

Research Paper :

## Ergonomic improvement in operator seat and controls of small tractor

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### ABSTRACT

Ergonomics is the field of study that examines human behavior, psychological and physiological capabilities and can design and modify established work environment to maximize, the productivity worker's comfort and overall efficiency. Modern agricultural industry is inclined towards high speed, power and efficient agricultural tractor. The nature of tasks on a tractor necessitates a number of actions to be performed by the operator, which puts varying physiological demands on the body. Making these tasks injury and stress-free for the driver is a challenge for the designer. This project was intended to make Ergonomic improvements in company's 15hp tractor. The customer feedback about the seeding batch of the tractor was obtained, based on which modifications were made in the design of the tractor for better ergonomics. The activities in the project included checking the workplace design measurements as per Budni recommendation, benchmarking with competitor tractors, study of anthropometric data of Indian population, analysis of the tractor controls for force and vibration limitations. Various improvement areas were identified and the necessary changes were made in the seat dimensions, improvement is done in operator's seat as per IS 12343 (1998) standard and anthropometric details *i.e.* 5<sup>th</sup>, 50<sup>th</sup> and 95<sup>th</sup> percentile of selected persons. Location and orientation of steering and other controls of the tractor, this improvement was done as per BS, ISO.IS standard and Indian customer survey report – Budni. These modifications were implemented on the existing tractor. To validate the improvements, and checking the workplace design measurements as per Budni recommendation after improvement, a survey was performed taking 25 operators before and after the modifications. The results of the survey indicated a remarkable improvement in driver's comfort, reachability of controls and visibility

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**E**rgonomics (Human Engineering) is the scientific study of relationship between man and his working environment. The term environment includes his tools and materials, his methods of work, ambient condition and physical environment of work, also the organization of work. Importance of ergonomics has been well established and recognized in industry and military application. However, it is equally important and relevant in agriculture and related activities also. In most of the developing countries human workers constitute as one of the important sources of farm power. Besides, they also operate tractors, power tillers, self propelled machines and power operated machines. Therefore, in agriculture also, the application of ergonomics can help in increasing the efficiency and there by productivity of the worker

without jeopardizing their health). They are being mainly used for primary and secondary tillage operations and as a means of transportation to haul goods, peoples and even animals. The self- propelled machines are about 0.04 million and include combines, self-propelled reapers, threshers etc. they are used for harvest and post harvest operations.

The primary factions of a tractor seat include the need to locate the tractor operator in a position from where he can operate the tractor safely with all around vision and experiences reduced vibration levels. The operator must also feel comfortable in cushion material of the seat. Moreover, an extended period of sitting results in a high risk of back problems, discomforts in buttocks due to surface pressure and discomfort in legs and feet from