

Preface

The Genesis of the Book

So it was arranged, Prof. H. Sato and Dr. T. Senba were coming from Japan to visit me in Western Australia. Dr. Senba had been before but I never thought to see Prof. Sato in Perth. They were arriving late on September 2, 2007 and though staying in a hotel had agreed to stay one night at my home. This was an unexpected pleasure. There was something important in the air. As it turned out Prof. Sato had come to request that I should agree to write a book with him on vibration and machine tools. Writing a book was not something that I had contemplated but how could I refuse as he had come so far?

It was one of those providences that arranged for me to first meet and talk with Prof. Sato. We had both attended the CIRP Annual Assembly in Bruges, Belgium in 1982. I knew him by sight but there we were sitting opposite each other in a train on the way to the airport. We got on well and had much in common. Over the years we met at CIRP conferences and then when I moved to Australia we met more often. The request was for each of us to write one half of a book on vibration and machine tools. Professor Sato was concerned that much experience was in danger of being lost and wished to record it for posterity. In the event the book became too large and so my part was submitted on its own and resulted in the book before you. Professor Sato's book is yet to be published.

The Objective

It is very important to stress that this book is about preventing chatter from occurring in machining processes. It is not about forced vibration that arises from cyclic excitation but about an unstable oscillation that grows with time and that is most unwanted. The objective is to stop chatter from starting. This means that the vibration is not just reduced in amplitude but eliminated completely, it never starts. Others have had an apparent goal of modelling the machining process more and more accurately and even modelling what happens after chatter starts. This approach does not often result in major advances in chatter avoidance as the

models begin to be as complex as the real process and do not immediately suggest major innovations. The alternative approach adopted in this book is to use simpler models that, while noting their limitations, give an overview and do allow for more frequent innovations.

So why another book on machine tool vibration, and in particular chatter? The author combines the following attributes:

- He was a young researcher when the foundational advances relating to machine tool vibration were made and has a particular insight into those early days.
- He applied his research expertise to industry problems and found novel solutions.
- He is familiar with and able to be critical of the progress or otherwise that has been made since then.
- He has many years of experience dealing with real vibration problems and has been careful to listen to experienced workshop practitioners. There is an immense amount of practical knowledge that is not apparently known to many current research students.
- He is aware of solutions to machine tool vibration that appear to have been long forgotten.
- He has made contributions to reducing machine tool chatter that cover turning, milling, drilling and grinding. This range of applications is not common in most texts on machine tool chatter.
- He has written many animation programs that can help with the comprehension of what to many is a complex and difficult topic.

The book is concerned with the suppression of chatter, that is, preventing it from starting. The objective is to present sufficiently complex models of chatter that allow an understanding to be gained of how a particular solution works. As already noted it is possible to develop models that are so complex that solutions cannot be understood or even imagined. The test of the approach adopted is whether the solutions have been found to work in practice. As this is the case, the simplifying assumptions have been justified as a means of finding solutions.

It is hoped that those who read this book will join in the goal of stopping chatter in machining operations with the result of improved surface finish, longer tool and grinding wheel life and significant reductions in noise.

<http://www.springer.com/978-3-319-05235-9>

Chatter and Machine Tools

Stone, B.

2014, XVI, 260 p. 209 illus. With online files/update.,

Hardcover

ISBN: 978-3-319-05235-9