

ERGONOMICS

Essential to Manufacturing Excellence

By Blake McGowan

Manufacturing excellence has been defined as the ability to provide high quality, competitively priced products and services in a global marketplace. Simply put, it means being the best of the best.

Companies strive to achieve manufacturing excellence by incorporating improvement initiatives such as benchmarking; reengineering; cycle-time reduction; supply-chain management; synchronous, lean and agile manufacturing; and six sigma. These initiatives are truly transformative; yet, to unlock the full potential of excellence in manufacturing, companies must also deploy a comprehensive ergonomics process. A world-class ergonomics process does more than reduce the occurrence and costs of employee soft-tissue injuries and musculoskeletal disorders (MSDs); it optimizes human performance and improves system and business performance.

Unfortunately, ergonomics is often overlooked when deploying a manufacturing excellence initiative (Dul, Bruder, Buckle, et al., 2012). Its value is often underappreciated by business stakeholders, as they have a perception that ergonomics is solely a well-being initiative. Who can blame them when federal agencies such as CDC and NIOSH explicitly diminish the value of ergonomics through their official definitions?

According to CDC (2018), “The goal of ergonomics (i.e., the scientific study of people at work) is to prevent soft-tissue injuries and MSDs caused by sudden or sustained exposure to force, vibration, repetitive motion and awkward posture.” Furthermore, Canadian Center for Occupational Safety and Health (CCOHS, 2019) states, “An ergonomics program is a systematic approach and a management system that is designed to reduce risk from ergonomic hazards in the workplace.” Based on these definitions, it is clear why business stakeholders have limited awareness or understanding of the value of ergonomics.

In contrast, professional organizations such as International Ergonomics Association (IEA, 2013) and Human Factors and Ergonomics Society (HFES, 2006) provide a more compelling definition for stakeholders:

Ergonomics (or human factors) is the scientific discipline con-

cerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance.

This definition better communicates the value of ergonomics and how it contributes to manufacturing excellence initiatives. It explains the value of ergonomics in terms and measures understood by business stakeholders.

Like other improvement initiatives, ergonomics has a significant positive impact on system and business performance; it can enhance product quality, increase manufacturing performance and improve employee engagement.

Remember, when ergonomics is done right, many groups reap the benefits, including employees, supervisors and managers, safety and ergonomics team members, human resources professionals, operations, engineers, management, leadership, board of directors and investors.

The Value of Ergonomics

In business terms, value is commonly defined as the importance or worth to the operation. Effectively communicating the value of ergonomics to all stakeholders starts with providing a clear and concise definition of ergonomics. In simple terms, ergonomics is defined as designing the workplace to match people’s capabilities, with the goal of optimizing human performance (NIOSH, 1997). When ergonomics is done right

and human performance is optimized, two primary positive outcomes result: improved employee well-being and enhanced business performance.

Traditionally, dependent stakeholders such as those in safety and human resources departments appreciate the value of ergonomics. They understand that it improves employee well-being. However, dominant stakeholders including plant leadership (e.g., quality, operations, manufacturing heads), boards of directors and investors tend to have limited awareness or understanding of the value of ergonomics (Dul, et al., 2012). They are often unaware that ergonomics can improve business performance by enhancing product quality, increasing manufacturing performance and improving employee engagement. It can even result in better stock performance and corporate social responsibility.

At the 2018 Institution of Occupational Safety and Health (IOSH) conference in the U.K., IOSH past president Craig Foyle told delegates that the key challenge for the safety and health professional was “to really demonstrate the significant return on investment of good safety, health and well-being management” (IOSH, 2018). He urged them to learn to speak the language of business stakeholders.

To do this, safety professionals must better understand financial statements (e.g., income statements, balance sheets, cash flow) and how ergonomics positively impacts them. Business stakeholders often see ergonomics as an expense on the income statement or a cost of doing business. However, businesses are starting to recognize that investing in good safety and health management, including ergonomics, is material to business performance.

Impact of Ergonomics on Achieving Manufacturing Excellence

Ergonomics leads to quantifiable enhancements in business performance, from both an operational and financial perspective. Research shows that the sum of enhanced operational and finan-



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A workplace that is designed to meet people's needs demonstrates the employer's commitment and encourages employees to be fully engaged.

cial performance benefits from ergonomics is greater than the sum of employee well-being benefits (Alabdulkarim, Nussbaum, Rashedi, et al., 2017; Falck, Örtengren & Högberg, 2010; Falck, Örtengren & Rosenqvist, 2014; Goggins, Spielholz, & Nothstein, 2008; Larson & Wick, 2012; Tompa, Dolinschi & Natale, 2013). Some researchers have even suggested that the benefits are 10 times greater (Kolus, Wells & Neumann, 2018).

Higher product quality. Proper ergonomics design and intervention result in reduced rates of product defects, less time spent correcting defects, and lower costs to correct them by 59% to 85%. For example, jobs and tasks with higher MSD risks have three times the quality errors and six and a half times the quality failures, and it costs nearly eight times as much to correct these quality errors compared to those associated with lower MSD risk jobs and tasks (Alabdulkarim, et al., 2017; Falck,

et al., 2010; Falck, et al., 2014; Goggins, et al., 2008; Humantech, 2016a; Tompa, et al., 2013).

Better manufacturing performance. Proper ergonomics design and intervention reduce manufacturing task times and improve facility productivity by 20% to 30% (Alabdulkarim, et al., 2017; Goggins, et al., 2008; Larson & Wick, 2012; Tompa, et al., 2013).

Improved employee engagement. The ergonomics conditions of the workplace reflect leadership's respect for employees. To engage employees, business leaders must connect one-on-one with them and establish a foundation of trust and respect (Kahn, 1990). A workplace that is designed to meet people's needs demonstrates the employer's commitment and encourages employees to be fully engaged (Humantech, 2016b). It is generally accepted that engaged employees are 20% more productive compared to employees who are not engaged

(Chui, Manyika, Bughin, et al., 2012; Dvorak & Kruse, 2016). A Humantech (2017) study shows that large global corporations perceive employee engagement as the biggest value of a formalized ergonomics initiative.

Better human capital management. Human capital includes the skills, knowledge and abilities employees bring to their work (viewed in terms of their value or cost to the company). Note that management of OSH, including ergonomics, is part of human capital. Senior management teams and financial investors understand that investing in human capital improves financial performance (Bernstein & Beeferman, 2015) (Humantech, 2016b). The four key investments include providing ergonomics training to all employees, deploying a management system for ergonomics, measuring the system's effectiveness and publishing lost-time injuries.

Better stock performance and corporate social responsibility. Studies have shown that companies that invest in and build a culture of safety by focusing on employee well-being and workplace improvement, including ergonomics, yield greater value for their investors. On average, these companies outperform the general stock market by 5% annually (Fabius, Thayer, Konicki, et al., 2013; Goetzel, Fabius, Fabius, et al., 2016).

Better corporate credit rating. Data from the S&P Global Market Intelligence Group show that proper human capital management and safety management (ergonomics being an important part of both), can have a positive impact on corporate credit ratings (Humantech, 2018). A change in corporate credit rating has a significant impact on business performance (de la Gorce & Williams, 2018) and can alter stock price positively or negatively by 10% to 20%.

Case Studies

Cummins Inc. is a corporation of complementary business segments that design, manufacture, distribute and service a broad portfolio of power solutions. Cummins deployed a comprehensive and systematic ergonomics process that has enabled the company to complete more than 7,000 MSD risk assessments and more than 2,700 improvements. The company's incident rate dropped from 0.8 in 2013 to 0.12 in 2016, with a savings of more than \$4 million in efficiency and productivity and more than \$12 million in injury cost avoidance.

The ability to identify and aggregate global MSD risk data has transformed the way we prioritize and mitigate MSD risk. The data-driven outputs of our software have allowed us to make a strong business case and justify the necessary improvements to management. The built-in e-learning has given us the agility that is necessary to keep up with a global audience. In addition, the executive summary report has proven to be very useful for all audiences, as it brings the data together in a clean, visual package. (C. Shieldsmith, personal communication)

Timken Co. engineers and manufactures bearings and mechanical power transmission components. Timken deployed a comprehensive and systematic ergonomics process at 34 plants in 11 countries in 2015. The company's incident rate is now at an all-time low due, in part, to its ergonomics process.

Our current metrics require at least three innovative improvements annually at each plant. These projects must demonstrate MSD risk reduction and cost savings, but often yield improved associate morale, attendance, product quality and return on investment. (R. Scott, personal communication)

Conclusion

Remember, when ergonomics is done right and human performance is optimized, both employee well-being and business performance improve. Like other improvement initiatives, ergonomics has a significant positive impact on system and business performance; it can enhance product quality, increase manufacturing performance and improve employee engagement. With all of these pieces in place, manufacturing excellence is well within reach. **PSJ**

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