

CHAPTER 1

INTRODUCTION

During the last thirty years, Finite Elements Analysis (FEA) has been a technology available for specialized analysts as an engineering planning tool, but as time passed this analysis has evolved as an easy tool to be used that such that many industries want to take advantages of the referred technology.

One industry that has all to do with finite elements analysis is sports field. Impact events, materials strength, dynamic loads and even human mechanism simulations are all possible to be developed in a FEA software (figure 1.1).

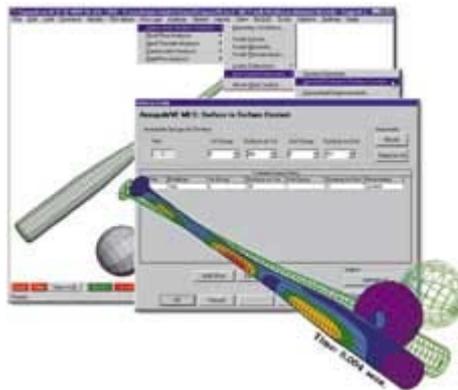


Figure 1.1 Baseball bat dynamic event (Easton Aluminum)

Sport appliances, as the under-development product, are to be modeled in computer programs most of times, due to economic and time factors, because it is much faster and cheaper to set a computer analysis for a 3D model than a physical model analysis, because its failure, given the case, will not cost neither so much money nor effort to the work team. SportKreativWerstaff, together with Technical Universität München, have many creative projects in the sport field. One of those projects is the Ruck'n Roll: an innovative slope-descending device for the average non-extreme-sporting people.

Its backpack-offroad roller crossover looks to satisfy the needs for its defined target market. Further and in-depth explanations about concept, market study and requirements of the product are given in chapter two.

Chapter three presents the steering device design, going from a theoretical research about non-holonomic systems - the principal steering principle found in already existing products in market -, to the selection between different conceptual design, and the proper design calculations for each element.

Chapter four presents the rear axle design: theory about axles, selection between different conceptual designs, and the proper design calculations for each element.

Chapter five refers to the main results of static FEA analysis, going from the model set up, kinematic constraints and materials selection, to the event setup. Results were compared with the design allowable stresses of previous chapters.

Chapter six refers to the main results of dynamic FEA analysis, MES with non linear materials. Maximum values for stress and strain are got and compared with the design allowable stress.