CRAFT
SUMMARY/SYNTHESIS REPORT

Project No.: CR–1 201-91
Contract No.: BRE2–CT94–1 **345**
Starting Date: 1st **July 1994** **Duration: 24 months**

Title: Low Cost Tooling Centre for the Footwear and Allied Trades

Project Coordinator: Mr Robert Hackney, SATRA

Proposers:	**R&D Performers:**
J Drew (London) Ltd	SATRA Footwear Technology Centre
D J Fidas SA	CTC(A), Portugal
L Gent Ltd	ELKEDE, Hellenic Leather Center
Optimise Control	
Basilius SA	
Beleza — M Costa E Silva Lda	

For the period from:	**01**	07	**94**
	day	**month**	year
to:	**30**	06	**96**
	day	month	**year**

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CRAFT

Summary/Synthesis Report

Low Cost Tooling Centre for the Footwear and Allied Trades

Project No.: CR–1201–91

Contract No.: BRE2-CT94–1 345

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1. Abstract

In order to respond quickly to a rapidly changing market place, footwear manufacturers must adopt techniques that allow them to reduce their lead time for introducing a new style into manufacture. One major element in that lead time is tooling up and significant time savings could be made if some tool manufacture was performed in–house,

However, many footwear SMES do not have any workshop facilities to make their own tooling and components. This puts them at a disadvantage compared with large companies, many of whom have these facilities and can implement QUICK RESPONSE' strategies accordingly. Workshops are expensive to set up so the majority of smaller companies have to rely on outside contractors to provide for their tooling requirements.

This was demonstrated by a survey of footwear and related tooling manufactured in Europe carried out by several European footwear research institutes and part funded under the EC SPRINT programme. The results showed that the vast majority of tooling manufacture is subcontracted to tooling/die shops and the problems arising from this are inaccuracy, long delivery times, high costs and delay if damage occurs in use.

The aim of this project is to develop a low cost turnkey system using a milling device linked to a software package that can be used by SME footwear manufacturers to produce specific types of footwear tooling. The system has a turnkey price of under 25k ECU, and comprise; a low cost gantry milling machine driven by a WINDOWS based software package.

2. Objectives

- To develop a prototype 'in–house tooling centre' aimed at manufacturing the types of tooling and components required by participating SMES in the footwear and allied trades industry sectors. It is expected that the system will be flexible, user friendly and, above all, inexpensive. The prototype system should have the ability to take advantage of CAD data, but especially, it should have the ability to be used as a stand–alone system.

- Examine the use of alternative materials including recycling to manufacture required tooling and components to reduce production costs.

- To produce a system which has a turnkey price limit of 25000 ECUs.

Technical overview' . . '

The overall aim of the project is to enable footwear manufacturers and their allied trades to manufacture certain items of high cost tooling in–house using a low cost and easy to use machining centre.

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The approach adopted for this project was to develop a low cost gantry style milling machine with a large working envelope —. essential if it is to cover the large, expensive items of tooling such as automatic stitchers pallets (work holders). The machine produced has an A 1 (approximately 800 x 580mm) size cutting bed and is made of low cost but robust aluminium construction/fabrication.

Software to create the toolpaths and to drive the machine was also produced. A key element of this apart of the development was to ensure that the overall system is easy to use and requires little or no engineering expertise. To achieve this the software was written under the WINDOWS operating system with an easy to use graphic user interface together with a knowledge based system incorporating engineering expertise to assist in set up.

4. Results and conclusions

Each of the industrial partners were visited, early in the project to identify their needs in terms of tooling requirements. the types of materials used and the maximum dimensions of the tooling. Based' on this a specification was developed. The system needed to be able to process materials ranging from sheet plastics ' through to aluminium and mild steel. Some of the tooling could be very large indeed and the optimum cutting envelope was defined as 500 x 800mm.

All the hardware was obtained in line with the specification and consisted of an 800 x 580mm three axis gantry milling machine with integral motion control hardware. A computer and digitizing tablet were also obtained. Modifications to the hardware platform were undertaken to include tool depth detection and safety features such as stop buttons.

Software modules were developed in line with the project plan as follows:

- Digitisation module for manual input of tooling designs using a range of digitizing tablets.'
- CAD link for input of tooling designs from commercially available footwear CAD systems.
- Software module to create toolpaths from basic input data including splining, offsets and layering etc.
- Software module to take the toolpath cut file and feed it to the gantry mill controller.
- Expert system module to assist and deskil this machine set–up procedures.

During development and testing with the partners, certain additional functions and features were identified that needed adding to the original specification. These were the ability to easily recover following tool breakage and the capability to process several jobs in sequence on the cutting area. These additions were included in the final prototype version.

Alpha trials were undertaken at the premises of the milling machine manufacturer and' several improvements and modifications were carried out. When the machine was working satisfactorily it was transferred to the lead RTD performer SATRA for comprehensive testing of both software and hardware. Trials under factory production conditions were conducted for an extended period at the premises of one SME partners. The final prototype system was then transported to Portugal for evaluation by the partners at that location. .

Alternative materials that would be used for footwear tooling were obtained for evaluation. Two new suitable materials were identified.

It is anticipated that around six months will be required from the end of the project to fully commercialise the system.

Overall. the results of Lhe project meet fully the requirements in the original proposal and the SME partners have expressed their satisfaction.

5. Exploitation **plans**

The system will be targeted at two sectors within the Footwear and Allied Trades.

- Medium sized shoemakers — those with over 100 employees, particularly those within the fashion market and who use automatic stitching machines.
- Suppliers of tooling to the footwear industry.

The system will be given a commercial name and a brochure highlighting the system and its benefits will be produced. Articles will be written and published in the appropriate trade press announcing the launch of the system.

Demonstration sites will be set up at the premises on each of the RTD performers with full training given to appropriate staff. Exploitation will be spearheaded by one of the SME partners together with the RTD performers as specified in the terms of the Consortium Agreement.

A marketing' package will be produced comprising a demonstration program on a computer disk and a video which can be sent out to prospective clients together with full installation details. This will provide a safe mechanism for dissemination since the demonstration software will have a limited set of functions. As such, it will have no commercial value other than to explain fully the system and its benefits.

The video will show the total system in action manufacturing the components of an autostitcher pallet.

Market research will continue to identify those footwear manufacturers in the EU who use large quantities of tooling, ie those companies who have a large turnover of styles — mostly fashion footwear manufacturers. A brochure and demonstration disk will be sent out to those manufacturers identified. Tooling manufacturers will also be identified and contacted. In addition, other manufacturing sectors that could utilise the system will be contacted to determine the commercial viability of such applications.

6. Acknowledgements

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