

MECHANICS OF DESIGNING PRECISION MACHINES

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Abstract. All of our worldly goods were created with machines, but how were the machines created and with what tools? Furthermore, given all the splendor of modern design practice, from solid models to finite element analysis, how did engineers ever get anything done back in prehistoric times? It turns out that a deep understanding of the philosophy of fundamental principles, as well as the mathematics, is the key to the successful design of precision machines and products. From Occam to Saint-Venant to Abbe to Maxwell, examples of fundamental principles and corresponding applied mechanics in design will be discussed with examples ranging from consumer products to precision machine tools, to MEMs.