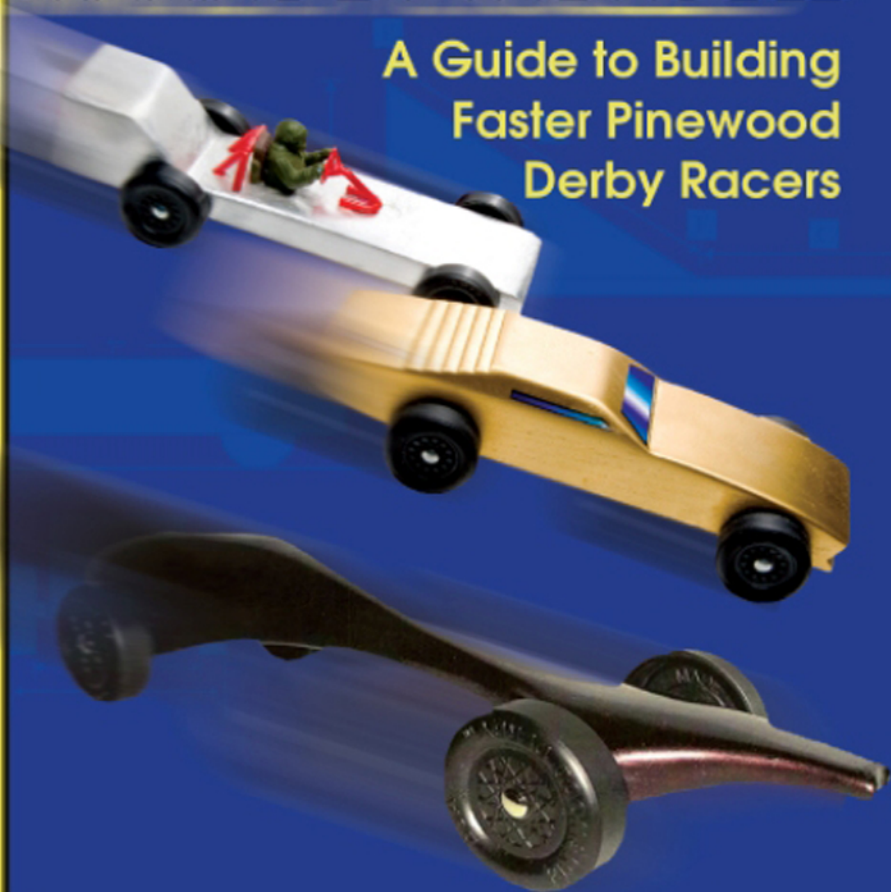




PINEWOOD

WINNING BY THE RULES

A Guide to Building
Faster Pinewood
Derby Racers



PHIL REINKE

Pinewood

Winning by the Rules

Phillip C. Reinke



Eloquent Books

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Eloquent Books
An imprint of Strategic Book
Group P.O. Box 333
Durham CT 06422
www.StrategicBookGroup.com

ISBN: 978-1-61204-955-7

Printed in the United States of America

To My Dad...

...who taught me many valuable lessons...

...of them...

...the most important one was...

...how special the time was that we spent together...

To Lori...

...to the best...

... who gave the support ...

... that made this and many other things happen ...

To Grey Owl...

...although your voice came from the shadows...

...and I knew who you were...

...I listened and learned from you...

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Introduction

“We want a short and concise guide... We do not need filler... We do not have time to read page after page to find out what not to do... Tell us what to do and how to do it...and we’ll be happy.” That is what I continuously received as feedback as I passed out photocopies of my guidebook to interested dads and Cub Scouts. When I sat down to finalize this guide, I had that single goal in mind, to make it as brief and valuable as it could be.

This guide to building faster pinewood derby racers, without breaking the rules, contains both a detailed description of our discoveries and a “Quick Guide” section that incorporates most of the characteristics of a winning racer. If time does not allow for detailed reading, jump to the final chapter of the book, and follow those guidelines.

Please remember that you are one of many racers competing for the same thing. Everyone is trying to build a winning racer.

Nothing guarantees victory, especially cheating! What is guaranteed is that by doing your best and being an honest and true competitor, with good sportsmanship, you'll have a great time and learn many things along the way.

Good luck, and may you build the fastest racer ever!

1

Winning by the Rules

THE PINNACLE CAR COMPANY

Pinnacle Car Racing (PCR) is a fictitious company, founded by my son (Tyler) and me. Although its stated purpose was to build and race winning pinewood derby racers, its real purpose was to show an eight-year-old boy what his father did for a living. During the course of Pinnacle's three-year history, it created three pinewood derby racers that won three district championships. Winning a single district race is an accomplishment in and of itself, but a streak of three is a good indicator that PCR found a winning combination. Even more impressive was that each racer that PCR entered was progressively faster.

At the end of Tyler's racing career, and his retirement from Pinnacle's leadership, he suggested that we share what we learned about building pinewood racers in the form of a book. His reasoning was to give other Cub Scouts a chance to have as

much fun with their dads as he did working with me! How could I turn that down? So before closing the doors of Pinnacle Car Racing forever, we wrote this book.

I am an industrial engineer, a Six Sigma Certified Master Blackbelt, working primarily on shifting organizations' cultures and methodologies into more customer-focused and profitable modes. Trying to explain what I do to support our family is more difficult than the job that I have. Rather than submitting Tyler to long-winded explanations that are way beyond his attention span, I made him president of a company that builds pinewood derby racers, and I performed the role that I do with the companies that I work for.

My job combines science, engineering, and statistics with other disciplines. For the sake of our work at PCR, we would focus on the engineering aspects of my job. That is just what we did while we designed, built, and tested his racers. There was one critical characteristic that the racers had to maintain while we did that. They had to conform to every rule of the race. Using statistical tools, we would hypothesize what effect a change would have on the performance of his racer and test for actual statistical significance. Those things that mattered to the speed and consistent performance of his racer were added to the design, and we continued to discover new things.

When the big races occurred, we made notes of how his racer actually performed and also made notes related to his competition, just like real companies should be doing! Over the course of time, we learned much and rejected even more!

As you can probably conclude, our hobby was not a two-weeks-before-the-race-type effort. PCR Research and Development operated year-round! But to conform to the race rules, every racer was constructed in the month prior to the Pack race, with the kit provided by the Pack. The only exception to this was Tyler's first racer. It was designed and built in the two weeks prior to the race. From that point onward, the designs for the new and improved racers began immediately after the last race.

This brings us to another reason for writing this book. When Tyler and I set out to build his first racer, we went to the Internet to capture as much background information as possible. What we found was *very* disheartening!

Not once did we find a single booklet about how to win by the rules. In fact, the Internet is loaded with information on how to cheat and get away with it, not to mention just as many dealers selling machined wheels, axles, lubricants, and bodies, all guaranteeing faster speeds (even though they are well beyond the limits of the rules). We also found places where one can purchase racers (already built) that supposedly won previous district championships! We purchased many of these items and tested them. Many we found made a difference, while others didn't. What we wanted to know was the capability of our competition, even if they cheated, and how to ensure that our performance exceeded theirs (within the rules).

As we were gathering information, Tyler asked if cheating in the pinewood derby broke the bigger Scout rules, "You know, Dad, like the ones about honesty?" My response was an emphatic, "Yes!"

Awareness of what was out in the market often allowed us to identify racers with machined axles or machined wheels. Tyler and his racer were rewarded for their honesty and integrity by victory, even over those who chose to try win by cheating. I recall a few sideline “Shhhhs” when a young man would (somewhat loudly) say to his dad, “I thought you said those special axles would make us win.”

Rather than filling a book with conjecture and theories, as many of the available books do, we will share only those aspects that we tested and showed actual statistical significance. There are also a few myths that we will note as making no difference. Over the course of four years, we hypothesized hundreds of characteristics and tested each. Many did not show any statistical difference, and a few made big differences. One would think that there are not enough things related to building a racer out of a block of wood, four nails, and four plastic wheels to write a book about! The very opposite is true; in fact, we are still discovering things, and you will too!

How big were the differences? During the second year of PCR’s existence, and the weekend before the race, we received a call from a fellow Scout, who needed help building his racer. In one evening, we built and painted the racer, applying the design features that the time allowed us. That year, Tyler’s racer took first place, and his friend’s racer took second place. The only racer that beat his friend’s racer was Tyler’s! Those same techniques are described in the “Quick Guide” section.

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