

In this study author had emphasized the importance of ergonomics on the production line, having examined the topic from the company and simple line worker point of view. This study clearly showed the link between company productivity and production line ergonomics. The author examined the way of working at Ericsson Eesti AS's production line. In scope was ergonomics effect on company economics. The study was set to describe existing ergonomic situation on production line and improve it. The author stated goals based on his specific interests and potential company interest. The author found the study to be enormously interesting and rich on discoveries – just the fact about time lost on production line purely due to the ergonomics and knowledge to improve it was a priceless experience. High value is in feedback gathered from line operators. The study shows, that improving operator working environment also has a beneficial effect on productivity and possibly on product quality since exhausted operators loses their focus, which might results in poor finished goods quality. Thanks to this study it is now known how much operators are getting exhausted during working day. With this study author can improve productivity on all existing and upcoming production lines.

Goal of thesis was to find effects of workplace ergonomics. These effects turned out to be loss of production time due to poor working environment and exhausted workers. Effects of fatigue on workers was not established however by analyzing feedback gathered from operators it can be said that even on average working on production line people feel quite exhausted after working shift. Thus improving work environment will reduce amount of time wasted due to ergonomics and also improve line workers health feelings.

Line workers are performing many movements in order to complete assembly. Author classified movements that are not directly value adding actions and thus can be called as time wasting and shall be avoided in production. Those actions are related to existing production line ergonomics and working environment. Aim of this thesis was defining those ergonomic poor movements, analyzing production time waste on operations moments and come up with solution to reduce it. Author found that tasks like walking,

stretching, bending, twisting, use of force, eye strain, lifting are in one or other way were taking line workers time but did not carry any value to production process. Tasks like these shall be avoided.

Assembly work, as any physical effort requiring work, can exhaust workers. Defining the way how and when operators are getting exhausted were goals of this thesis. Moreover finding a link between ergonomics and economics was a goal of the thesis. The theory behind it was found through research on available literature on this topic. Hardest obstacle was finding direct relation between ergonomics effects and productivity. Surely author covered related topics on the macro level; however on micro level information was inadequate. To establish what were the ergonomically wrong movements' author used Ericsson Eesti AS inner standards. The first chapter of thesis handled all above listed topics and defined exactly what kind of ergonomic standards shall be kept in a production environment. The author defined working postures, tools and working methods which will later be used as a reference to research object and improvements. In the second chapter, the author described company profile. The author covered production floor build and logic behind it. Products were also introduced; their purpose and whole system build up. With this author wanted to stress the importance of product quality. Basic data about the production process and production line were revealed. Also, the author introduced workbench used at the production site, which later served as improvement object. After that, third chapter examined production line ergonomics.

In third chapter author defined meaning behind "bad" ergonomics, defined each movement and average time loss on each movement. Exhausting movements on production line were: stretching, bending, twisting, steps and eye strain. All those movements are no value adding movements and thus were counted as time consuming operations. The author also prepared a questionnaire for operators to be asked based on health related materials. All this gathered data was used in next chapter where author started examining production line, measured ergonomics while also gathered feedback from operators. With gathered data author created each workplace layout, work process and operators tiredness body map. Each different workplace conducted a whole picture serving as a great platform for analysis for ergonomics and reviewing economic background behind it. In the fifth chapter author summarized gathered data. The processed data showed weak points, which existed in production process. Based on this calculation author brought up

exact numbers how much production time is lost purely due ergonomics on the production line. Most time consuming operations were eye strain, stretching, walking and twisting. Analyzing Ericsson Eesti AS on single production line it was discovered 235 time wasting movements. Having measured every single time wasting operation 20 times (appendix 5), author had table of average time consumption on every single time wasting movement. This made production of one single unit on assembly line having 296 seconds in total time waste. The author also visualizes global picture about time loss on production line, which gave author idea how to improve ergonomic situation production line. The author brought out all movements that are consuming production time. It was obvious that ergonomics movements, which take most operation time, had to be reduced to a minimum.

As a solution development, the author created solution matrixes to find the key to reducing time loss. Author aimed to create such workplace that allowed minimizing operator's movements. The author found that bringing components, tools and trolleys closer to working place will actually reduce lost time since the operator does not have to walk or stretch anymore on long distances. With this knowledge author designed workplace, that allows operators to freely choose working posture by raising or lowering working surface. Also, all components and tools had to be in reach of hands. A specially designed trolley allowed operators to have them right in front of them, as opposed to the current situation. Within this new solution, author calculated, that time loss would be reduced approximately 5 times, having one unit produced with operation time waste of 61 seconds. Amount of time wasting operation would be 92 movements. The author gave the cost of the upgrade in 17 006 euros and a net present value after 2 years would be 6 thousand euros. This meant pay off period would be very quick, and upgrade would start paying off right in middle of second year of exploitation.

Author hopes, that given study could be used as a basis for improvements in production volume and operators working environment means. The author showed that there is clear connection with production ergonomics and company production volumes.