CHAPTER 2

SCOPE OF WORK

A (mass) foot survey is a research programme based on taking samples of the target population and carrying out certain anthropometric investigations on their feet. Thus it should properly be prepared and planned with a clear definition of its objective and scope (the flowchart of the entire foot measurement survey is shown in Figures 2.1, 2.2 and 2.3). Moreover it has a statistical character since it is impossible to measure each and every person. Like any research programme, foot surveys need some kind of instruments, staff, methodology for processing the collected data and interpreting results. The preparation of the foot measurement should cover all these aspects (Canadian Fitness and Lifestyle Research Institute Physical Activity and Sport Monitor study, 2005).

2.1 THE OBJECTIVE OF THE SURVEY

There are two types of foot measurement methods: individual and mass survey. Individual foot measurement is used when either a specific foot is analyzed for a specific purpose (e.g. orthopaedic treatment, made-to-measure service). Mass or statistical surveys aim at assessing size distribution, proportions and determining possible grouping criteria for a given population which may be an entire country (state), a region, a specific group (e.g. children of certain age, soldiers, workers in a given industry, sportsmen). Individual measurements serve single persons interests, mass
surveys try to define characteristics which will be helpful in designing and supplying goods - in our case: footwear - for a given market (segment).

The main objective of this foot survey was to collect data on the anthropometric properties of the Indian population’s feet. It was expected that the survey would

- reveal differences among various ethnic groups and geographic areas - if they exist or prove that no differentiation is needed when footwear is produced and supplied to any part of the country,

- determine characteristic age and size groups requiring specific attention when footwear is designed for them,

- set basic measurements to be used for marking sizes of footwear, establish size ranges providing the required coverage of the population with footwear (to be) produced using industrial technology for retail,

- produce rules and numerical data(bases) for designing well-fitting shoe lasts which will avoid development of static and other foot diseases caused by wearing shoes which are not comfortable.

2.2 THE FOOT SURVEY PROCESS

In the footwear industry it is essential to have statistical data of the proportions of the foot of the local population. This is essential for last development as lasts designed and manufactured in other countries cannot serve their purpose in India, owing to differences in population, climate, wearing conditions, urbanization etc. It was therefore imperative to conduct a nationwide survey for reliable data on foot proportion. This thesis aimed to
characterize the foot dimensions of the Indian population based on a specially designed foot measurement survey.

The sample sizes for measurement were determined and the places of measurement selected based on geographical, ethnic, social and biological variables. The measurement methodology consisted of a high precision, fully automated video based computerized equipment where the subjects feet were captured as images in the form of orthogonal projections. These images were stored and later processed by finding their boundaries, determining linear measurements and typical angles according to a predefined network. The pixel graphic picture files were then converted into a vectorized data stream for later retrieval of foot data. The basis of the statistical data analysis was the unified database retrieved from numerical data collection and from calculations based on graphics images.

The ultimate objective was to identify the length, width ranges required to cover the need of the local population for footwear, to define proportions and rules of constructing shoe lasts required for providing well-fitting and healthy footwear. For computations, the database files were transferred into a set of spread sheets. The statistical averages, empiric standard deviations, ranges of each measured and derived data were computed for each geographic region within each basic size group as well as for the sample population of that particular size group. The ‘students’ t-test’ was applied to test whether a geographic region differs significantly from the foot sizes representing the entire country. The ‘F-test’ was also applied to compute the reliability. To investigate all possible combinations of the data fields and various types of relationships, the ideal correlation and regression analysis was carried out. Analysis of the various statistical descriptions helped formulate the parameters for the geometric modeling of the “last”.
Figures 2.1 Flow Chart for Foot Survey Process
DATA PROCESSING AND ANALYSIS

Figure 2.2: Flow Chart for Data Processing and Analysis
Figure 2.3 Flow Chart for Technical Documentation of the Foot
Anthropometric survey data