Preface

Why did we decide to write this book? In fact, we had never thought of writing a book on winter sports since our competences were focused just on bobsleigh, skeleton and luge (except Stefano Maldifassi who, being responsible for the research of the Italian Winter Sports Federation, had carried out research in all disciplines but had no time for writing a book). Too less material for writing a book.

One day, however, we took part to a congress with a special session on sports equipment, and there was a great interest in the sensors we had developed and the test campaign we had carried out to characterize the dynamics of the sled coupled with the actions by the athletes. Our surprise was to see that what we had done within our discipline was very similar to what colleagues had done in different disciplines, e.g. in skating. In fact, all winter disciplines have one thing in common: the sliding on a slippery surface (either ice or snow). Thus, to maximize performances, one has to minimize (or control, such as in curling) the friction at equipment—ice/snow interface.

The following question arose: Why not putting the experiences gained in all the various disciplines together to cross-fertilize and provide new ideas? Looking around, however, there was no common archive of the engineering studies done on winter sport disciplines. You had to go around the internet and the various public or private databases trying to collect all the literature. Even more problematic, several colleagues, especially in the past, had published their researches at conferences and the corresponding proceedings were almost lost. Not to talk about brilliant researches done within Ph.D. thesis that had not been published elsewhere.

Thus, we decided to collect all the relevant literature on the engineering studies done in the various disciplines and to write a book summing them up. However, a mere review would have been not that interesting. We therefore tried to highlight the research paths, to critically analyse the obtained results, to show the technological trends, to draw the attention to the open questions, and, even more important, to stress the similarities and the differences between the different disciplines. We decided to split the book into two main sections: the first focusing on the common denominator of all winter sports, i.e. ice and snow as well as their interaction with skis and runners, respectively, and the second focusing on the various disciplines.

We decided to limit our analysis to the most popular Olympic disciplines but interesting hints for disciplines not considered in the book can easily be obtained. At the end, we added a concluding chapter that bridges engineering with the other most relevant science in sports: medicine. In fact, you may have the best equipment but you will win or lose according to your training and your psychology. We hope you will enjoy the reading of this book.

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