

TO CATEGORIES 

1.400.000 PAGES OF RESEARCH

MONTHLY
1.200.000
PAGE VIEWS

OVER
300.000
VISTORS PER MONTH

new E-BOOKS 

FULLTEXT SEARCH

GO!

NEW: [Advanced Search](#)

Periodicals:

MSF

> Materials Science Forum

KEM

> Key Engineering Materials

SSP

> Solid State Phenomena

DDF

> Defect and Diffusion Forum

AMM

> Applied Mechanics and Materials

AMR

> Advanced Materials Research

AST

> Advances in Science and Technology

JNanoR

> Journal of Nano Research

JBBTE

> Journal of Biomimetics, Biomaterials, and Tissue Engineering

Static and Dynamic Force Analysis to Large-Scale Bed of Leather Cutting Machine Tool

Journal [Key Engineering Materials](#) (Volumes 353 - 358)

Volume [Progresses in Fracture and Strength of Materials and Structures](#)

Edited by Yu Zhou, Shan-Tung Tu and Xishan Xie

Pages 1927-1930

DOI 10.4028/www.scientific.net/KEM.353-358.1927


Citation Guo Shun Ji et al., 2007, Key Engineering Materials, 353-358, 1927

Online since September, 2007

Authors [Guo Shun Ji](#), [Wen Wang](#), [Yan Jun Huang](#), [Zi Chen Chen](#)

Keywords [Cutting Machine Tool](#), [Finite Element Model \(FEM\)](#), [Force Analysis](#), [Leather Materials](#)

Abstract The leather is cut by hand or by hand with some help of semiautomatic machine in general leather cutting technology. In order to enhance the cutting efficiency and quality, the machine tool to realize high speed automatic leather cutting was developed. The final goal of the design is to cut a piece of hide on a working table with cutting velocity 2 meters per second, the dimension of the machine tool is big. It is very difficult to design the frame of this machine tool to meet the performance index for high speed cutting, so the static and dynamic force analysis to the body of it was implemented. First, the digital model of the body of it was built with AutoCAD software, then, the digital model in IGES format was transmitted to the Ansys software and the finite element analysis to it were carried out. Because the static force and vibration from driving system have great influence on the deformation of this machine tool and this deformation will affect the cutting precision and the whole performance of it. So the static force analysis and modal analysis were carried out. Finally, the results of finite element analysis were discussed, corresponding modification to the design was proposed. The analysis results indicate the mechanical property of the body of the developed machine can meet the requirements for high speed cutting.

Full Paper  [Get the full paper by clicking here](#)

First page example

Static and Dynamic Force Analysis to Large-scale Bed of Leather Cutting Machine Tool

Guoshun JI^a, Wen WANG^b, Yanjun HUANG^c and Zichen CHEN^d

Institute of Advanced Manufacturing Engineering, Zhejiang University, Hangzhou, P.R.China

^a jgsh888@163.com, corresponding author. E-mail: ^b wangwn@zju.edu.cn,
^c zjuyashan@yahoo.com.cn, ^d chenzc@sun.zju.edu.cn

Keywords: Force analysis; FEM; Cutting machine tool; Leather materials.

Abstract. The leather is cut by hand or by hand with some help of semiautomatic machine in general leather cutting technology. In order to enhance the cutting efficiency and quality, the machine tool to realize high speed automatic leather cutting was developed. The final goal of the design is to cut a piece of hide on a working table with cutting velocity 2 meters per second, the dimension of the machine tool is big. It is very difficult to design the frame of this machine tool to meet the performance index for high speed cutting, so the static and dynamic force analysis to the body of it was implemented.

First, the digital model of the body of it was built with AutoCAD software, then, the digital model in IGES format was transmitted to the Ansys software and the finite element analysis to it were carried out. Because the static force and vibration from driving system have great influence on the deformation of this machine tool and this deformation will affect the cutting precision and the whole performance of it. So the static force analysis and modal analysis were carried out. Finally, the results of finite element analysis were discussed, corresponding modification to the design was proposed.

The analysis results indicate the mechanical property of the body of the developed machine can meet the requirements for high speed cutting.

Introduction

In general leather cutting craft, leather materials are cut by hand or by hand with some help of machine. In this cutting fashion, the leather materials are put on a working platform, and then some shaping plates, the contours of them to be cut, are laid out on it. With a knife, the worker cuts the leather materials along the contour of these shaping plates. Much many workers are needed to cut the leather materials in a medium scale leather processing factory, and the amount of labor of workers is great, another questions resulting from this leather cutting fashion is low utilization ratio of leather material.

In order to lighten the amount of labor and enhance the utilization ratio of leather materials, as shown in figure 1, the machine tool to realize automatic cutting for leather processing was developed. The gantry layout was used to design this machine tool. The working platform and a set of beam assemble, crossing over it, constitute the basic frame, and the leather materials to be cut will be placed on the working platform. Beam assemble includes a tool post, two cut-off knives are fitted on it. During cutting, the tool post is driven moving along the beam, thereby driving the cut-off knife to move across the plane of working table, at the same time, the servo motor drives the beam assemble to move along longitudinal direction of the working platform, the aforesaid two kinds of coordinated motion generate the 2-D cutting motion of cutting knife, cutting the contour of shaping plate.

It is easy to realize above mentioned 2-D motion for general application, but there are two kinds of reasons for leather materials cutting that cause the development to be difficult. First, it is well known, the dimension of a piece of leather is quite big, the length of it may be 3.5 meters, and the width of it may be 2.5 meters, in addition, the developed cutting machine should has two working table, one is for cutting, and another is for preparation for cutting and baiting parts. So the total length of the

CONFERENCE

> GO!

11/13/2012 - 11/15/2012

The International Conference on Advanced Eng

8/24/2012 - 8/25/2012

AMMT 2012: 2012 International Conference on

8/24/2012 - 8/26/2012

2012 2nd International Conference on Material :

more...