

The Digital Ergonomics Is Here!

Contributed by AXS Motionsystem

Workplaces designed on the basis of reliable ergonomic analyses do not harm health of employees, and they enhance work safety and enable more effective production. A pioneer solution-supplier of digital ergonomic analyses, AXS Motionsystem Kft. has opened new dimensions in the world of expert systems based on wearable technology.



Figure 1: Motion digitizer unit collecting data.

can be precisely digitally recorded. Ergonomic evaluation can be practically automatically — just on site of recording — performed on the basis of data using AXS Ergonomic Evaluating Software.

Motion Digitizer System

The motion digitizer unit is a sensor net which consists of 18 units suitable for collecting data necessary to ergonomic analyses and with which body movements can be digitally recorded continuously (**Figure 1**). The system's speciality is that there is no need for magnetic orientation to determine spatial positions of every single sensor and this way it can function reliably in any industrial environment. The patented process of AXS determines the actual position of a body from angles made by sensors in relation with each other. Data of sensors are collected by the central unit that makes a datafile suitable for processing and which can be loaded in processing software either through Wi-Fi access or from an SD card. Insoles and gloves (can be connected to sensor net) contain pressure sensors that record power impulses that happen on the given surface (**Figure 2**). The sensor net is fixed on the cooperating person using a specially developed sensor-cloth. This cloth was tested regarding work safety and it can be safely worn also in operating workplaces.

AXS Motionsystem Kft. was established in 2014 on encouragement of Audi Hungaria for developing an ergonomic expert system. Instead of subjective analyses supported by data which are in 90 percent based on observation, the aim was to develop a system capable of providing reliable data that are in 90% based on measurements (accurate data) supporting preparation of objective certifications. In 2016, AXS won Audi Hungaria's international tender for procurement of ergonomic expert systems with its Ergonomic Evaluating System and with this brought *Digital Ergonomics* into being. AXS Ergonomic Evaluating System is an integrated unit of two items. Using AXS Motion Digitizer System, all kinds of movement, as well as the power impulses on hands,

First Prize

In November 2020, AXS Motionssystem won the first prize at the electronica Fast Forward Startup Award. As part of the Hungarian Accelerator Program of the Consulate General of Hungary in Bavaria, the Hungarian Ministry of Foreign Affairs and Trade supported our participation in the electronica Fast Forward 2020 startup competition last year.



Figure 3: The digital recording can be replayed in 3D in any visual angle.

Ergonomic Evaluating Software

The datafile prepared by the central unit is processed in AXS Ergonomic Evaluating Software. Using the software, the ergonomist can perform the entire ergonomic analysis of a given workplace. Decisions to be made during analysis are supported by a control video recorded simultaneously with digital recording. The ergonomist can make established decisions on the basis of measured precise motion data and pressure data, while without AXS Ergonomic Evaluating System the ergonomist can only rely on her/his observations and estimations. The outcome of analysis can be displayed on results sheet of the given ergonomic evaluating methodology, like EAWS, and can be exported to an Excel or PDF file. Furthermore, the entire process of analysis can also be exported to video file so this way the ergonomist can precisely show the engineers dealing with development of workplace where possible problems arise.

On the basis of the results of thousands of performed measurements it can safely be stated that AXS Ergonomic Evaluating System gives a much more precise result than that of the way based observations and analyses can be performed much quicker than in the conventional way.

Why AXS Ergonomic Evaluating System

Results of ergonomic risk assessments are based on estimations in 90 percent and on measured data only in 10 percent (e.g., weight of piece of work). The body posture and the continuous motion of it that is the basis of ergonomics analysis as well as the power impulses on the hands occurred meanwhile cannot be measured accurately with the traditional observation method. The basis data of analysis depend on the experience and perceptibility of the ergonomist performing observation. AXS Motion Digitizer System is capable of performing precise measurement on body movement, power impulses and bow/turn of spine in a unique way with the assistance of the used 18 sensors. On the basis of measured data, according to the requested ergonomic methodology, evaluation can immediately be performed with AXS Ergonomic Evaluating Software after recording. Assessment and evaluation of a workplace can be performed in on the average of 20 to 30 minutes. The digital recording can be replayed in 3D over and over again in any visual angle and this way dangerous movements can be seen immediately (**Figure 3**). The ergonomist can supply accurate and confirmative result on data sheet and video to the designers in order to improve the workplace. ◀

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Figure 2: Insoles and gloves contain pressure sensors.

Services of AXS Ergonomic Evaluating System

- › Easy to use integrated system
- › Digital recording of motion and pressure data
- › Precise recording of bow/turn of spinal column
- › Identifying motion processes
- › Synchronizing of control video and digital recording
- › Identifying motion processes
- › Preparing immediate ergonomic analysis according to APSA and EAWS methodology
- › Fixing recordings and analyses in searchable database
- › Possibility of performing „what if“ analysis
- › Exporting the result of evaluation into PDF and Excel files
- › Exporting process of evaluation into mp4