



Federal Institute  
of Sport Science



Supporting  
Sport

Dirk Scheumann & Marco Rues

# Snowparks

New Winter Sports Facilities



Dirk Scheumann & Marco Rues

# Snowparks

New Winter Sports Facilities

---

**Bibliographic information of the Deutsche Nationalbibliothek (German National Library)**

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available on the Internet at <http://dnb.d-nb.de>.

---

**Imprint****Editor**

Federal Institute of Sport Science  
Graurheindorfer Straße 198 · 53117 Bonn  
[info@bisp.de](mailto:info@bisp.de)  
[www.bisp.de](http://www.bisp.de)

**As of**

July 2017

**Layout**

Andrea Willems

## Foreword

Freestyle skiing and snowboarding are gaining popularity in winter sports resorts around the world. Competitive sport structures have now been established for these new sports, paving the way for freestyle skiing and snowboarding to become part of the Olympic Winter Games.

Functional needs-based sports facilities are a prerequisite for a successful commitment to competitive sports. The mere presence of attractive sports facilities encourages people to take up sporting activities – the basic prerequisite for a competitive sports culture in the future. The absence of such sports facilities rules out successful participation in top-class sports at international level. In snowboarding and skiing, the validity of this premise has been demonstrated by the performance of German athletes in the new Olympic winter sports, such as halfpipe riding, slopestyle and cross. At the Olympic Winter Games in Sochi 2014, 20 competitions (of 98 in total) were carried out in freestyle skiing and snowboarding. German athletes failed to win any medals. The poor performance can also be attributed to the fact that the infrastructure in Germany is inadequate compared to countries that are successful at a global scale, such as the USA, France, Canada and Scandinavia.

In the future, these new sports will play an even greater role in Olympic winter games. However, there are hardly any facilities in Germany suitable for training and competition in freestyle skiing and snowboarding. Sports facilities that can be used by high-talent teams, junior teams and sports schools, as well as for advanced training of coaches and teaching staff, are scarce here.

With this practical guide, the German Federal Institute for Sports Science would like to make a contribution to promoting the construction of sports facilities for the new winter sports disciplines. The brochure is intended to help the people entrusted with the planning of so-called snowparks to increase the safety in the design and later operation of these sophisticated sports facilities.

Michael Palmen  
BISp, Sports Facilities Department

# Table of Contents

|   |           |
|---|-----------|
| <b>Foreword.....</b>  | <b>3</b>  |
| <b>Table of Contents .....</b>                                    | <b>5</b>  |
| <b>I Introduction .....</b>                                       | <b>6</b>  |
| 1 Today's sports scene.....                                       | 7         |
| 2 Why are special infrastructures required for snow sports? ..... | 7         |
| 3 Objective and target audience .....                             | 8         |
| 4 The aspect of safety.....                                       | 9         |
| <b>II Basics .....</b>  | <b>10</b> |
| 1 Legal basis.....  | 11        |
| 2 Technical basis .....   | 11        |
| 3 Statistical basis.....  | 11        |
| <b>III Explanation of terms.....</b>                              | <b>12</b> |
| 1 The snowpark concept – Smart Style.....                         | 13        |
| 2 Snowpark .....  | 16        |
| 3 Halfpipe/Quarterpipe .....                                      | 23        |
| 4 Related facilities .....  | 23        |
| <b>IV Project phase - conception .....</b>                        | <b>26</b> |
| 1 Target group, central theme and current trends .....            | 27        |
| 2 Financing and profitability .....                               | 28        |
| 3 Terrain selection and location .....                            | 28        |
| 4 Level of difficulty and guidance system .....                   | 30        |
| 5 Safety and danger points.....                                   | 31        |
| 6 Marketing and communication.....                                | 32        |
| 7 Project description and interactive solutions.....              | 33        |

|   |           |
|---|-----------|
| <b>V Safety aspects during set up.....</b>      | <b>34</b> |
| 1 Building principles .....                     | 35        |
| 2 Implementation of individual features .....   | 35        |
| 3 Labelling and marking.....                    | 42        |
| 4 Materials.....                                | 43        |
| 5 Examples of a sample snowpark .....           | 44        |
| <b>VI Safety aspects during operation.....</b>  | <b>47</b> |
| 1 Safety aspects from operator perspective..... | 48        |
| 2 Maintenance and upkeep .....                  | 48        |
| 3 Legal aspects .....                           | 50        |
| <b>VII Appendix.....</b>                        | <b>53</b> |
| <b>VIII Glossary .....</b>                      | <b>59</b> |
| <b>References .....</b>                         | <b>64</b> |
| <b>Picture credits by chapter .....</b>         | <b>65</b> |

# I Introduction

I



# 1 Today's sports scene

Snowparks are a recent development in winter sports. They were first built in the 80s and 90s, when snowboarding became more and more popular. Inspired by surfing sport, snowboarding became the forerunner for today's freestyle skiing at the end of the 1970s. The history of snowparks practically merges with the history of snowboarding. From first amateurish beginnings with makeshift ski ramps on small slopes, the professional activity of snowpark construction flourished in parallel to the snowboard industry, driven by the growing demand. In 1990, a professional facility was set up in Colorado, USA for the first time. Dubbed the Vail Resort, it was a trailblazer that boasted park-like equipment. The success was not long in coming – the concept of snowparks was continuously developed and spread rapidly around the world.

Nowadays freestyle snowboarding and freestyle skiing are increasingly significant winter sports events. Action-packed fun offerings are increasingly servicing the needs of the most experienced target groups at all skill levels. While these offerings were formerly only interesting for freestylers, fun & action infrastructures nowadays attract diverse visitors. The trend towards diversification of the facilities should also be stressed here. The original snowparks for the wider population have increasingly transformed into infrastructures specifically tailored to the needs of individual target groups, such as kids land (children's snowpark).

The popularity of freestyle winter sports is underlined by the participation in the Olympic Games, World Championships and various major city events. The set up and operation of snowparks is therefore an essential feature for the further development of these sports. Structural deficiencies of the park infrastructure containing artificial features, jumps, halfpipes or cross tracks increase the risk of accidents and can still sometimes be found in German facilities. Consequently, this handbook is intended to provide an initial orientation for the development and operation of a snowpark.

## 2 Why are special infrastructures required for snow sports?

Snow-shaped ramps serve as an enhanced imitation of natural terrain and enable athletes to perform long, quiet flight curves in the air. A clear advantage that has emerged from the operation of snowparks is better control over the community and lower number of cost-intensive rescues off-piste.

However, it has now been recognized that snowpark development also brings along numerous tourist, economic and sporting advantages.



## 2.1 Tourist advantages

The operator of a snow sports facility has to consider the different needs of his guests. Diverse and sophisticated tourism facilities make it possible to meet the ever-growing demand for action and fun activities. It should be noted that skiing and snowboarding will remain the core business of the winter sports industry in the coming years. The target group of a snowpark is usually smaller than those of traditional ski slopes, but it should be noted that young visitors are the next generation of snow sports enthusiasts. It can be said that winter sport resorts linked to positive youth memories will often also be preferred by snow sports enthusiasts in adulthood; snowparks and related infrastructure are therefore arguably a sustainable investment. Of course snowparks do not only have an impact on the young generation of winter sports enthusiasts, but also on their parents. Especially in family ski holidays, facilities such as a snowparks can be decisive for the choice of winter sports resort, as keeping the kids entertained is always a top priority.

## 2.2 Economical advantages

When it comes to snow sports, it is no longer a question of just grooming the slopes, but of making them attractive and exciting. Diversity is constantly increasing, opening up new possibilities that would not have been imaginable before. Normal slopes are often no longer sufficient: groomed slopes, carving slopes, fun slopes and also snowparks are now part of a ski resort usual range of offerings. These are generally available to all age groups and for each skiing level. Well-planned, maintained and, above all, safe snowparks bring success, increase the outreach value, address new target groups and ultimately consolidate the existing clientele.

## 2.3 Sporting advantages

The growth of winter sports has led to the development of three new sports categories: Slopestyle, Halfpipe, Big Air and Cross, which now are freestyle disciplines in professionally managed, competitive skiing and snowboarding events. Snowparks are also indispensable in the training and development of trainers, coaches, and snow sports instructors.

What's more, snowparks give children the opportunity to tackle appropriate challenges, allowing them to develop. The more possibilities they have to gain first experiences in a snowpark, the better the chances to build up their sports skills. Obstacles in a terrain can be seen as help to learn different movement patterns. Snowparks should therefore be recognized as training camps in the snow, which promote the sports and help it grow.

*„Children and young people receive intensive support in snowparks, under the supervision of qualified trainers and coaches. In this way, they can playfully develop self-reliance and independence while enjoying snow sports.“*

*(Friedrich May, state-certified sports and snowboard instructor)*

### 3 Objective and target audience

This handbook is intended to explain the different process steps in the development of a snowpark. Particular attention is paid to minimum safety requirements in order to ensure the greatest possible safety for the set up of a facility. Obvious steps such as planning and set up are explained in detail, but maintenance is also highlighted and treated as a not insignificant part of the process.

Furthermore, this handbook contains detailed definitions and explanations of entry-level features (kicker or other artificial objects) to ensure increased skiing safety. Detailed instructions for the set up of each snowpark feature are beyond the scope of this handbook. For further information please refer to companies specializing in the design of snowpark facilities.

In principle, this handbook can be a guidance for a diverse audience. Not only tourist regions, authorities or railway operators are addressed, but also private snowpark designers, shapers or anyone else who is interested in the topic. This handbook therefore provides concrete guidance for the realization of smaller snowpark projects.

*„This handbook is designed to help operators of family-friendly ski resorts and contribute to safety and quality in the construction of infrastructures.“*

*(Michael Palmen, Head of Sports Facilities at the Federal Institute of Sport Science)*

### 4 The aspect of safety

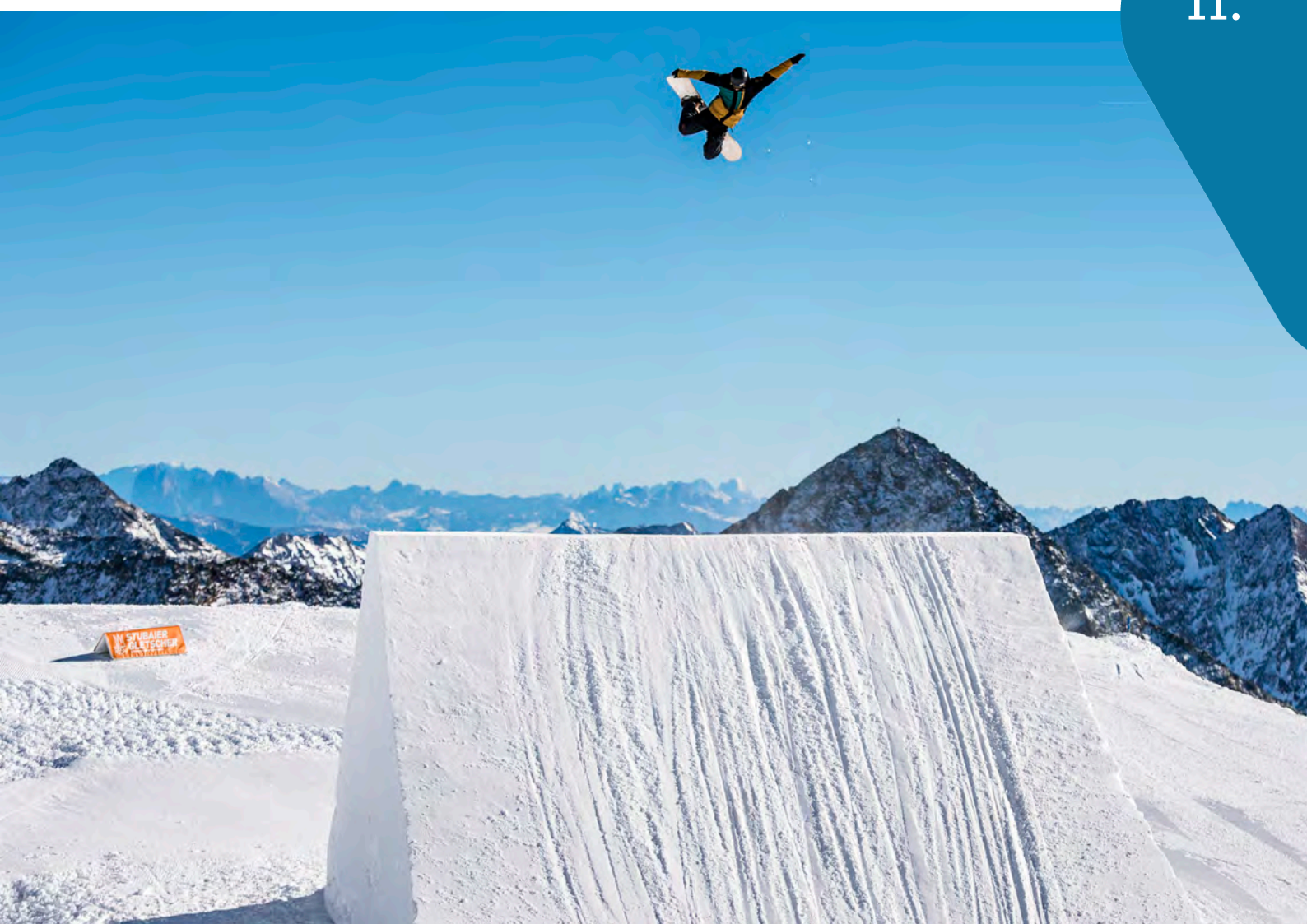
Proper planning and construction are indispensable when setting up a snowpark. Mountain lift operators are highly invested in providing a safe skiing experience for their guests, to the extent of their financial, technical and personnel resources. For laypeople, it is usually difficult to distinguish relatively safe jumps from dangerous ones, since standardised specifications do not exist.

For this reason, special attention must be given to the possible dangers when planning and implementing a facility. The risk of accidents can be significantly reduced by concrete suggestions and recommendations for suitable construction.

A snowpark is a special area in a ski resort that can only be planned, built, operated and marketed with the right expertise. The involvement of external experts is useful and recommended; subsequent training of own staff is essential. External service providers should be thoroughly checked for their expertise and references, and not only on the basis of favourable prices.

## II. Basics

II.



## 1 Legal basis

In Germany, the rights and obligations relating to snow sports are governed by the applicable provisions of civil, criminal and public law as well as the FIS Rules of Conduct (10 FIS rules for skiers and snowboarders).

## 2 Technical basis

Currently, no technical standards exist that impose clear safety requirements on snowparks, neither for Germany nor at EU-level. However, the creation and implementation of such standards is being pursued. Certain ideas and guidelines regarding the design and operation have evolved over the years, but there are very few specific instructions. This handbook makes recommendations in this regard and helps to define standards. However, it has no normative character.

## 3 Statistical basis

In 2014, about 42,000 German citizens were injured during skiing or snowboarding. Of these, 7,050 people had to be hospitalised (statista - the statistics portal). Studies from France, Canada and America suggest that the risk of severe injury in snowparks is higher than on the piste (Brooks, Evans & Rivara, 2010; Laporte et al., 2011; Goulet et al, Laport & Constans, 2007). Examinations of accident figures from different countries also show that injuries to the head and back and/or cervical spine occur more frequently in accidents in the snowpark than on flat snow courses (10 FIS Rules for the Conduct of Skiers and Snowboarders, statista – Das Statistik-Portal; Brooks, Evans & Rivara, 2010; Laporte et al., 2011; Goulet et al., 2007). The German Journal of Sports Medicine showed that the risk of a head injury when skiing in snowparks is 1.69 times higher than on the slopes (Ruedl et al., 2010).

According to an American study, with 2.56 injuries per 1,000 rides, the risk of injuries in jumps and halfpipes was higher than when riding on rails (0.43 injuries per 1,000 rides) and quarterpipes (0.24 injuries) (Russell et al. 2013).

### III. Explanation of terms

III.



Today's world of modern snowboarding and freeskiing has many terms that the layman often does not understand at first glance. The terms, now also used across Europe, are mostly in English and can be traced back to the American origin of the sports. The terms relevant to this handbook are defined below.

## 1 The snowpark concept – Smart Style

A uniform snowpark safety concept modelled after the US system is also being pursued in Europe. Snowpark users can find instructions for safe behaviour on Smart Style snowpark signs, which define the basic rules of conduct in a few words and with the help of illustrations. Nevertheless, the personal responsibility of visitors using the slopes must stand in the foreground. The colour orange is used for immediate recognition and makes the signs clearly distinct from the slopes.

An easy-to-understand snowpark arrange helps the user groups find orientation. Elements are generally marked according to size and difficulty level. Entry-level features – also dubbed ‚small‘ – must be accessible for first-time park visitors. As objective criteria are lacking, the levels ‚medium‘ and ‚large‘ – which demand a certain level of experience and skills – will depend on the subjective standards of the park designer.

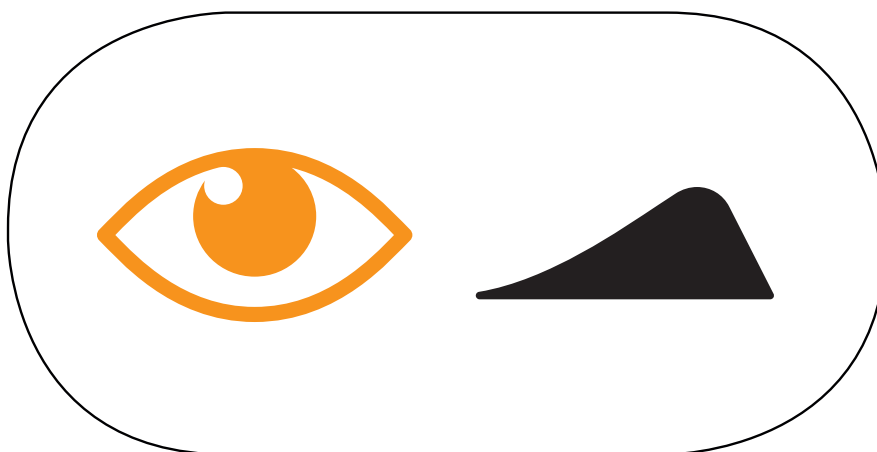
The snowpark Smart Style concept includes:

- › Orange as colour to mark snowpark facilities (RAL colour 2003)
- › Consistent official signboards
- › Clear advice about the self-responsibility of users
- › Restriction to four main park rules
- › Difficulty level ‚Small‘ for inexperienced users

The four most important park rules are briefly discussed below:

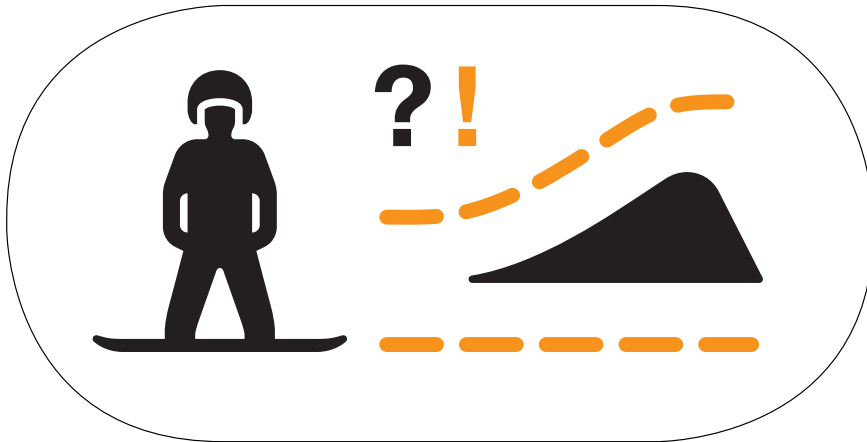
### 1. Look before you leap

Users should look at all obstacles first and ensure that the landing is free. They should also leave the landing zone after jumping as quickly as possible.



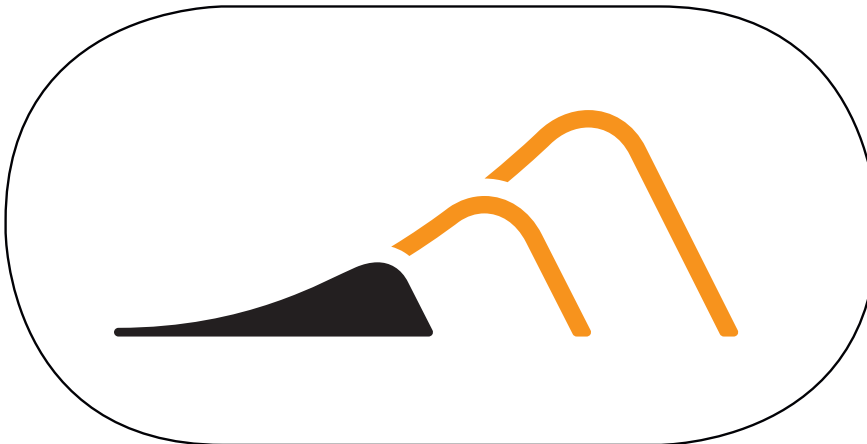
## 2. Make a plan

Users should consider which features they want to use. The speed, the approach and the take-off have a direct impact on the trick and the landing.



## 3. Start slowly

Users, especially inexperienced ones, should start with the small features and develop the skills necessary for larger elements (medium to large).



## 4. Respect gets respect

Snowboarders and freeskiers should respect each other and the terrain. This means, first of all, not to put oneself and others at risk, leave no waste and respect the park rules.



## What does Small mean?

Small features are designed for those who want to gain (first) snowpark experiences.

- › Small jumping features have a minimum fall height of maximum 0.5 m and are therefore perfect for beginners to practise on
- › Small features can also be artificial obstacles (boxes, rails, etc.) without any gap between the approach and the obstacle, and which protrude about 0.3 m above the snow surface
- › Individual small features or a whole set of obstacles (lines) are marked with the ‚Small‘ sign
- › Small features must also be spatially separated from the larger features

As a rule, the Small, Medium and Large stand for a successive arrangement of individual obstacles and jumps, the so-called line. This allows features with the same degree of difficulty to be used consecutively, one after another. However, if a park only has features of a certain difficulty level, the whole park can be accordingly classified.



To avoid miscalculation, the commonly used colours blue, red and black should only be used on the slopes. Someone who wants to master a black run is by no means automatically capable of ‚black‘ jumps in a snowpark.

*„Many operators are already sharing their snowparks in different ‚lines‘ of difficulty. The names Small, Medium and Large help visitors orient themselves and find the appropriate line for their skills. This standardization can be recommended for any snowpark facility!“  
(Lisa Zimmermann, German freestyle skier, reigning world champion in Slopestyle)*

In Medium and Large areas, jumping dimensions or fall heights are difficult to define. It should be noted that there are no upper limits. In exceptional cases, for example in training centres for professional athletes, one speaks of X-Large jumps or lines.

This handbook focuses mainly on entry-level parks and small parks.

*„Obstacles that anyone can ride – from beginners to professional athletes – and a maximum fall height of 0.5m can be described as ‚small‘.“  
(Dirk Scheumann, Managing Director Schneestern)*





Photo: Schneestern

## 2 Snowpark

A snowpark is a general description for a freestyle terrain that has jumps, jibs and sometimes half-pipes. Jumps, in contrast to jibs, consist entirely of snow. Jibs are made of artificial material such as steel, plastic or wood. The snowpark is often referred to as a fun park or terrain park. A snowpark can be defined as an enclosed area within a ski resort, which contains all current (and possibly future) features of the sport, similar to a skate park. Music and various entertainment programmes, such as a bars or loungers, can create an ambiance appropriate to the mountain scenery.

At the entrance to the snowpark area, boards with guidelines indicate the correct use of the facility and thus contribute to the safety of the snowpark.

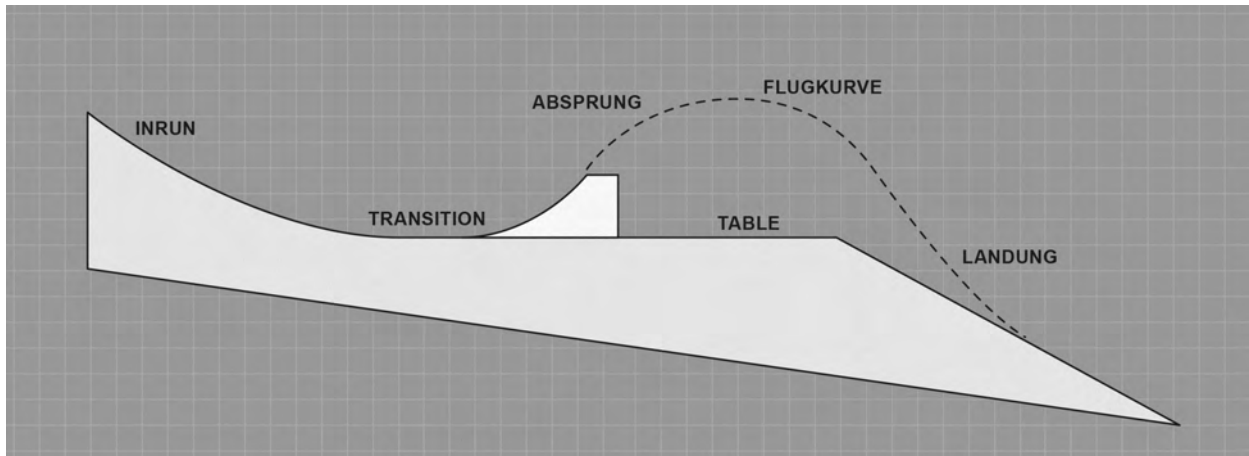
### 2.1 Jumps

Among the most popular jumping facilities in a snowpark are kickers (jumps). The steep approach of a snow-shaped kicker allows riders to perform tricks (grabs, spins, flips, etc.) during the flight phase.

Elements of a kicker:

- › Approach/inrun: approach or run-up to the jump
- › Transition: concavely curved part of the riding and sliding surface
- › Take-off angle: influence on the trajectory
- › Flight curve: description of the rider's trajectory in the air
- › Table: flat stretch between take-off and landing
- › Knuckle: transition from table to landing

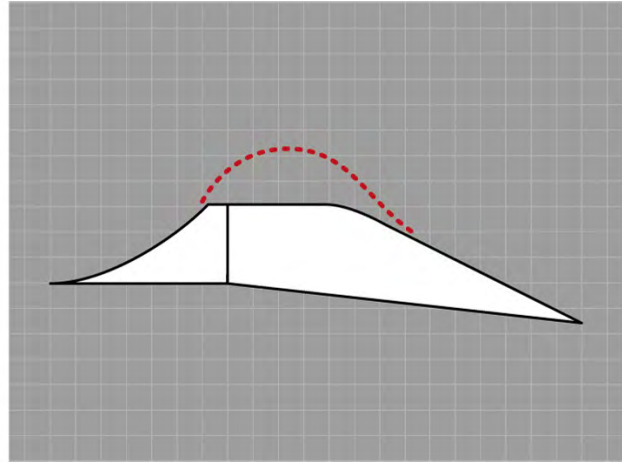
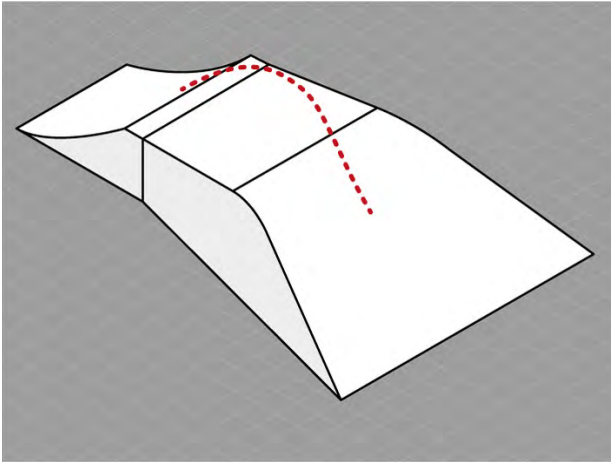
- › Landing: slope with which the flight curve is optimally completed



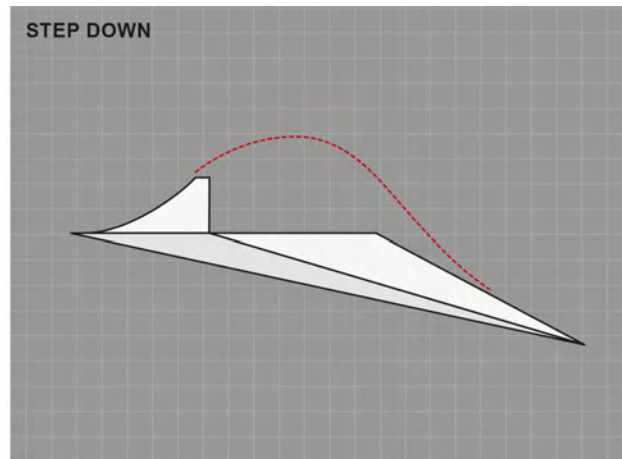
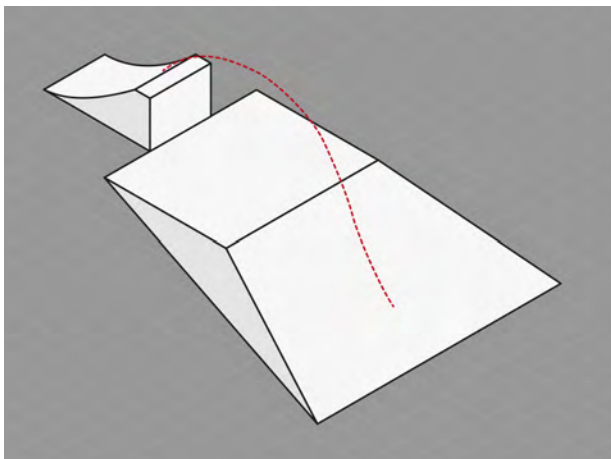
Absprung = Take-off; Flugkurve = Flight curve; Landung = Landing

There are many different types of jumps:

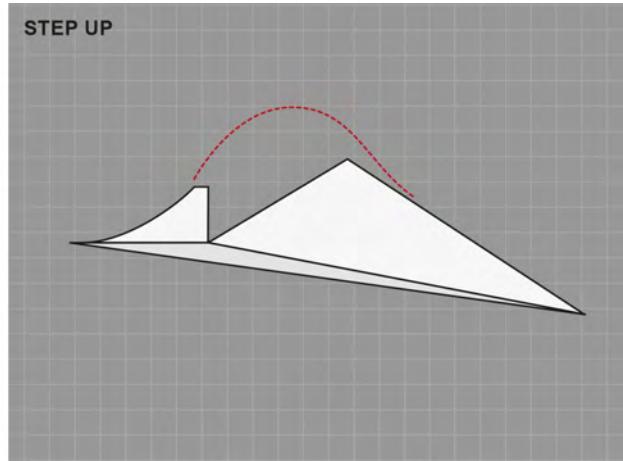
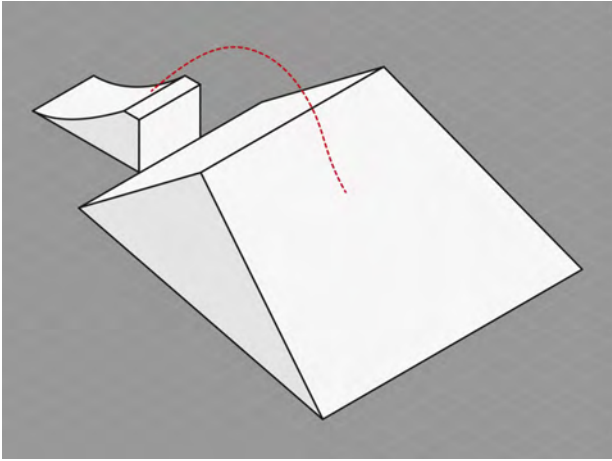
**Tabletop:** Jump with a table-like intermediate part (jump-off platform), where the landing is at the same altitude as the jump – ideal for beginners.



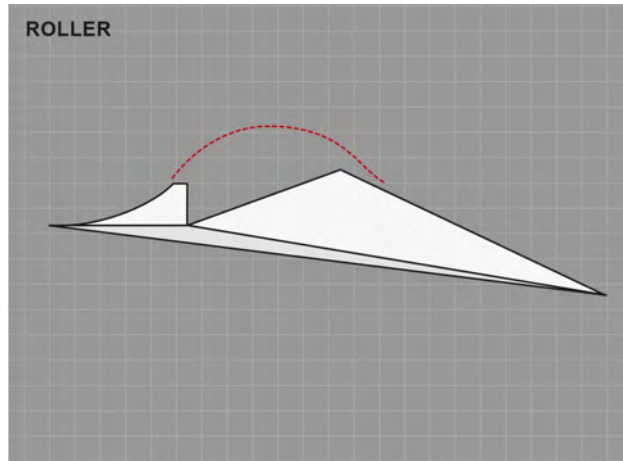
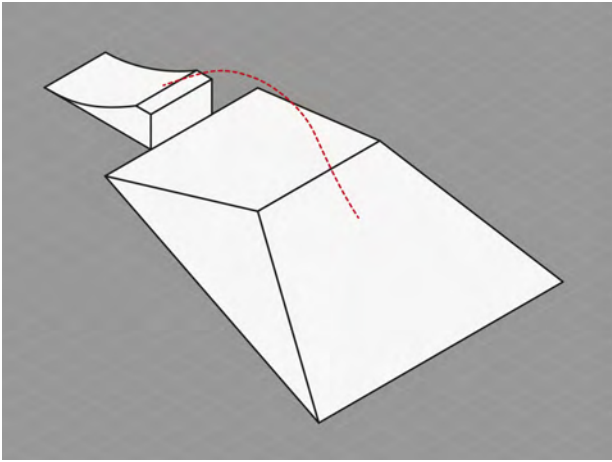
**Step Down:** Jump with a steep angle, where the jump is higher than the landing.



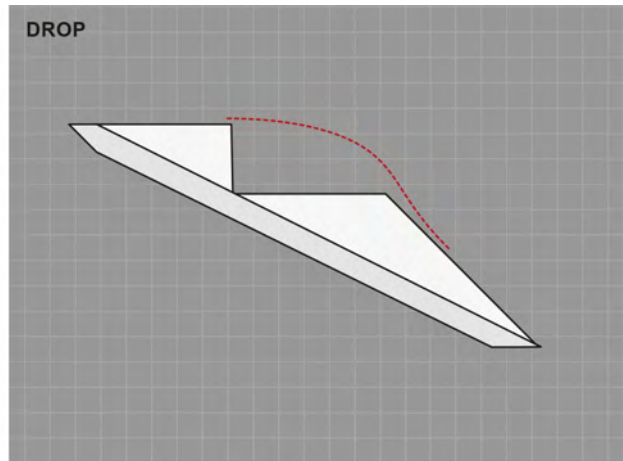
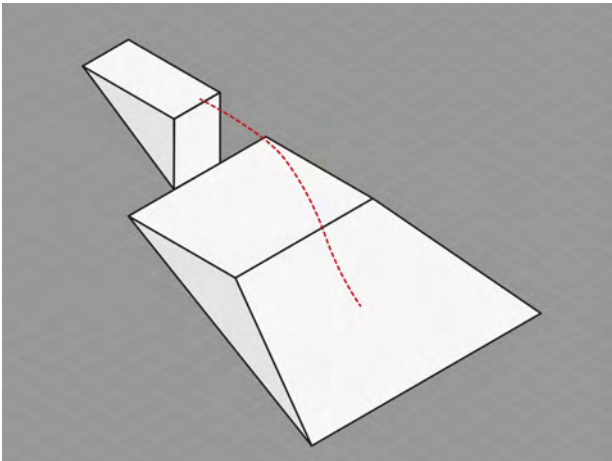
**Step Up:** Jump, where the take-off is lower than the landing.



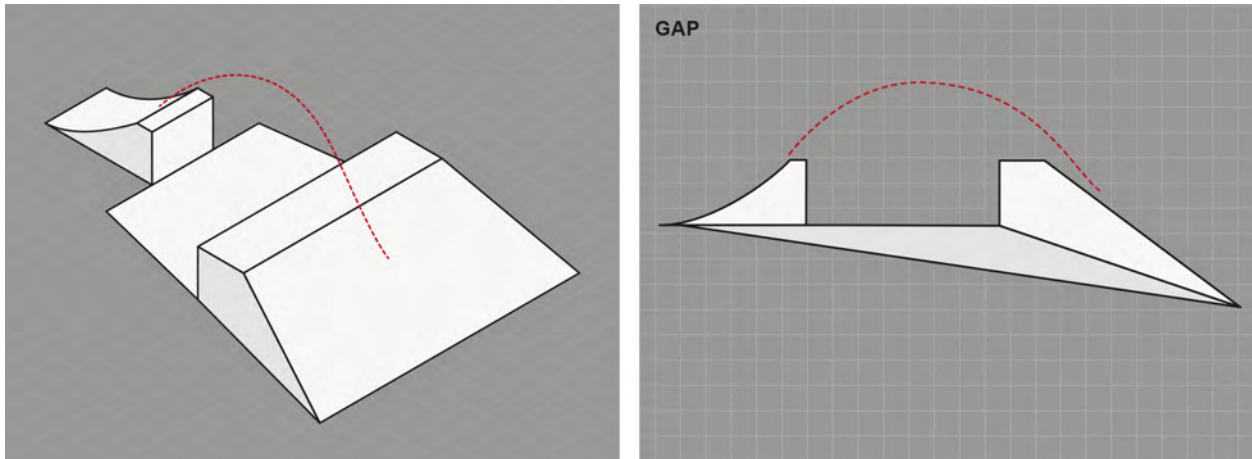
**Roller:** Jump and landing are adapted in their form to the planned flight curve.



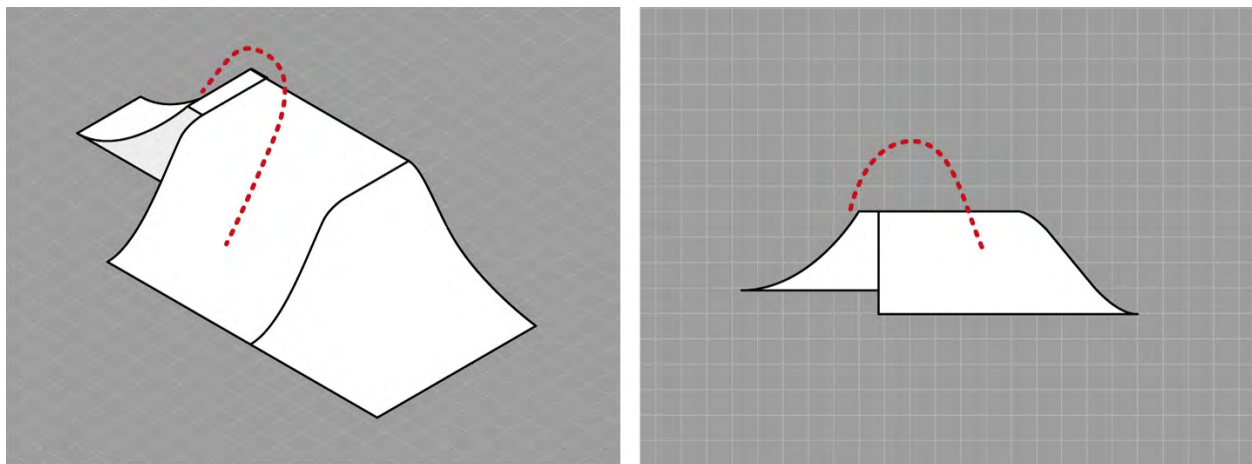
**Drop:** A jump with low take-off angle, where take-off is higher than the landing.



**Gap:** Jump, where instead of a table, there is a gap between the jump and the landing.



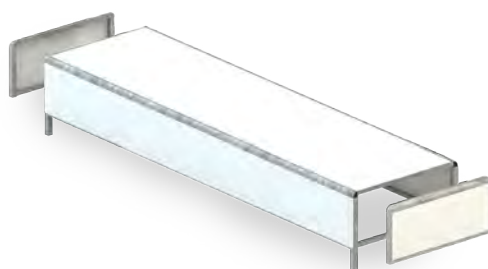
**Hip/Corner:** Jump with landing at a right angle to the jump.-



## 2.2 Jibs

Jib features (also known as jibs) are artificial obstacles which are nowadays indispensable snowpark features. Snowpark jibs are made of steel, plastic or wood and built in various variations. It is then tried to carry out ,slippery' tricks on the features – in jargon described as shredding, sliding, jibbing, tapping or bonking. Slopestyle competitions often integrate jibs into the course, but there are also pure rail or jib contests.

Jibbing has its origins in skateboarding. This also explains the similarity of the features to urban features such as handrails/railings, tables, stairs, steps, containers or benches. Basically, any conceivable object can be a challenge for snowpark users. This shows that there are no creative limits to park design.



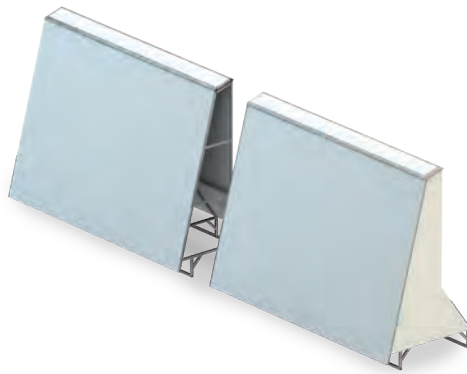
**Box:** Obstacle with wide support surface for longitudinal or transverse sliding – ideal for newbies.



**Rail:** Metal railing (also pipes) with round or flat surface for sliding. It can be bent into various shapes. The narrow pipe width enables sophisticated tricks – rails are therefore among the more difficult jibs. Apart from straight, step-like and kinked versions, boxes and rails can also be constructed with bent geometry (e.g.: C-curved, S-curved, banana or rainbow). The shapes can be easily visualised from the descriptive names.



**Park Bench and Picnic Table:** Element similar to a park bench or a picnic table. Consists in most cases of a combination of metal edges and plastic surfaces. Both features allow a variety of sliding styles.



**Wall Ride:** A wall made mostly of plastic, which is placed almost vertically and can stand both transversely and longitudinally to the track.



**Bonks/ Lollipops:** Vertical cylinders, trash bins, wooden trunks or similar with small take-off. These features allow the ‚bonking‘ or ‚tapping‘, which means a short touching or pushing the obstacle with the snowboard or skis.



Picnic Table



Bin



Downrail (Photo: Cyril Müller)

Snowparks



Wall Ride



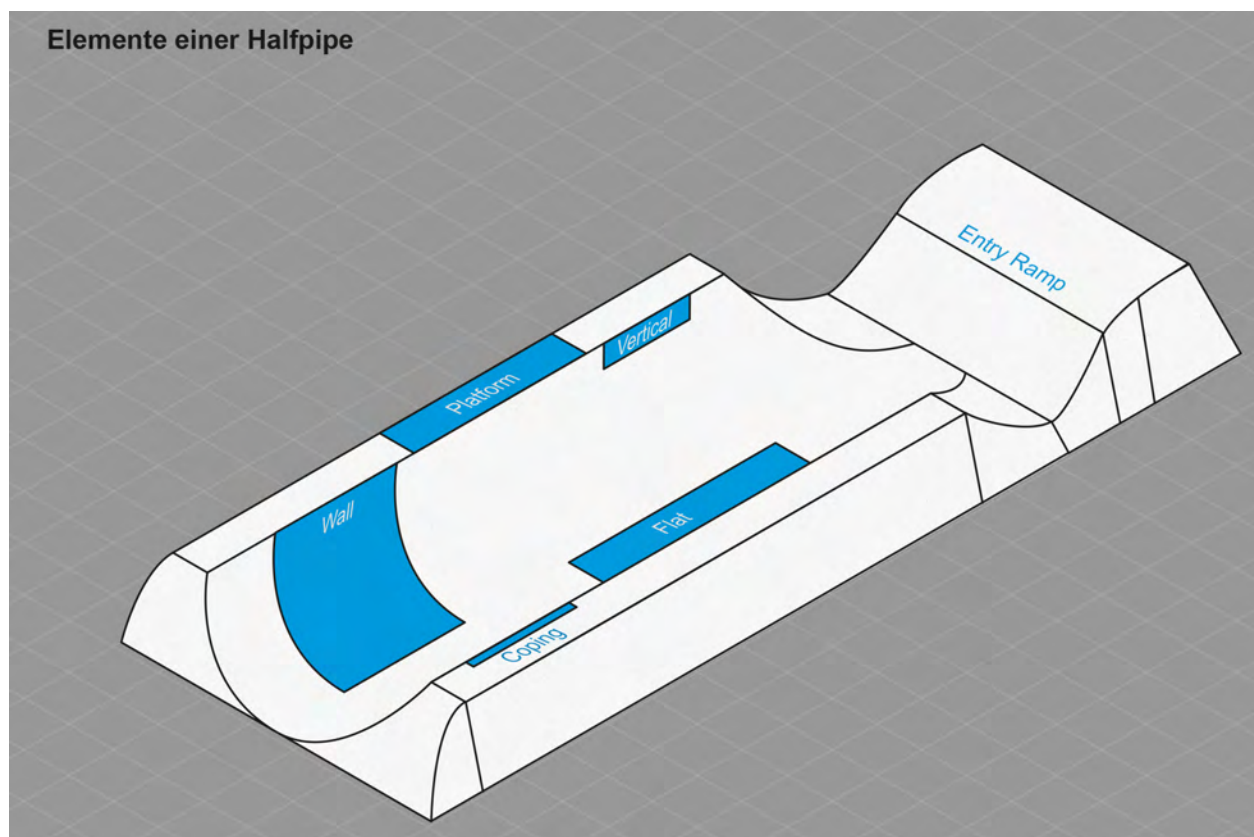
Industrial

### 3 Halfpipe/Quarterpipe

A halfpipe is a U-shaped structure made of snow in the shape of a pipe cut in half. In the competition, a ‚run‘ is completed by running different tricks alternately on both walls. In contrast to existing halfpipes for skateboarding, the snow-formed structures for snowboarding are longer and steeper. Here, the kinetic energy is not only produced by muscular force, but also through the steep slopes.

For FIS-organised (International Ski Federation) competitions and the Olympic Snowboard Halfpipe discipline, the halfpipes dimensions are set by a competition regulation ([www.fis-ski.com](http://www.fis-ski.com)).

A distinction is made between small pipes (up to 1.50 m high), medium pipes (1.50 to 4 m high) and large pipes (competition poles: 4 m high). The height of the wall and the associated radius are decisive for these definitions. In general, when building a halfpipe, it is important not to create too narrow a radius, as compression will then be too high.



Elemente einer Halfpipe = Features of a halfpipe

### 4 Related facilities

The snowpark concept – the first fun and action infrastructure in winter sports – has meanwhile triggered the development of related facilities. This trend is based on the desire to address the needs and expectations of fun and action oriented winter sports guests more effectively. To experience fun & action in winter sports has gained mainstream popularity among visitors. This development requires appropriate infrastructures aligned to the needs of the various target groups.

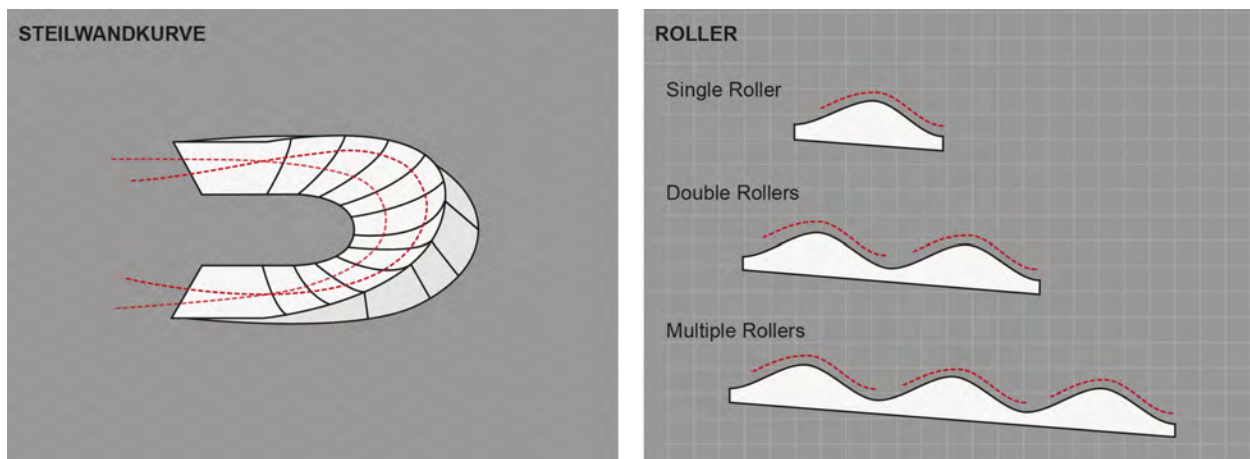


## 4.1 Cross

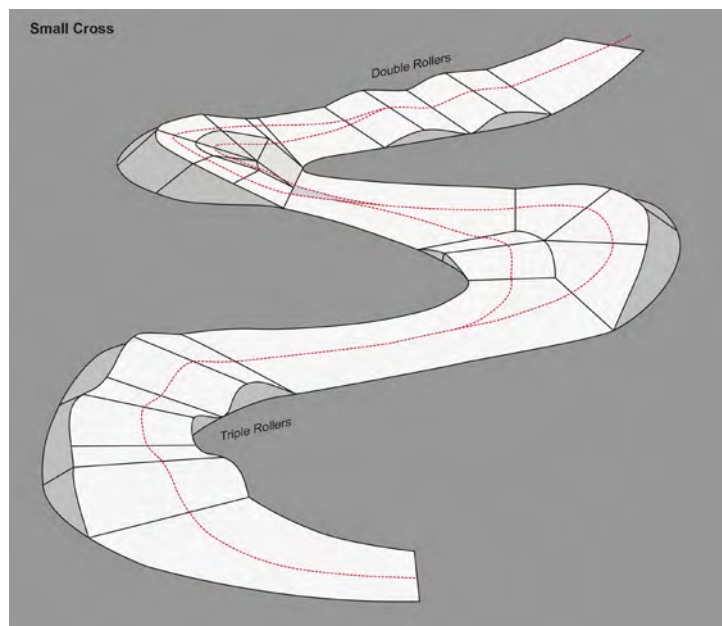
Fun & action winter sports include artificially built downhill tracks, similar to motocross courses, which offer various challenges, such as jumps, steep curves, hollows or ledges: the cross. The basic principle however is not creativity, as in the snowpark, but speed. Ski and snowboard cross is meanwhile an official Olympic discipline and one of the most spectacular winter sports formats. However, a competitive cross track can be difficult to realize without professional help and requires a lot of maintenance and effort.

While it is possible to set up small, entry-level routes and variants for advanced users, the tracks will be designed for recreational use and less for competitive purposes. Simply put, more fun & action will be integrated into the circuit to meet the entertainment needs of the growing target group. These can be upgraded beginners' routes (see funslope) or cross-country trails adapted to the needs of athletes in the areas of alpine, freestyle and freeride.

For the track design, this means the cross can contain both well-known cross-features such as jumps and steep curves, but also freestyle obstacles such as boxes and freeride obstacles (waves or drops). The aim is to create an action-packed track experience, as a contrast to monotonous ski runs in winter sports.



Steilwandkurve = Banked curves



## 4.2 Funslope/family run

The so-called funslope can be seen as a family-friendly modification of the cross. While this is also an artificial downhill course, it has however been significantly toned down and no longer focuses on speed, but simply on fun. You will also find steep curves, waves and smaller playful features such as overpassing jumps, snow tunnel and flat boxes in a novice-friendly version.

## 4.3 Kinder-Snowparks/Kidsland

The name clearly illustrates the set up and function of the facility. Children can enjoy their first fun & action experiences in a separate area. An ideally flat terrain with simple playful obstacles allows them to slowly learn the ropes of freestyle. The kids land includes features such as simple slides for riding over snow and flat waves.



(Photo: Roland Haschka)

## IV. Project phase – conception

IV.



A sophisticated concept is the cornerstone of success for every modern snowpark. As mentioned above, it has to be well integrated into the overall strategy of the ski resort. This section however deals with the practical design of a snowpark, which depends on the following factors: available space, target group and budget. However, calculations also have to include the required snow volume, information on personnel costs, time management and equipment needs. Ultimately, the deliberations must present a detailed cost estimate with the aim of guaranteeing an optimal experience for park visitors with low maintenance costs.

Therefore, all stakeholders of the snowpark should be involved in the project phase. These include: cableway and lift operators, security specialists, machine and equipment suppliers, support staff, snow sports schools, tourism associations, winter sports industry, avalanche and landscape protection, gastronomy and potential sponsors.

*„Function and quality intersect seamlessly in snowparks. Only when both factors are right, the facility is perceived as a valuable sporting facility.“*

*(Ralf Speck, Managing Director of Alpenspitzbahn Nesselwang)*

The following points should always be part of the concept:

- › Target group, central theme and current trends
- › Financing and profitability
- › Selection of terrain and location
- › Level of difficulty and guidance system
- › Safety and danger points
- › Marketing and communication
- › Project description and interactive solutions

## 1 Target group, central theme and current trends

Prior to concrete planning of a snowpark, the operator has to consider which target group he would like to address. This means: who are the visitors of the ski resort and which audience do you wish to attract. A comprehensive analysis about the potential of each facility is essential here. Current trends in winter sports should also be addressed here. This shows the growing diversification of sports facilities in modern ski resorts, which are increasingly geared to individual target groups. For example, children have completely different needs in the field of freestyle than for instance young people.

Rough distribution of the target groups within a ski area:

- › Children, youth, families
- › Ski and snowboard schools, schools
- › Beginners, experts, pros
- › Freerider
- › Freestyler
- › Associations, training groups, teams
- › Day tourists, holidaymakers, locals

The target group should be defined on the basis of a ski resort analysis. From this, in turn, the basic idea and future approach can be derived. As already mentioned, modern ski resorts are increasingly choosing to diversify their sports facilities for logical reasons. This means that special infrastructures have to be created for the different needs of the visitors. If these developments are considered, it will become clear for who the snowpark is being built and whether additional infrastructures, such as a children's snowpark, are required.

However, a snowpark can be aimed at all age groups. A basic principle of snowparks is to address different skill levels. This is done by creating different lines (Small, Medium, Large) in the park.

However, a park that appeals to all skill levels is an extensive undertaking that goes beyond the scope of this handbook. If you, as the operator, want to concentrate on more than one entry-level park, you should seek professional support from external park designers.

## 2 Financing and profitability

After first steps have been taken in the areas target group, central theme and latest trends, it is important to discuss the financing and profitability of the project.

First of all, the acceptable costs should be defined in relation to the size of the ski resort and available budget. To set up a successful, i.e. profitable snowpark, one should aim at surpassing a quality threshold. Profitability and costs are logically interlinked. The first purchase and set up of high-quality obstacles is also only the beginning of a chain of consequential costs, which consists of maintenance, upkeep and repairs.

In addition to the costs for planning, design and implementation, it is also necessary to take account of personnel expenses, in particular with regard to daily maintenance and equipment needs. Often, snowpark financing schemes ignore the aspect of marketing, which contributes significantly to higher visitor numbers and to increased profitability.

Finally, it is also necessary to re-evaluate the cost-benefit ratio for each season. This requires a separate controlling of the snowpark, which can be carried out in its simplest form by measuring visitor numbers, for example by means of a visitor counter.

## 3 Terrain selection and location

One of the most basic factors in the construction of a snowpark is the selection of an appropriate terrain. It is essential to consider the natural conditions such as slopes, cliff drops, steep slopes, peaks, banks, etc.. Once a suitable site has been found, the question is whether the project requires earthworks or not.

Earth shifts have been made for halfpipes for a long time, but now they are also widely used in the modelling the jumps. The advantages are undeniable. Earthworks ensure that much less snow (especially artificial snow) and therefore less energy are needed for building the snowpark. This not only reduces costs, but also significantly increases the service life. On the other hand, earthworks generally require a building permit, which in turn must be considered in the timetable. Therefore, the competent authorities or landowners should be approached in good time. It should not go unmentioned that earthworks are of course a significant intervention in nature.

Important points when selecting the terrain are:

- ▶ Sufficient snow: natural snowfall and the snowmaking facilities should be clarified in advance so that this can be taken into account when calculating the required amount of snow. If not enough snow can be guaranteed in the future snowpark location, one should consider collecting snow from other places or producing large amounts artificially.
- ▶ Terrain: It must not be too steep or slope sideways. Blue slopes are ideal for smaller facilities (Small park). As a guideline, a maximum longitudinal or transverse gradient of 25% is recommended for small parks.
- ▶ Good accessibility: The best terrain is useless if it cannot be reached. In the ideal case, the length of the lift should be appropriate to the length of the snowpark, as accessibility is essential for visitors. Experience shows that long journeys between park and lift are a visitor turn-off. Easy access is therefore a top priority. This also applies to the vehicles required for set-up and maintenance.
- ▶ Long opening hours: It has been observed that park visitors are among the first and last guests in winter sports resorts. It is therefore desirable to keep the facility open for as long as possible, usually from December to April.
- ▶ Social meeting place: Many successful snowparks have a central social meeting place, the so-called park base, which is mostly at the end of the park. It is the hub of the community that develops around a snowpark. Ideally, this will not only include seating, but also music and catering facilities. Solutions range from converted containers to stand-alone huts.

| INFLUENCE OF THE EXPOSURE TO THE SNOWPARK |   |   |
|---|---|---|
| NORTH SIDE                                | ADVANTAGE   | DISADVANTAGE  |
|   | Durability and high stability of the facilities             | Shadow is not attractive to users   |
|   | Less rework time due to harder snow conditions              | Bad orientation for photo shoots and visitor gatherings due to poorer light conditions and low temperatures                             |
|   | Perfect for halfpipes (even sunlight) and kicker lines      | Take-offs soften quickly as they are strongly exposed to the sun  |
|   |   | In the early winter often very unfavourable conditions, in the late winter soft and mashed-up inruns with consistently hard landings    |
| SOUTH SIDE                                | ADVANTAGE   | DISADVANTAGE  |
|   | Soft landing, kicker stays harder                           | The start-up distance varies with the changing snow conditions, which makes the estimation of the correct starting speed more difficult |
|   | Higher visitor numbers due to prolonged exposure to the sun | Because of increased melting, larger amounts of snow and rework time required   |
|   | Ideal for events  |   |
|   | Perfect for halfpipes (even sunlight)                       |   |

In addition to terrain inclination, wind and sunlight are other natural factors. They play an important role, especially when using the obstacles (influence on jump/landing, or wind effect at take-off), and are also responsible for the correct flair.

## 4 Level of difficulty and guidance system

A uniform guidance system for snowparks is unfortunately not available to date. A common colour concept for snowparks is however being pursued in Central Europe – modelled after the US system. The Smart Style concept has meanwhile been adopted by most German snowparks.

The table below shows the correlations between type of rider, learning objectives and needs, and related safety requirements.

*„The right speed is an important aspect of safety. Beginners and newbies have to get the hang of seemingly innocuous features so that they do not overestimate their speed. The choice of the right location can make a significant contribution to accident prevention, for example, through natural boundaries at the inrun.“*

*(Daniel Schiessel, Team Manager of the German Freeski National Team)*

| DISTRIBUTION BY LEARNING GROUP IN THE SNOWPARK              |   |  |  |
|---|---|--|--|
| PARK BEGINNERS  | LEARNING OBJECTIVE                                | NEED   | SAFETY PRECAUTIONS                                     |
|   | Small kicker jumping                              | Features: jump, box, waves/troughs, halfpipe                 | Line type SMALL  |
|   | Basic principle of sliding                        | Learning the basic features of freestyle                     | Clearly arranged/visible                               |
|   |   | Simple box riding (continuous ground contact with ski/board) | Terrain flat (blue)                                    |
|   | Create optimal (facilitated) learning environment | All obstacles moveable and reversible                        |  |
| Ride as many features as possible (number of jumps per run) | Extensive, enough space available                 | Minimum fall height  |  |
| PARK EXPERTS  | LEARNING OBJECTIVE                                | NEED   | SAFETY PRECAUTIONS                                     |
|   | Kicker jumping and sliding                        | High frequencies (number of jumps per run)                   | Line type MEDIUM                                       |
|   | More airtime (flight time)                        | Quantity and variety before quality                          | Correct proportions                                    |
|   | Variation of many features                        | All jibs, jumps, halfpipe                                    | Long and steep landing areas                           |
| PARK PROS   | LEARNING OBJECTIVE                                | NEED   | SAFETY PRECAUTIONS                                     |
|   | Competitive                                       | As visible as possible -> media                              | Line type LARGE and X-LARGE                            |
|   | Higher, wider, faster (more spectacular)          | All jibs, jumps, halfpipes in the best quality               | Large, correctly designed installations                |
|   |   | Lift nearby  | Good run visibility (no overlap of lines and landings) |

## 5 Safety and danger points

Basic considerations about safety need to be made, especially in the project phase. Currently, there are no clearly defined regulations in this field.

On the one hand, operators must guarantee safe operation of the snowpark; on the other hand they must appeal to the general safety awareness and personal responsibility of their target groups. An ideally built jump does not guarantee an accident-free ride, since the behaviour of the users is also crucial. An accurate assessment of in-run speed and an optimal take-off or jump help to reduce accident risks. So called ‚over- or undershots‘ can thus be avoided. Professional snowpark designers today offer flight curve calculations and landing analyses to minimise the risk of accidents through an optimally designed take-off.

*„You can plan as much as you want, one factor is always unpredictable – the park visitors themselves. Ultimately, the visitors determine themselves how safe they are in the snowpark and decide through their behaviour whether they land safely or fall.“*  
(Maximilian Kaiser, Managing Director Schneestern)

An optimally built park is nevertheless the groundwork for the safety of all parties involved. Potential hazards must be identified and minimized. For example, the risk of collision of the users during the landing of jumps. The duties of a snowpark operator include setting up appropriate signs and boundaries.



Products and obstacles of the highest quality provide the highest possible level of safety. A high level of safety and quality should be ensured for artificial snowpark features in particular, as poorly manufactured obstacles entail a significant risk.

Features with certified safety and quality standards are already available.

An example could be a TÜV Süd test which guarantees consistently high quality of the obstacles. These are not prescribed for building a snowpark, but it is recommended to take precautions by carrying out a test. However, certain minimum requirements must be observed in any case.

Jib features should meet the following minimum requirements:

- ▶ Weather, corrosion and break resistant materials must be used in the construction of the features.
- ▶ The features are coordinated with one another to create closed structures. Rounded, burr-free edges without sharp spikes, protruding splinters or screws should be used. There should be no holes where visitors' cords or drawstrings could get snagged in.
- ▶ All accessible edges must be seen as a potential danger point and must be well rounded (minimum radius 3 mm, preferably 5 mm).
- ▶ Flush connections must be created between features such as two consecutive sliding surfaces, side surfaces, etc. The width of joints must not exceed 5 mm.
- ▶ All features must be closed on the sides and clad. To prevent unintentional catching, pipe openings must be closed (e.g. by welding metal pegs).
- ▶ The features must be stable and firmly connected to the ground to prevent displacement or overturning by people or strong winds.

*„Operators bear full responsibility for the quality of features and obstacles. It is their duty to safeguard potential risks and to do everything in their power to avoid danger points.“*

*(Andreas Kleinlercher, Cableway Director Stubai Gletscherbahnen)*

## 6. Marketing and communication

Today, the marketing and communication of snowparks reaches far beyond clear markings on the ski resort's piste map. Accurate 'reports' from the snowpark are of fundamental importance. For many visitors, a top priority is to find out the state of the snowpark and what it actually looks like. A website designed for the target audience and integration of media from the snowboarding scene (online, print, forums, interactive web portals, etc.) can generate success. PR plays an important role in this context, as the broadest possible communication should be sought within the respective target group. This includes cooperation with brand partners for image transfer to the park. Manufacturers in the industry have a strong influence on the image of the freeskiing and snowboarding scene. A co-operation therefore not only offers financial advantages but is also an excellent means for influencing the target group. Photo and video shootings as well as events and social media channels/blogs can also be excellent marketing channels. Marketing activities can create a wide range of ideas and concepts that are positively received by the target audience – there is no limit to creativity.

*„The marketing and communication of a snowpark are key features for the success and profitability of such infrastructures. Professional tools of target group appeal/leverage such as PR are indispensable today.“*

*(Agency Manager 5 Stars GmbH, Bernhard Burger)*



*Phillippe Fragnière, Nike Chosen Sessions Park*

## 7. Project description and interactive solutions

For larger projects, a detailed project documentation is generally carried out during the concept phase, which should include a survey and assessment of the terrain as well as the creation of a (3D) park layout. This must be carried out before the first snowfall – early planning is therefore essential. Nowadays a good visualisation of the future park can be created through 360° animations, without needing any feature on the ground. These can later be integrated in the website – giving potential visitors a view of the snowpark from anywhere in the world. The 3D map and cartographic design are, of course, not absolutely necessary. Smaller resorts or small parks usually manage without them.

## V. Safety aspects during set up



V.

Labour input and snow requirements for snowpark construction can be greatly reduced by using the landscape features. There are many ways to make the most of the terrain, for example, by using paths, humps, peaks, channels or waves for the design of a ramp. After choosing the optimal location and submitting all necessary building permits, the building of the snowpark can begin.

## 1. Building principles

Enough snow should be available to set up the individual features. If there is plenty of natural snow available, it is better to be generous than skimpy with the snow used for each feature. Nevertheless, available snowfall is very seldom sufficient, even if the natural terrain is used. Often, most snow lies in places where it is not needed. As a rule, it is almost impossible to avoid producing and processing artificial snow, creating snow deposits and transporting the snow – also called snow farming.

Artificial snow has a higher density than natural snow. This avoids the compaction work required by natural snow. In addition, the snow can be produced directly at the desired location. Setting up a snowpark with artificial snow is therefore generally more cost-effective, despite the operating costs incurred by the snowmaking systems.

In the landing area of jumps and jibs, however, the artificial snow can also be disadvantageous due to its hardness. Iced landings are an additional accident factor that should be avoided if possible. It is best to take artificial snow for the foundations, and cover the upper layers and the finish with natural snow.

## 2. Implementation of individual features

The construction begins with the removal of snow for the individual features in a line. It is essential to keep the right distance between the features and mark a straight line with colour or a cord. This ensures the right, optimum speed between the features. The distance from feature to feature varies according to the size of the individual feature and depending on the inclination of the terrain. There must be sufficient clearance between two lines for maintenance equipment to pass.

When setting up a park, you should keep in mind flight and movement paths of the users and adjust the design accordingly. This can prevent, for example, that gaps or tables are built too short. It should be noted that, when in motion, these often seem smaller than they actually are. Landings that are too flat or built too close to a feature should be avoided – especially after boxes and rails.

*„The take-off of a feature depends largely on the landing design. For this very reason, the landing must be built first. It is much easier to adapt the jib features and a suitable take-off design to the landing later.“*

*(Bernie Kofler, Headshaper)*

## 2.1 Jumps

Jumps are classified by distance (of 1-30 m and more) and height.

The take-off must be adjusted to the landing and indicate the direction of the trajectory. Take-off and landing angles must be adapted to an even flight curve. The following rule applies for the design of normal jumps (step down): the higher (steeper) the take-off angle, the higher the trajectory and the steeper the landing slope must be. Conversely, this means that the flatter the take-off, the flatter the landing slope. Therefore, the wider and longer the landing zone, the longer and wider the jump. Thus, both height and width of the jump must be proportional to the landing.

A rule of thumb is that the landing should be nearly twice as long as the table. As regards the in-run of kickers, the transition often feels too short. Longer transitions make the jump easier and safer for riders. The take-offs should, if possible, have at least the width of a crawler to facilitate subsequent maintenance work.

Phases for setting up a jump:

1. Exact axis of the jump and ,knuckle' (transition from table to landing; landing edge) are marked by means of bars.

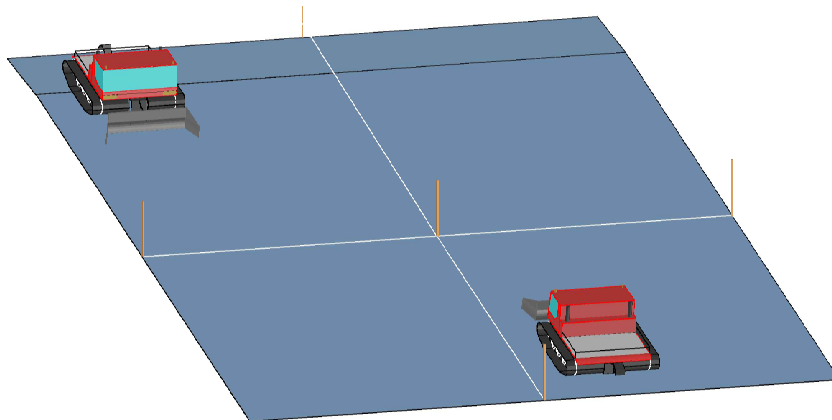


Figure 1: Safety aspects of Kicker 1

2. A snow wall is piled up at the end of the landing. This prevents the snow from slipping downwards. This also makes it easier to build a steep landing.

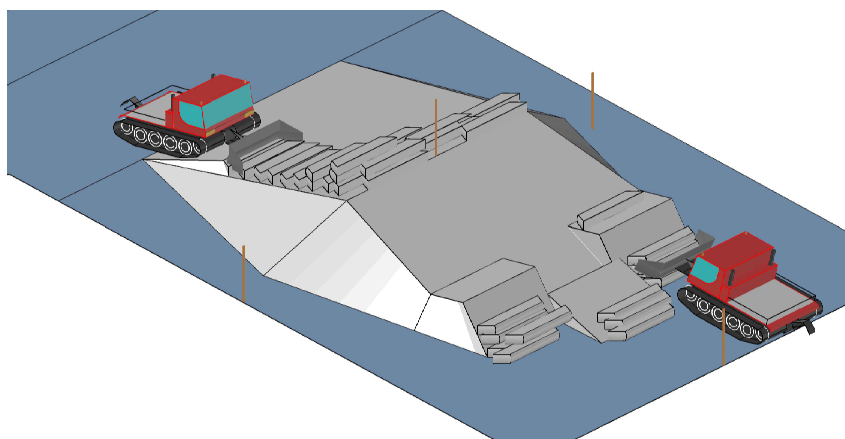


Figure 2: Safety aspects of Kicker 2

3. The centre point of the landing edge is marked with bars. From this point, the distance to the landing edge (three bars) is marked.

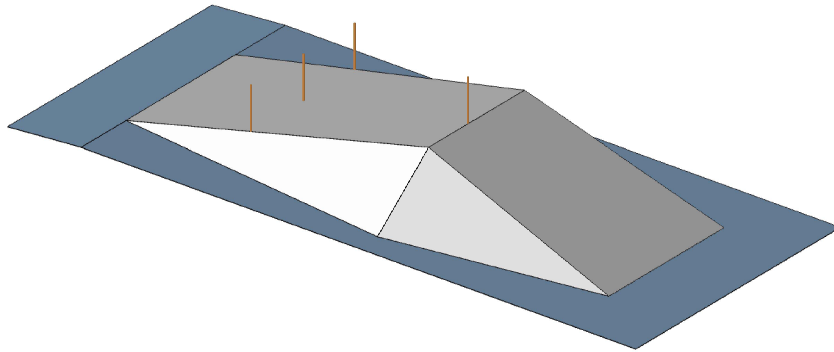


Figure 3: Safety aspects of Kicker 3

4. Snow is piled up for the take-off. Markings can provide orientation here. The take-off must be built in the direction of the two markings that identify the centre line. The landing edge runs parallel to the take-off end. The landing slope should be at least twice as long as the distance from the landing edge to the knuckle.

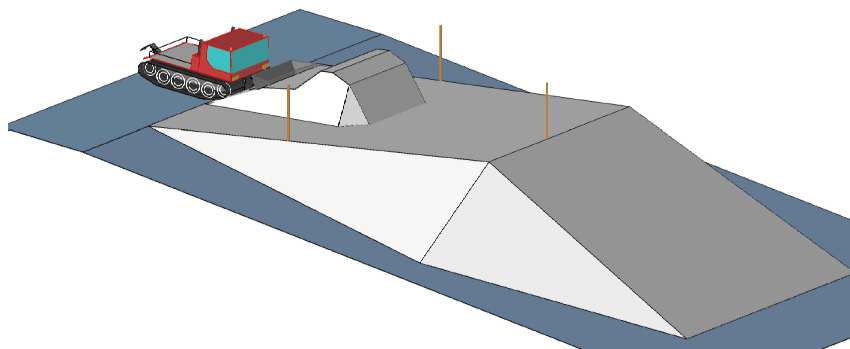


Figure 4: Safety aspects of Kicker 4

5. Only when the take-off has the planned altitude and the transition is long enough, the transition radius is shaped into the take-off by using a shield attachment. This step requires a lot of sensitivity in the forward movement – the shaping process.

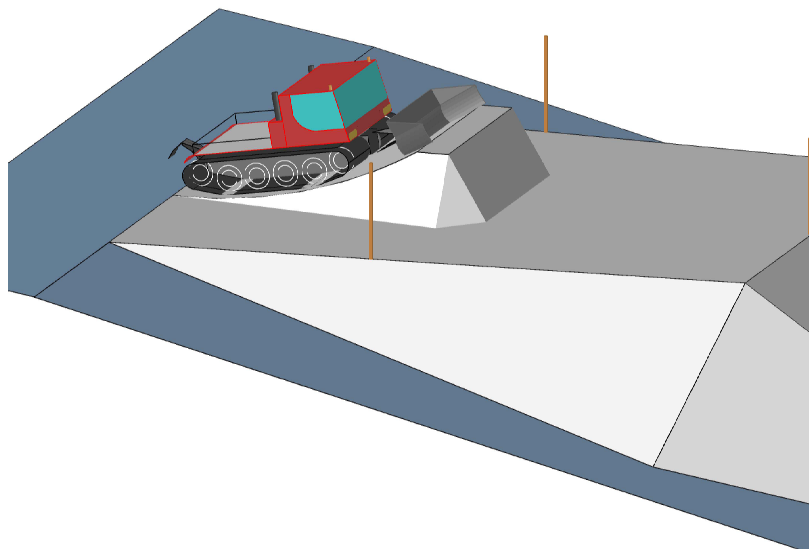


Figure 5: Safety aspects of Kicker 5

6. A) After the take-off has been roughly completed, the front and side walls are cut straight. In case of poor visibility, the clear definition of the take-off (marked edges - colour highlights) is an advantage and is visually appealing.

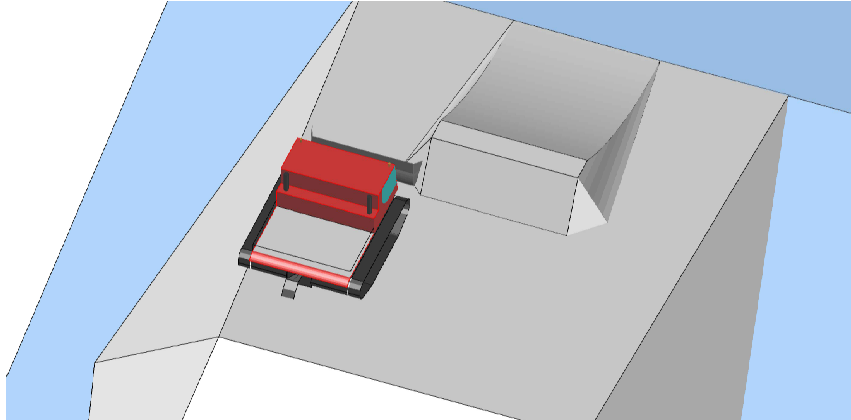


Figure 6: Safety aspects of Kicker 6

- B) Ideally, the take-off is about as wide as the machine finisher used for maintenance later. In order to facilitate daily preparation, the take-off is designed in such a way that a snow cat can pass through.
7. A) The final step is the finish. Here it is important that the finisher, when reversing on the take-off, is placed exactly on the edge of the take-off table or closing edge of the transition. Otherwise, the landing edge can be destroyed.
- B) The direction for shaving the landing is always from top to bottom. It is imperative to avoid waves and holes so that the landing looks like a perfectly groomed runway.

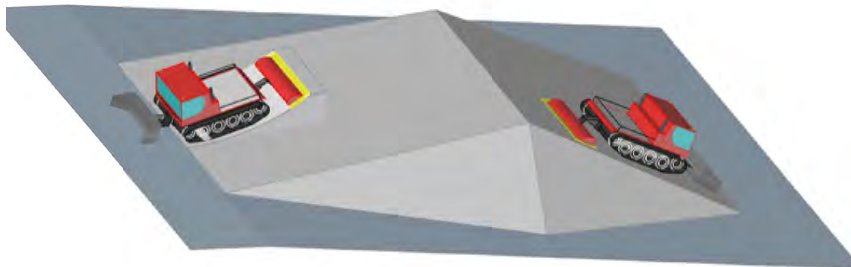


Figure 7: Safety aspects Kicker 7

8. Now the final work begins by hand. Even the most skilful driver and best snow cat cannot build a perfect take-off; the ‚fine tuning‘ must therefore be done by hand using a so-called shape tool (see point 4). This is a kind of ‚snow pusher‘ that can remove thin layers of compressed snow, to finalize the take-off and give it the perfect transition.
9. While this step requires experience in the set-up of take-offs, it also ensures higher quality and is more cost-effective because machines are not always needed for maintenance.

## 2.2 Jibs

Most jibs have a distinctive geometry and therefore also differ significantly in the way they are anchored in the snow. The following example shows the set up of a flat box and thus one of the basic features of any snowpark.

Phases of set up a flat box (of a jib):

1. After a suitable terrain has been found, a straight line is marked with sticks in the line of the slope.

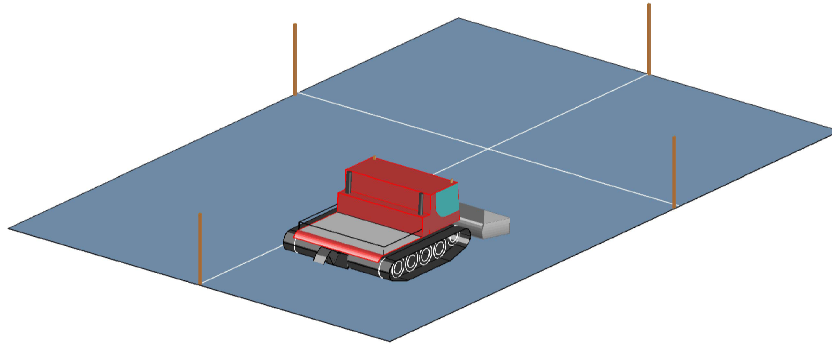


Figure 8: Safety aspects of Flat Box 1

2. Taking into account the markings, a straight snow plateau is piled up in the planned length. Alternatively, the dimensions can be adapted to the available snow.

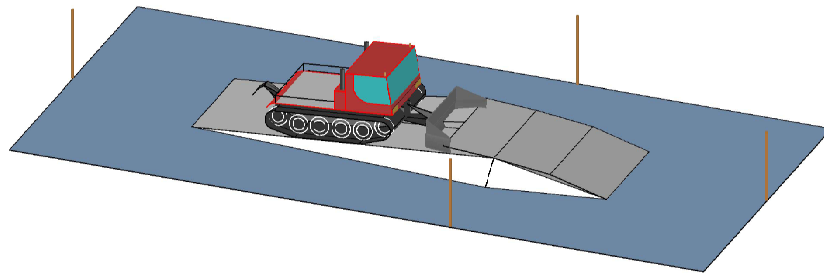


Figure 9: Safety aspects of Flat Box 2

3. The box is positioned when the table and landing have been completed. It is important that the box is straight and has no lateral inclination. For this purpose, the box must be completely anchored in the snow, and the take-off should have a minimum width of 1 m. The closer the take-off is from the box (distance and height), the easier it is for riders to ride the box. The take-off is also designed with a radius or a small transition.

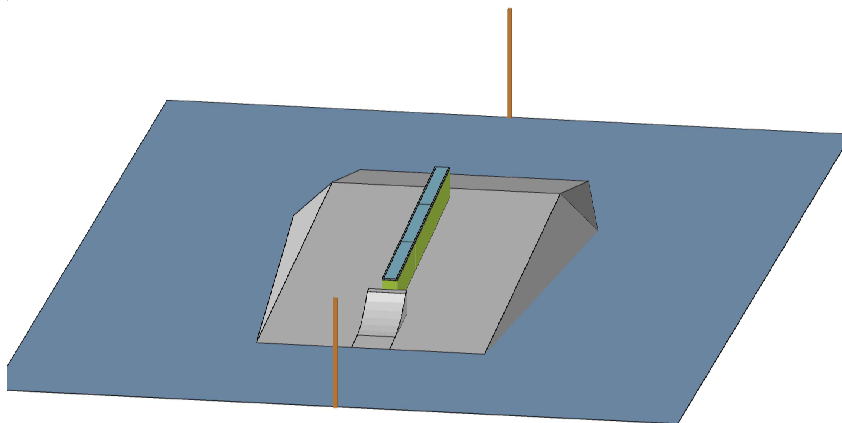


Figure 10: Safety aspects of Flat Box 3



- When both take-off and box are standing, the side walls of the snow plateau are pushed away or removed to the width of the take-off. This makes it easier to maintain the box after snowfall, while creating fall zones at the sides.

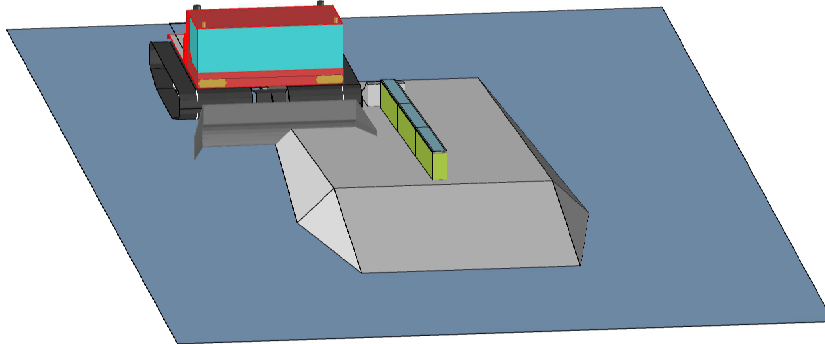


Figure 11: Safety aspects of Flat Box 4

- Here again, the final step is the finish, where a machine is used to strip everything off and create a smooth surface with better contours. If the landing is tilted, the finisher should be placed as close to the end of the box as possible. However, the precision work should be done by hand at the take-off.

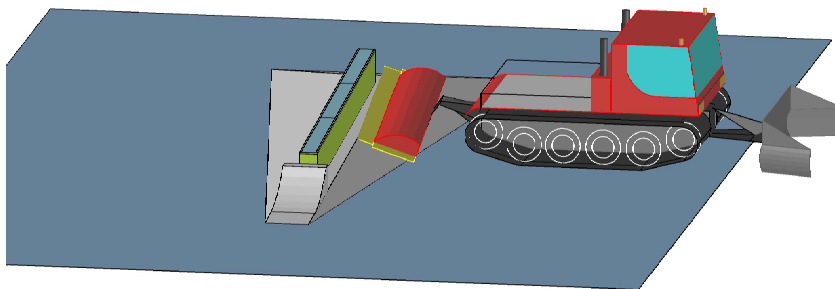


Figure 12: Safety aspects of Flat Box 5

## 2.3 Halfpipes

Halfpipes are available in different sizes. The two main differences are the height and associated radius of the transition. Consequently, different manufacturers offer different shapes. However, the structure remains basically the same.

Phases when building a pipe:

- A) The first step is to pile up two snow walls (left and right pipe walls). Markers are set up on the terrain for orientation and overview.

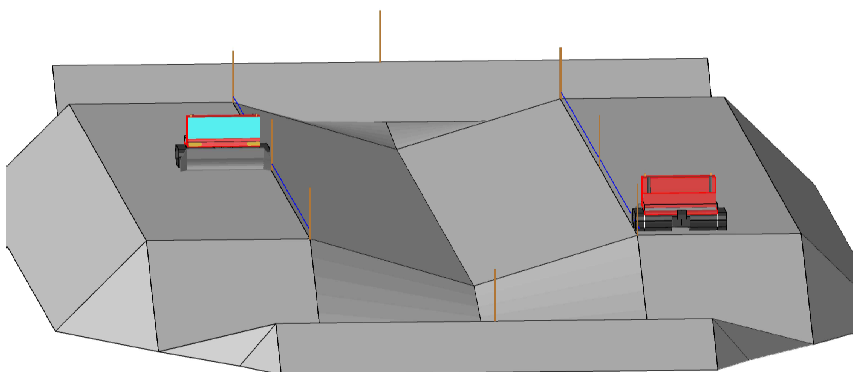


Figure 13: Safety aspects of Halfpipe 1

B) Then the two tables (platforms) are built in the same height as planned. Thus, the width of the pipe can be derived from the centre line. The two coping lines (upper edges) are drawn with cord and laser. Using a chain saw, the vertical (about 50 cm) – the steep part, which passes into the transition – is cut off along the line at an angle of approximately  $80^\circ$ .

2. The snow is now pushed out of the pipe in one-meter steps – identical on both sides.

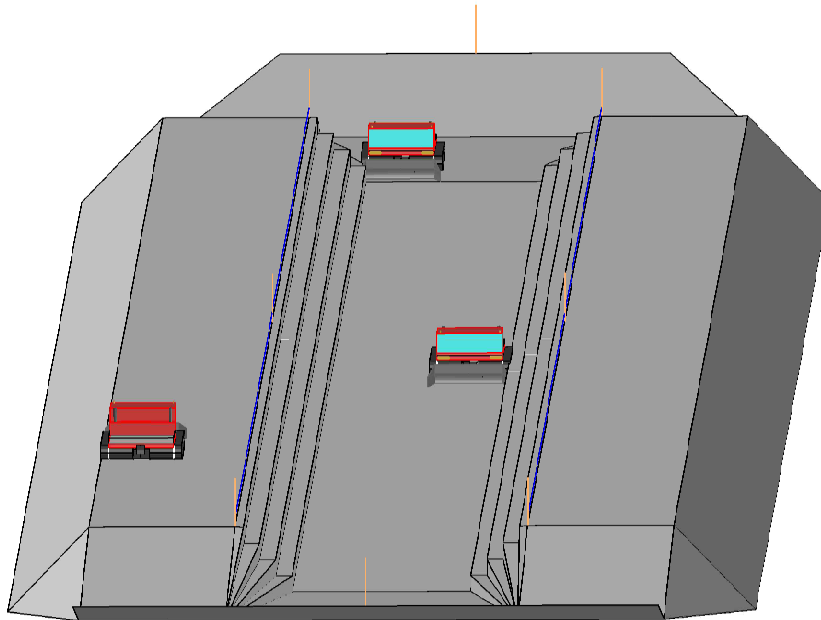


Figure 14: Safety aspects of Halfpipe 2

3. These steps can now be removed gradually or a transition can be formed with the pipe tiller.

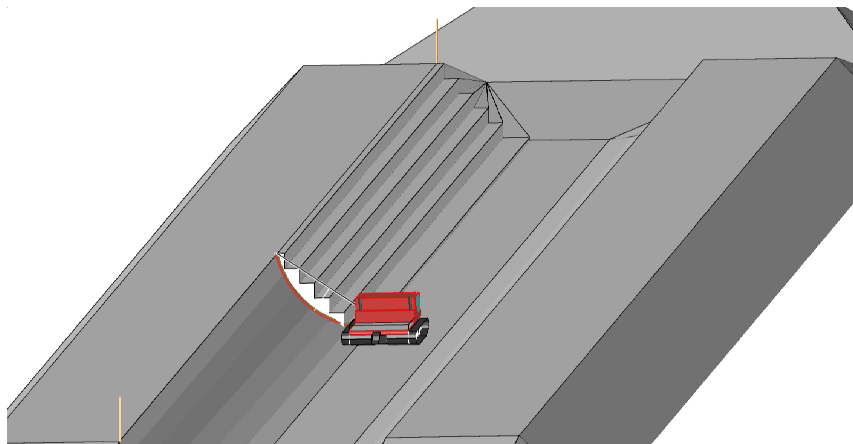


Figure 15: Safety aspects of Halfpipe 3

4. This process is repeated several times, making sure that the pipe tiller is placed at the angle specified by the manufacturer. In the last step, the two tables (platforms) and the flat of the pipe are removed.

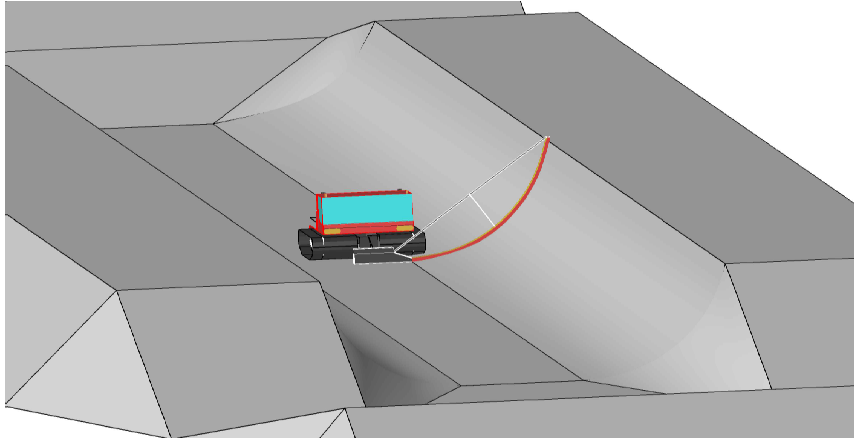


Figure 16: Safety aspects of Halfpipe 4

*„Film projects in freestyle winter sports, regularly shot in professional snowparks, are now produced at such high standards that they can no longer be realised without professional planning. This includes an accurate calculation or analysis of the jumps. On the one hand, this ensures the safety of athletes, but also helps to get the shots wrapped up as quickly as possible.“*

*(Tobi Reindl, professional freeskier)*

## 2.4 Construction of related facilities

Related infrastructures such as cross tracks, fun slopes or kids snowparks are increasingly being built in combination with snowparks as a fun & action offering in ski resorts. In general, the same constructional principles apply as for the implementation of snowparks. In particular kids parks or fun slopes can be set up according to the same principle. But if a more professional approach is desired, especially if cross tracks are involved, an experienced snowpark designer should be consulted.

## 3. Labelling and marking

After all constructional measures of the snowpark have been completed, it is essential to inform all riders about the rules and risks of using the facility. It is recommended to install orange snowpark panels – Smart Style – at all access points.

Snowparks are classified as special installations and should therefore be specifically marked as such. The colour orange is used for marking and labelling and thus stands out from the classic ski run colours – blue, red, black.

*„The safety of all parties involved must always be a priority. Through proper set up and maintenance of the snowpark, as well as communication of the rules of conduct, operators fulfil their obligations and maintain safety.“*

*(Dirk Scheumann, Managing Director Schneestern)*

Some points must be observed for the marking system:

- › The entrance to the park is marked by barriers and can also be separated from the normal runway.
- › Small features must be separated from medium and large features and identified, if the situation requires.
- › It must be readily apparent whether the park is open or closed. This is best marked by pennants or nets.
- › The park interfaces are marked by barriers or signs.
- › Orientation boards and brochures can be helpful to help the user know if it is a snowpark area for beginners, advanced or expert skiers.

Snowpark signs inform about:

- › Individual responsibility
- › Validity of the FIS rules
- › Snowpark rules
- › Recommendations for wearing protective equipment (protectors, helmet)
- › Emergency number of the ski rescue service

## 4. Materials

The equipment has also adapted to the dynamic development of snowpark structures and a variety of innovative shaping tools such as cutters and rakes, which are far more advanced than traditional shovels. These devices allow work on both soft and hard snow. Artificial elements such as boxes and rails have minimum requirements with regard to materials (checklist appendix). However, portable modular systems that can be adapted and modified continuously offer considerable benefits in the set-up. Ideally, the elements are so light that they can be carried by two people and can be stored easily without taking up much space.



*Shape tool, Kaspars-Daleckis*

## 5. Examples of a sample snowpark

This handbook can be primarily used to implement smaller stations in the 'Small' area of a snowpark. The following examples are intended to provide a first impression of how such a park could look.



*Elephant, Gastein, Parkshooting, Daniel Ausweger, QParks*



*Elephant, Kaunertal*



*Snowpark Nesselwang, Park Overview, 5 Stars GmbH*



*Small Park, Schneestern, Piz Sella*



*Small Park Overview*

# VI. Safety aspects during operation



VI.





The success of a snowpark depends on the prevailing conditions throughout the season. Particular attention is paid to the safety, upkeep and maintenance situation. Specific rules for the responsibilities and relevant tasks should be pro-actively coordinated by the ski lift operators in advance. In addition, a written arrangement should be drawn up between the ski lift operators and park management.

*„A snowpark must also be cared for! In addition to preparation of the normal pistes, daily monitoring and improvement of the park should be on the agenda of ski lift operators or park managers.“*

*(Heli Herdt, Ski Cross & Freeski Sporting Director, German Ski Association)*

## 1. Safety aspects from operator perspective

After the shaping process has been completed, the facility can be opened. At this point, responsibilities should be clarified: the slope service, the shapers or even someone from the local ski/snowboard school. Here, you must bear in mind that shapers may not be available every day in small ski resorts.

To ensure the facilities can be used every day, the condition of the park must be permanently monitored. Possible changes in the flight path during the jumps must be recognized, the quality of jumps and landings must be ensured, etc. From experience it is advisable to make such and similar considerations on a daily basis and have them recorded by the responsible shapers. In addition, the park management should consider the rescue facilities (SOS station, rescue procedure, heli pad, etc.) by the park.

*„It is recommended to create maintenance reports for all incidents. Careful logs help to keep track of the park condition, but also about special incidents such as accidents and damage.“*

*(Michael Sonnenberger, Snowpark Designer)*

The following points should be implemented:

- ▶ Marking of the features (jumps, landings, coping of the pipe, steep wall curves, etc.) with flags, brush or colour in the event of bad visibility or fog
- ▶ Closure of the system in case of persistent bad weather, fog, poor visibility, snowfall, strong wind or in case of repairs. According to the legal duty to maintain safety, it is mandatory to close a facility during maintenance work involving a tiller.
- ▶ A website or social media channel can be used as an information source about the current state of the park.

## 2. Maintenance and upkeep

An uncared-for facility is not only a source of danger, but also not attractive for users. Therefore, installations should be maintained and repaired over the entire season. Particularly installations that attract many visitors require a high level of care and maintenance (reshaping). To avoid fatal consequences, maintenance must always be carried out conscientiously and reliably. The use of special tools and machines as well as full integration into the time management of the daily slope preparation is essential to ensure the perfect condition of the facility. Additional maintenance may be required during competitions or other events.

*„A tip for all shapers: The easiest way to handle snow is in the morning. Then it's still fresh and soft and provides the perfect base for shaping.“*

*(Nejc Kralj, Headshaper)*

As a rule, a trained shape-team is responsible for maintaining and repairing the facility during the season. Shapers are not only responsible for shaving jumps and their inruns and landings, but also for general safety control of the park (damage, signage, fencing, wear). Handwork with special shaping tools can also be carried out during operation. To ensure the quality and safety of the park, it is highly recommended to use trained and experienced personnel.

The following points should be implemented:

- › Removal of recent snowfall or snowdrifts
- › Shaving the landings (removal of hard ice layers)
- › Automatic and manual filling of holes and/or run-out areas in the inrun, take-off and landing
- › Adaptations and changes to the facility

*„Maintenance or remodelling work must be treated with caution. The facilities should be closed while the machines are on the snowpark grounds. Only when carrying out small-scale manual work, it is enough to close individual features.“*

*(Samuel Dürr, Snowpark Montafo Project Manager)*

The quality of jumps and jibs must be kept at the same level throughout the season. This is most easily done by taking the same care as during the first set-up. For this purpose, individual set up steps such as shaping the landing or preparing the transition are repeated at regular intervals. A combination of snow machine and manual work is often required here.



Schneestern, Overview Livigno

## 3. Legal aspects

### 3.1 Responsibility/liability in case of accident

Ruthless riding behaviour in snowparks or insufficiently secured facilities not only increase the risk of accidents, but can also lead to criminal and civil law consequences in the worst case scenario.

Criminal law is primarily concerned with negligence, especially negligent bodily harm (§ 229 StGB – German Penal Code) or negligent killing (§ 222 StGB). Negligence is defined as follows: „A person acts negligently if he fails to exercise reasonable care.“ Thus, a conviction for negligence always presupposes, among other things, a breach of due diligence. In addition, the defendant(s) must also be a natural person, for example a shaper or a skier.

The consequences of civil law are liability or compensation. In Germany, the injured party is basically responsible for his or her damages, unless the damage can be passed, under certain circumstances, to a party liable to effect compensation. The decisive factor for determining the person liable to pay damages is the culpability. Culpability means the degree of blameworthiness that can be attributed to the actions of a person committing an unlawful act. There is a distinction between intent and negligence. Pursuant to §278 BGB (German Civil Code), the obligor is responsible for fault on the part of his legal representative, and of persons whom he uses to perform his obligation, to the same extent as for fault on his own part.

The use of snowparks and artificially created jumps involves a higher risk potential than traditional skiing on level snow courses. Snowpark users should be aware of this and be willing to take greater risks than traditional skiers. However, a high degree of skill, body control and technique are also required. The blame for accidents caused by negligence, inattentiveness or overconfidence cannot be shifted to others.

Ultimately, each case must be considered individually. Since decisions are significantly influenced by the concrete circumstances, it cannot be categorically said beforehand whether there is liability and who is civilly or criminally liable after an accident.

#### 3.1.1 Principle of self-responsibility

As with most sports, skiing and snowboarding are subject to the principle of self-responsibility – be it on the ski slope or in snowparks. Winter sports enthusiasts are primarily responsible for any risks they may encounter during a ski run. Everyone must take responsibility for their own safety and be aware of the risks inherent in the sport. In case of snowpark accidents, the injured person is personally responsible. Only under certain circumstances can other users or the operator be liable for an accident and its consequences. Possible scenarios are a collision between two persons or inadequate maintenance, inspection and marking of the facilities by the responsible operating company (hereinafter referred to as ‚snowpark operator‘).

### 3.1.2 Duty of care of park users

The so-called ‚FIS Rules for Skiers and Snowboarders‘ were created as a standard for careful and responsible behaviour. The ten rules of the FIS (10 FIS Rules of Conduct for Skiers and Snowboarders) aim at the prevention of accidents and impose liability obligations on the undertakings involved (current version 2002). Anyone using special equipment such as snowparks and pipes must adhere to the FIS rules. They are legally binding.

Schools and clubs can order brochures and posters with the FIS rules free of charge from the German Ski Association.

Snowpark users are expected to have an increased sense of personal responsibility. Anyone who causes an accident through non-observance of the FIS Code of Conduct must face both civil and criminal penalties.

### 3.1.3 Responsibility and liability risk of the snowpark operator

Snowpark operators, as well as cableway and skilift operators are subject to the so-called legal duty to maintain safety measures [German: Verkehrssicherungspflicht]. Anyone creating, sustaining or controlling a potential source of danger or risk to humans, or exposing or circulating dangerous objects to the general public is required to maintain safety measures. This is based on the general requirement of avoiding harm or injury: anyone who creates or sustains a danger for others, e.g. by operating a snowpark, is obliged to take all reasonable precautions so that no damage can occur.

Snowpark operators therefore have to take the necessary and reasonable safety precautions on the basis of the legal duty to maintain safety measures. Snowparks must therefore be created and maintained in such a way that no defects are present and the safety of each user is ensured at all times. If this is not the case, the snowpark operator can be held responsible for the consequences of an accident.

For example, snowparks should be marked and visibly separated from the ski descents. An accident caused by a deficient condition of the snowpark can have both criminal and civil law consequences for the operator. Nevertheless, the user groups must be aware of their own responsibility.

## 3.2 Minimising liability risks

The liability risks associated with the operation of a snowpark cannot be completely excluded. However, these risks can be reduced by operating a facility which is as safe as possible and diligently observing the maintenance and safety requirements. This includes the creation of a safety scheme.

There are no statutory regulations which lay down that a snowpark can only be created by trained snowpark builders. When creating and operating a snowpark, however, the operator is recommended to hire an expert team to guarantee the necessary knowledge and expertise.

After opening a snowpark, regular checks are indispensable. This includes the checking of markings and signals, as well as the recognition of atypical dangers that require special measures or maintenance work. The party(ies) responsible for safety is (are) only obliged to eliminate danger within economically reasonable bounds. It is advisable to immediately remove, provisionally secure, or even block access to danger points which do not lie outside these bounds. Checks are essential if it can be assumed that the snowpark has changed due to concrete conditions (e.g. topographical, atmospheric conditions, visitor frequency) and is now insufficiently secured.

Generally valid safety precautions cannot be described in detail. They depend on the given conditions and various factors such as the location and condition of the facility and terrain, user frequency, weather, etc.

The economic feasibility of the safety precautions for the snowpark operator is also decisive. This is based on its financial, technical and human resources.

We recommend that the snowpark operator take out liability insurance that covers claims for damages and thus the associated risks of operation.

# VII. Appendix

VII.



## CHECKLIST PLANNING AND REALIZATION OF A SNOW PARK

|  |                                | STATUS   |   |                |
|--|--------------------------------|--|---|----------------|
| PLANNING   | CONCEPT PLAN                   | Where: terrain selection   | Exposure (south orientation ideal for smaller parks)<br>Slope and natural forms<br>Accessibility (lifts, travel time)                                 | ok<br>ok<br>ok |
|  |                                | What: scope of the park  | Approximate number of artificial/natural objects and their difficulty level<br>Availability of additional staff<br>Additional restoration operations? | ok<br>ok<br>ok |
|  |                                | Who: allocation of tasks   | Allocation of tasks of mountain lifts and external experts (planning, marketing, set up and maintenance)  | ok             |
|  | How: financing                 | Costs of mountain lifts, sponsorship funds   | ok  |                |
|  | DETAILED CONCEPT               | Set up   | Park map/sketch<br>○ Target group oriented set up and distribution of the obstacles<br>○ "Working" runs/lines: rhythm and safety                      | ok             |
|  |                                |  | Snow amount calculation   | ok             |
|  |                                | Inventory, acquisitions (rails, boxes, jibs, tools)  | ok  |                |
|  |                                | Season planning  | ok  |                |
|  |                                | Timeline (revisions, snowmaking, set up, events)   | ok  |                |
|  |                                | Resource planning (required snow cannon, machine and man hours)  | ok  |                |
|  |                                | Elaboration of the safety concept  | ok  |                |
|  |                                | Season preparation   | Logistics   | ok             |
|  |                                |  | Depot for unused obstacles, tools, equipment and other park material  | ok             |
|  |                                |  | Deployment plans for machinists and shaper  | ok             |
|  |                                |  | Clarify responsibilities (maintenance, daily park clearance)  | ok             |
|  |                                |  | Safety concept  | ok             |
|  |                                |  | Signalization (snowpark rules, barriers)  | ok             |
|  |                                |  | Ensure access and routes for rescue service (possibly helicopter landing place)   | ok             |
| MARKETING  |                                | Sponsoring/fundraising   | Prepare project description/concept, sponsorship strategy   | ok             |
|  | Contact potential partners     |  | ok  |                |
|  | Marketing                      | Website/own homepage   | ok  |                |
|  |                                | Social media (Facebook, etc.)  | ok  |                |
|  |                                | Park guides, web forums, tourism platform etc.   | ok  |                |
|  |                                | Magazines and other media  | ok  |                |
|  |                                | Flyers, stickers, etc.   | ok  |                |
| Post recent news, pictures and videos as early as possible | ok                             |  |   |                |
| IMPLEMENTATION   | Preparation of the obstacles   | Revision/restoration of existing obstacles   | ok  |                |
|  |                                | Purchase and transport of new obstacles  | ok  |                |
|  |                                | Branding (stickers, stencils, colour)  | ok  |                |
|  | Positioning the snow cannons   | Sufficient production at the required places   | ok  |                |
|  |                                | Possibly plan reserves (subsequent snow production may be difficult depending on area/situation)                                   | ok  |                |
|  | Park set up (approx. 3-5 days) | Ensure availability  | ok  |                |
|  |                                | 2-3 machines for the rough structure (1-2 days), afterwards 1 machine  | ok  |                |
|  |                                | Designer/headshaper and 2-3 shapers  | ok  |                |
|  |                                | Rough work   | ok  |                |
|  |                                | Use machine to push snow with machine and shape tables and jibs  | ok  |                |
|  |                                | Check sufficient length of the tables as well as adequate steepness and length of the landings (also for jibs!)                    | ok  |                |
|  |                                | Place the jumps, rails, boxes and jibs (in transition, take-off angle and altitude adjust to the degree of difficulty and landing) | ok  |                |
|  |                                | Fine work  | ok  |                |
|  |                                | Carve out and cut off jumps and jibs, prepare small jumps by hand  | ok  |                |

| CHECKLIST PLANNING AND MAINTENANCE OF A SNOWPARK                                       |   |        |
|--|---|--------|
| PLANNING   | COMMUNICATION AND WORKFLOWS   | STATUS |
|  | RESOURCE PLANNING   |        |
|  | Operational plans for machinists  | ok     |
|  | Operational plans for shapers   | ok     |
|  | CLARIFY RESPONSIBILITIES  |        |
|  | Small/large reshapes  | ok     |
|  | Safety checks, daily park clearance   | ok     |
|  | Contact lists for mountain lifts and shapers  | ok     |
|  | SPECIAL EVENTS  |        |
|  | EXCEPTIONAL/ADDITIONAL RESHAPE REQUIREMENTS (BEFORE EVENTS)   |        |
| Schedule adjustments to the set up/terrain (e.g. audience platform, judge table, etc.) | ok  |        |
| Possibly special/additional machines/devices (chain saw, snow tiller, etc.)            | ok  |        |
| Resource planning (additional machinery and staff)                                     | ok  |        |
| FURTHER REQUIREMENTS   |   |        |
| Material (electricity, technical equipment, wireless communication, etc.)              | ok  |        |
| MARKETING  | SPECIAL EVENTS  |        |
|  | WEB PRESENCE (OWN WEBSITE, SOCIAL MEDIA ETC.)   |        |
|  | Post information (news, pictures, videos) on the current state as early as possible   | ok     |
|  | MAGAZINES AND OTHER MEDIA   |        |
| Advertising, reporting   | ok  |        |
| IMPLEMENTATION   | ROUTINE RESHAPING, MAINTENANCE  |        |
|  | Machine work: daily preparation of the landings, inruns and, if necessary, jumps (if wide enough); in normal conditions in the evening, with new snow at night/in the morning | ok     |
|  | Manual work: fine-tuning of jumps if necessary; in normal conditions in the evening, with new snow in the morning   | ok     |
|  | PARK CLEARANCE: IN THE MORNING BY SHAPER AND/OR MOUNTAIN LIFT   |        |
|  | Signs, barriers, nets and buffers are installed as planned  | ok     |
|  | All snowpark features are intact and can be used without avoidable hazards (unevenness in the inrun/landing damage, etc.)   |        |
|  | Carve out and cut off jumps and jibs, prepare small jumps by hand   | ok     |
|  | CONVERSION AND EXTENSION OF THE SET UP  |        |
|  | Ensure availability (machines and shapers)  | ok     |
|  | DISMANTLING AND REMOVAL OF THE SET UP   |        |
|  | Remove no longer usable objects, kicker crashing  | ok     |
|  | LOGISTICS   |        |
|  | Summer storage for rails, boxes and jibs  | ok     |
|  | Transport BEFORE snowmelt   | ok     |
| Waste disposal (on the terrain and in the workshop), clearance of the deposit          | ok  |        |
| Storage or return of advertising materials (flags, banners, etc.)                      | ok  |        |



| DAILY SNOWPARK CONTROL |   |     |    |
|------------------------|---|-----|----|
|                        | NAME OF SNOWPARK:   | YES | NO |
| 1                      | Smart style board is set up, visible and not covered with ice or snow   |     |    |
| 2                      | The snowpark features have no dangerous unevenness or damage and are set up correctly.  |     |    |
| 2A                     | If not: Which obstacle?<br>What is defective?<br>What action is being taken?<br>Condition repaired?<br>Park closed?   |     |    |
| 3                      | Safety nets are set up and adapted to the snow conditions   |     |    |
| 4                      | Barriers are set up and adapted to the snow conditions (Small is separated from others)   |     |    |
| 5                      | Safety buffers are set up and adapted to the snow conditions  |     |    |
| 5A                     | If not: Why?  |     |    |
| 6                      | What has been done in the park?<br>Closure day<br>Reshape<br>Changes/remodelling: Which?  |     |    |
| 7                      | Verified and carried out by:  |     |    |
| 7A                     | 1. Inspection: time<br>2. Inspection: time<br>Date: day / month / year  |     |    |
| 8                      | Conditions:<br>New snow: cm<br>Temperature: °C (average)<br>Weather: snowfall / sun / fog / rain<br>Wind: windless / light / moderate / strong<br>Visibility: good / hazy / bad / fog |     |    |
| 9                      | Injuries:   |     |    |
| 9A                     | If so: Where in the park?<br>How?<br>When? Time:<br>Personal information: ski / snowboard / male / female / age   |     |    |
| 10                     | Signature   |     |    |

# SNOWPARK

**DE**

Denke daran, dass sich die Bedingungen laufend verändern und die FIS-Regeln und SKUS-Richtlinien auch hier gelten.



**erst schauen  
dann springen**



**plane  
deinen Lauf**



**lass es  
langsam angehen**



**Respekt  
verdient Respekt**

**small**

**small**  
Diese Elemente weisen eine geringe Absturzhöhe auf und sind fahrbar (auch für Snowpark-Einsteiger).

**FR**

N'oublie pas que les conditions changent en permanence, et que les règles de la FIS et les directives de la SKUS sont aussi valables ici.

**regarde avant  
de sauter**

**planifie  
ton passage**

**vas-y  
gentiment**

**le respect  
invite au respect**

**small**  
La hauteur de chute de ces éléments est peu importante et ils peuvent être parcourus en glissant (aussi par les novices dans les snowparks).

**IT**

Ricorda che le condizioni cambiano costantemente e che le regole FIS e le direttive SKUS valgono anche negli snowpark.

**controlla prima  
di saltare**

**pianifica  
la discesa**

**progredisci un  
passo per volta**

**rispetto  
chiede rispetto**

**small**  
Questi elementi hanno un'esigua altezza di caduta e sono utilizzabili (anche dagli inizianti snowpark).

**EN**

Keep in mind that the conditions are constantly changing, and that the FIS rules and SKUS guidelines also apply here.

**look before  
you leap**

**make  
a plan**

**easy  
style it**

**respect  
gets respect**

**small**  
These elements have a low fall height and are rideable (even for beginners).

## Start small and work your way up.



[www.schneestern.com](http://www.schneestern.com)

Snow board, Schneestern

**small**

**medium**

**large**

# VIII. Glossary

# VIII.



**Air**

Jump over an obstacle

**Inrun area**

Space the park user requires to access or approach an obstacle or jump

**Approach/Inrun**

Run-up on the jump

**Banks**

Banked curves

**Big Air**

A ,big jump' as well as the name of a snowboarding discipline

**Boardercross**

See ,cross'

**Bonking**

Short touch, tapping of artificial features

**Box**

Obstacle with wide support surface for longitudinal or transverse sliding

**Cliff Drops**

Jump down from a rock

**Contest**

International term for competition

**Coping**

Upper edge of the pipe, where platform and vertical meet

**Cross**

Boardercross (also known as snowboard cross, SBX or boarderX) and skicross are a competition in which a four to six snowboarders race down a course.

**Ride surface**

Any part of a fun park that is not an obstacle or its associated fall/landing surface.

**Finisher**

The finisher is attached to the tiller of the snow groomer and is used for smoothing the slope.

**Freeski**

Name for a free skiing style or expression (freestyle)

**Freestyle**

Freestyle is a discipline that encourages skiers and snowboarders to express their creativity

**Funpark**

See ‚snowpark‘

**Sliding surface**

The area of each rail that can actually be used for snowboarding

**Halfpipe**

A halfpipe is a sporting facility carved out of snow in the shape of a pipe cut in half.

**Halfpipe competition**

The aim of half-pipe competitions is to prove one's skills in the halfpipe. Riders perform different tricks alternately on both walls in a so-called run.

**Inrun**

See ‚approach‘

**Jibbing (also shredding, sliding)**

Sliding over obstacles

**Jibs**

Jib features (short: Jibs) are artificial obstacles (not made of snow).

**Jumps**

General term for all types of jumps

**Kicker**

A kicker is a ramp with some curve to it. Commonly referred to as ‚kicker‘.

**Knuckle**

Transition from table to landing

**Line**

A line is defined by obstacles with a consistent level of difficulty in a snowpark.

**Obstacles**

Umbrella term for all obstacles in a fun park, irrespective of material, geometry, size and intended use

**Over-/Undershots**

If someone jumps too far (over the landing) or too close (not over the table)

**Platform**

Upper, wide rim of a halfpipe

**Quarterpipe**

A natural or artificially designed quarter-tube

**Rail**

Round or flat metal rail (pipe) for sliding, usually bent in different shapes

**Rail/jib contests**

In addition to slopestyle competitions, where the jibs are often part of the line, there are also pure rail or jib contests. Such events are often held in cities and are therefore also called ‚city events‘.

**Run**

A run means a ride through the snowpark.

**Shaper**

Also the park builder. The shaper is usually part of a shape team that is responsible for care and maintenance of the snowpark.

**Shape tool**

Special tool for manual maintenance of snowpark features made of snow

**Shredding (also jibbing, sliding)**

Sliding over obstacles

**Safety zone**

Space around an obstacle, which is necessary for the safety of user groups and third parties. Safety zones are, in particular, the inrun area as well as the falling and landing areas.

**Skicross**

See ‚cross‘

**Sliding (also jibbing, shredding)**

Sliding over obstacles

**Slopestyle**

Competition for skiers and snowboarders. An obstacle course with at least two lines containing a series of obstacles in a connected course must be passed and evaluated by a jury.

**Slow Slopes**

Slow downhill slopes for connoisseurs and beginners

**Small-Medium-Large**

The classification Small, Medium and Large is mainly based on the size and risk potential of the individual features.

**Smart Style concept**

Smart Style was developed in the US and is more than just a signposting system. The information is based on advice and not on rules, and is therefore well-received by its target group. Smart Style appeals to the individual responsibility of visitors and gives all parking designers the highest possible freedom in the designing the snowpark facilities.

**Snow farming**

Refers to the production and processing of artificial snow, creation of snow deposits and transport of snow.

**Snowpark**

Snowpark, also known as fun park or terrain park, is an umbrella term for terrain parks in winter resorts, such as slope style parks with jumps, jibs (artificial features), half and quarter pipes as well as cross-tracks.

**Table**

Segment between landing and take off

**Tapping**

Short touching/bonking of artificial features

**Terrain Park**

See ‚snowpark‘

**Transition**

Concave part of a riding surface, for example the curve inside a pipe or the curved inrun portion of a jump. The transition is characterised by an increased acceleration that acts vertically to the riding surface of the rider.

**Tricks (grabs, spins, flips)**

Freestyle figures that are usually executed during the flight phase. Grabs refers to grasping and holding the snow sports equipment. Spins are rotations around the vertical body axis. Flips are rotations around the body's transverse or depth axis.

**Panelling**

Side and impact panels of rails. From a sports point of view, panelling is a non-usable area that serves only to close the rails laterally in order to reduce the risk of injury.

**Vertical (Vert)**

Nearly vertical area of a wall with halfpipes or quarterpipes

**Wu-Tang**

Very steep, jump-like obstacle in a cross



## References

- Audema, B., Laporte, J.D. & Constans, D. (2007). *Accidents Occuring in Snow Parks in France. Abstract.* 17th International Symposium on Ski Trauma and Skiing Safety, 13-19 May 2007, Aviemore/Scotland.
- Beratungsstelle für Unfallverhütung (bfu). Leitfaden. <http://www.bfu.ch/de/ratgeber/ratgeber-unfallverhütung/sport-und-bewegung/sport-und-freizeitanlagen/snowparks/snowparks-tipps> <<http://www.bfu.ch/de/ratgeber/ratgeber-unfallverh%C3%BCtung/sport-und-bewegung/sport-und-freizeitanlagen/snowparks/snowparks-tipps>>
- Brooks, M.A., Evans, M.D. & Rivara, F.P. (2010). Evaluation of skiing and snowboarding injuries sustained in terrain parks versus traditional slopes. *Injury prevention*, 16 (2), 119–122.
- Bürgerliches Gesetzbuch in der Fassung der Bekanntmachung vom 2.01.2002 (BGBl. I S. 42, 2909; 2003 I S.738), zuletzt geändert durch Artikel 16 des Gesetzes vom 29.06.2015 (BGBl. I S. 1042).
- Goulet, C., Hagel, B., Hamel, D. & Legare, G. (2007). Risk factors associated with serious ski patrol-reported injuries sustained by skiers and snowboarders in snowparks and on other slopes. *Canadian journal of public health*, 98 (5), 402–406.
- Laporte, J.D., Delay, J.B., Lamy, D., Audema, B. & Binet, M.H. (2011). Snow park injuries in France during the winter season of 2007. In: I. Scher & R. Greenwald (Hrsg.). *Book of Abstracts. 19th International Congress on Ski Trauma and Skiing Safety*, Keystone/Colorado, USA.
- Ruedl, G., Sommersacher, R., Woldrich, T., Kopp, M., Nachbauer, W. & Burtscher, M. (2010). Risikofaktoren von Kopfverletzungen auf österreichischen Skipisten. *Deutsche Zeitschrift für Sportmedizin*, 61 (4), 97–102.
- Russell, K., Meeuwisse, W., Nettel-Aguirre, A., Emery, C.A., Wishart, J. et al. (2013). Characteristics of injuries sustained by snowboarders in a terrain park. *Clinical journal of sport medicine*, 23 (3), 172–177.
- statista – Das Statistik-Portal. <http://de.statista.com/statistik/daten/studie/247818/umfrage/unfallzahlen-und-krankenhausaufhalte-deutscher-skifahrer/>, Zugriff am 10.11.2015.
- Strafgesetzbuch in der Fassung der Bekanntmachung vom 13.11.1998 (BGBl. I S. 3322), zuletzt geändert durch Gesetz vom 20.10.2015 (BGBl. I S. 1722) m.W.v. 24.10.2015.
- 10 FIS Verhaltensregeln für Skifahrer und Snowboarder. [http://www.fis-ski.com/mm/Document/documentlibrary/Administrative/02/04/32/10FISRulesofConduct-German-A4\\_Neutral.pdf](http://www.fis-ski.com/mm/Document/documentlibrary/Administrative/02/04/32/10FISRulesofConduct-German-A4_Neutral.pdf). Zugriff am 10.11.2015.

## Picture credits by chapter

|          |  |
|----------|--|
| Page 6:  | Florian Falch, Swinging Spring, Falch Photography              |
| Page 10: | Pally Learmond Stubai Prime Park Session, Pally Learmond-Sebbe |
| Page 12: | Vegard Breie, Stubai Zoo Overview                              |
| Page 26: | Stefan Eigner, KT15 photo eignerphoto action                   |
| Page 34: | Pally Learmon Prime Park Sessions, Stubai, Pally Learmond      |
| Page 47: | Schneestern, Schneestern GmbH & Co. KG.                        |
| Page 53: | Stefan Eigner, photo eignerphoto action                        |
| Page 59: | Stefan Eigner, photo eignerphoto action                        |