between each jump . In especially tricky conditions , athletes may sometimes be forced to enter and exit the gate multiple times before they are permitted to jump .

If conditions are normal and a green light is shown , the athlete 's coach ? who is situated in a coaches ' section lower down the inrun with a flag in hand ? gives them the final signal to go . Once given this signal , the athlete must commit to their jump within ten seconds or else risk disqualification : they are not allowed to exit the gate from whence they came . To begin descending the inrun , they drop down from the gate to a crouching position , upon which speed is rapidly picked up within seconds via built @-@ in tracks into which the skis are slotted . This streamlined crouch minimises air resistance along the inrun , and a further effort is made to reduce friction by not allowing the skis to bump too much against the sides of the tracks . Speed is measured from the table using a speed gun .

No ski poles are used , and no assistance from others (such as a push from the gate) is allowed . In heavy snow conditions the tracks can become clogged up , which reduces inrun speed and may cause an unpredictable descent for athletes . Event personnel standing by the sides of the inrun are often assigned to use leaf blowers to prevent the tracks from clogging up with snow .

= = = Takeoff and transition phase = = =

Moments before being propelled off the table , the athlete undergoes a sudden increase in g @-@ force due to the curvature ? or ' compression ' ? of the bottom of the inrun . They then initiate a very powerful , explosive jump that requires great leg strength . At this very instant , they adopt their own unique aerodynamic flying position in what is called the ' transition ' ; all of this taking place in only a tenth of a second . Timing is crucial and there is very little margin for error at this phase : a jump that begins too early or late off the table can mean the difference between an excellent , average or poor effort . Each athlete has their own method of generating as much inrun speed as possible , depending on such intricacies as crouch depth , hip angle , arm placement , or how far the torso is positioned over the knees . Body weight is also a factor (see power @-@ to @-@ weight ratio) , which has led to some athletes ' health becoming an issue over the years .

The most challenging stage of the takeoff is carrying the speed from the decline of the inrun with sufficient height over the ' knoll ' , and achieving the correct trajectory down the slope . The knoll is the highest point of the hill itself , from which it begins to slope downwards ; on modern ski flying hills the table is placed considerably far back from the knoll , so as to reduce the steepness of the flight curve . A skilled athlete is able to aggressively ' snap ' into the transition so as to clear the knoll with ease , thereby allowing them to focus completely on using their specialised aerodynamic flying technique to maximise distance further down the hill . Athletes of the highest skill level can consistently compensate for any lack of inrun speed with perfect timing off the table and an excellent transition .

However , there is a fine line between aggressiveness and over @-@ aggressiveness at takeoff . One of the most common mistakes made by athletes , including those at world class level , is to raise the ski tips too much during the transition : this excessive angle of attack causes the skis to act more as a spoiler than an efficient aerodynamic device , resulting in more height than distance . In a well @-@ executed jump , athletes will spend several seconds longer in the air than in ski jumping ? up to five seconds more ? which requires a different level of skill in order to sustain flight for a longer period , and showcases how the role of aerodynamics is magnified in ski flying . Not all athletes who excel in ski jumping are able do so in ski flying (see the section on specialists) .

= = = Flight phase and equipment = = =

Once the athlete has taken flight , characteristics similar to that of a glider come into force . Ski flyers are able to cover such tremendous distances and land safely primarily due to the skis they use , which are substantially wider and longer than their cross @-@ country or Alpine skiing counterparts . Each ski is attached securely at the front of the boot ; the heel , under which there is a wedge , is then attached to the ski using a hinged binding peg with a maximum length of 7 cm (2 @.@ 8 in) , allowing the athlete to spread the skis wide apart and lean forward into their preferred aerodynamic position . Much like aircraft wings , the skis are flexible to an extent , resulting in them bending significantly upon takeoff . Maintaining stability in the air is paramount : a loss of balance or pressure under the skis can lead to disaster (see the section on accidents) .

Skilful use of headwind and thermal updrafts along various sections of the hill is used to generate additional lift , creating pressure under the oversized skis and enabling athletes to effectively ride on a ' cushion of air ' . A reasonable amount of headwind is favourable to a long jump as it has the effect of delaying the athlete 's descent back onto the hill , whereas a tailwind or no wind at all is considered highly unfavourable and tends to shorten a jump by pushing the athlete downwards towards the hill too early . In particular , the presence of a tailwind forms one of the most challenging aspects of clearing the knoll and achieving a competitive distance . Conversely , in ideal headwind conditions , an athlete can ' catch ' an updraft along the middle of the hill ? which always involves some degree of luck ? and use it to glide even further than normal , making for an impressive visual effect for spectators .

To further aid athletes in gliding as aerodynamically as possible , they wear a one @-@ piece fabric bodysuit more similar to a wingsuit than a ski suit . This bodysuit is loose @-@ fitting and generates yet more lift , but the amount of slack is stringently regulated by the FIS so as to not allow for excessive bagginess and thereby reducing its wingsuit- , sail- or parachute @-@ like properties . In the early 2000s , bodysuits had reached exceptionally baggy proportions , resulting in humorous comparisons to flying squirrels . A ban on these baggy suits came into effect soon after , and today the level of slack for bodysuits is measured by FIS scrutineers before and after each jump : if the amount is exceeded , that athlete is disqualified due to an ' equipment violation ' .

= = = Landing phase and distance measurement = = =

The ultimate aim is to land on , or ideally surpass , a line marked across the hill called the ' K @-@ point ' , ' critical point ' , or ' calculation line ' . In order to attain the most points from the style judges , athletes strive for a ' Telemark ' landing : instead of landing with simply both feet together , one foot

is placed clearly in front of the other (without sliding , so as to ' cheat ') , both feet held no more than four ski widths ' apart , and the body held stable with a straight back and arms outstretched . This pose must be maintained until the ' outrun ' ? a line at the very end of the hill , where the slope has fully flattened out ? is reached . The exact placement of landing is measured between the athlete 's front and back feet . Failing to make a Telemark landing results in a loss of style points . Considerably more points are lost if a landing fails before the outrun line , such as falling over or touching the ground with any part of the body except the feet .

Distance is measured from the edge of the table to the placement of landing by increments of 0 @.@ 5 m . This is done using electronic and video monitoring systems together with event personnel assigned to observe jumps by the side of the hill , known as ' distance measurers ' . If enough jumps are deemed to be too far beyond the hill size , or near the ' fall line ' (determined by the jury) ? where the slope begins to flatten out ? an immediate meeting is held between the jury and race director , which usually results in the start gate being lowered so as to check inrun speeds and therefore distances . For spectators and judges , increments of 5 m are clearly indicated by rows of fir across the hill ; a painted red line is used for the K @-@ point , and a dashed red line for the hill size . Both sides of the hill are also marked highly visible in red to indicate the ' landing zone ' , while the point beyond the hill size is marked in green on the sides .

= = Scoring and judging = =

= = = Distance points = = =

Ski flying uses the same points system as ski jumping , but with two differences . In ski jumping , an athlete who reaches the K @-@ point receives 60 points as a base mark for distance ; in ski flying it is 120 . For every metre beyond the K @-@ point , ' bonus points ' are awarded . In ski jumping , a metre has a value of 2 points for ' normal ' hills and 1 @.@ 8 points for ' large ' hills ; in ski flying , a metre is instead worth 1 @.@ 2 points . These bonus points are then added to those received from reaching the K @-@ point . Conversely , failing to reach the K @-@ point will result in a deduction of points from the base mark to the same aforementioned values . Examples :