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Protecting the Industrial Environment by Applying Ergonomic Design

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Introduction

A report from the Health and Safety Executive in 2018^[i] estimated that 6.6 million working days were lost in the UK in 2017/18 due to work related musculoskeletal disorders. This accounts for nearly a quarter (24 per cent) of all working days lost due to work related ill-health in the UK, with an average of 14 days lost in each case.

Manual handling, awkward or tiring positions and repetitive action are estimated to be the main causes of work related musculoskeletal disorders^[ii]. Interestingly, 82 per cent of these cases affected the back, hand, wrist, arm, shoulder or neck^[iii]. In terms of occupation, skilled trades' occupations, process plant and machine operatives had significantly higher rates than other occupations.

Health and safety, employee wellbeing and greater productivity benefits, make ergonomic working an essential consideration in today's workplace. This means not only ensuring that machines and equipment satisfy safety requirements but also making sure that they are as easy to use as possible - ideally effortless, strain-free and offering suitable adjustment for each operator.

Solutions for the process plant and machine operative

One example where manual handling can easily be optimised for process plant and machine operatives is the operator terminal on machines, which needs to be flexible and easy to position using support arm systems. The support arms must be adjustable to allow the terminals to be comfortably positioned for operators of different heights.

Rittal is now offering a height-adjustable support section for its CP support arm system. There are two weight ranges: 4–30 kg or 10–60 kg. Weight can be adjusted within these ranges to ensure that the enclosure remains at the set height over long periods of operation without any re-adjustment - a feature comprehensively tested by Rittal in the laboratory over 30,000 cycles.

Designed for a maximum height difference of 600mm and smaller than its predecessor, the new height-adjustable support section allows integration into the support arm system without adding an adaptor. The wide range of height adjustment ensures maximum comfort for operators of different heights, in both seated and standing positions.

As with all Rittal support arm systems, one-person assembly is possible. The weight of the height-adjustable support arm is set via an easy-to-access screw and does not require the dismantling of any components to access the screw, simplifying the system adjustment. Screws at the joints can be reached even after assembly while a removable side panel ensures easy access to cable routing.

Ergonomic panel building

It's not only the support arm systems that benefit from Rittal ergonomic design.

In the panel building and OEM environment Rittal has incorporated ergonomic design into all of its standard products.

The new AX and KX wall boxes (available from January) reduce dis-assembly work during initial modifications because the door, mounting plate, locks and gland plates are provided but not fitted. Furthermore, features such as retrospective earthing and simplified wall mounting ensure improved, flexible and efficient use.

Fitting AX accessories also needs relatively little manual operation. The interior installation rail with 25mm pitch pattern allows accessories to be fitted inside without any vibration/force caused by drilling, which in turn means the operator is safer as are the components inside (because the IP rating is protected).

The market-leading VX25 baying enclosure system has several ergonomically designed features. The new frame section now offers access from all sides as well as inside and outside. It is now possible to fit mounting plates from the back; particularly useful when heavily populated mounting plates are being installed. The additional 20mm installation depth provides more manoeuvre room within the enclosure for particularly deep installations.

Installing mounting plates in the VX25 is now easier with new protective slides. Until now, it was often difficult to fit very heavy mounting plates - lifting them with a hoist and then fixing them within the enclosure was an awkward process. With the VX25, protective slides ensure that the mounting plate can be easily positioned and screwed in place after it has been lowered down by the hoist.

Changing the manufacturing process to reduce manual impact and fatigue

The highest proportion of musculoskeletal disorders identified in the 2018 HSE report were found to be caused by heavy lifting and material manipulation. One way to substantially lessen the likelihood of manual strain and damage to employees is to consider introducing further semi- or fully automated tools into the workshop.

Rittal Automation Systems (RAS) offers a wide variety of semi-automatic and automated solutions to significantly decrease the required amount of manual handling and material manipulation.

Perforex machining centres deliver fully automated, fast, precise and reliable machining - drilling, thread-tapping and milling - of mounting plates, doors, roof plates, side panels, gland plates or complete enclosures.

The machines allow optimal handling of all parts and all materials commonly used in panel building - such as steel, stainless steel, aluminum, copper and plastic - may be machined very cost and time effectively, with savings of up to 80 per cent. It's far more precise than traditional manual processes and will replicate that accuracy as often as required. It also, of course, causes far less physical impact on the hands and wrists in particular. Almost all common CAD and E-planning systems can be used for remotely programming machine operation, while programmed job sheets can be re-used to avoid repetition of work. The enhanced performance package offers less vibration, faster feed rate, reduced noise emission and prolonged tool life.

The Perforex LC Laser Centre is a 3D-laser cutting machine designed for the machining of stainless steel and sheet steel, as well as powder-coated metals such as enclosure doors, side panels etc. Spray-finished metal parts are cut without visible paint damage or dis-colouration, and there is no tarnishing of the cut edges when machining stainless steel. It ensures ergonomic working, thanks to the retractable locating surface for enclosure machining.

Furthermore the machine is contactless, it allows simultaneous machining of five surfaces, it operates with low-vibration, it has no tool wear and - because there is no physical force applied to cut the workpieces - it can machine 3D cubes without the user either repositioning the workpiece or clamping it.

The Perforex LC takes minutes to machine each piece, saving multiple hours of effort and time per enclosure.

The Secarex cutting centre is simple and convenient to use. It cuts wiring ducts, cable duct covers and support rails (DIN rails etc) to length quickly, precisely and reliably. It saves time and effort spent on measuring and cutting, plus it eliminates any complicated handling. It lowers cutting waste, delivers significant time savings compared to manual cutting, reducing costs and speeding up the overall process. Easy handling is provided through guides and a built-in automated length stop

Semi-automatic wire processing machines are also available, offering length cutting, stripping, as well as combined stripping and crimping. All of these machines expedite and reduce manual repetitive work and strain.

Safe handling equipment

The Rittal portfolio of handling equipment offers assembly frames, storage and transportation trolleys, solving both manual handling issues and easing the strains of working in awkward positions.

The Rittal functional trolley's fold-out system allows it to switch from transport function into a convenient work table, making it the ideal solution for assembly technicians and service personnel. It has an integrated seat, high stability and durability and can be used for a maximum load of 20Kg as a handcart and 30Kg as a table.

The storage and transport trolley for flat panels has eight compartments and can accept a maximum load of 500Kg. The compartments are individually height adjustable to provide ease of accessibility and loading.

The ergonomically co-ordinated Assemblex frames for the assembly and wiring of mounting plates and enclosures are movable, position lockable and offer adjustable working height from 0.8-1.1m and tilt angle up to 80°. The most advanced version is adjustable via battery-powered electric motor and can hold a maximum load of 300Kg. Users can incline the assembly frame to allow machining whilst seated which, combined with the other adjustment features, allows the operator to adjust their position and work in optimum comfort.

Summary

The ergonomic design of industrial environments, machines and equipment, as well as their sub-component parts, can have a significant impact on human operator performance.

Designing tasks, equipment and work stations to suit the user can reduce human error, accidents and ill-health. Failure to observe ergonomic principles can have serious consequences for individuals and for the whole organisation.

Effective use of ergonomics in your workplace ensures a safer, healthier and more productive environment.

Further information at www.rittal.co.uk and www.friedhelm-loh-group.com or on twitter @rittal_ltd.

[i] "Work related musculoskeletal disorders in Great Britain(WRMSDs), 2018" by the HSE, <http://www.hse.gov.uk/statistics/causdis/msd.pdf>

[ii] Based on 2009/10-2011/12 Labour Force Survey data, mentioned in "Work related musculoskeletal disorders in Great Britain(WRMSDs), 2018" by the HSE

[iii] Figure 8. Number of cases of WRMSDs by anatomical site reported to THOR-GP, three-year aggregate total 2013 to 2015 in Great Britain from "Work related musculoskeletal disorders in Great Britain(WRMSDs), 2018" by the HSE, <http://www.hse.gov.uk/statistics/causdis/msd.pdf>

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Notes

Rittal, headquartered in Herborn, Hesse, Germany, is a leading global provider of solutions for industrial enclosures, power distribution, climate control and IT infrastructure, as well as software and services. Rittal solutions can be found in more than 90 percent of all industrial sectors worldwide.

Systems made by Rittal are deployed across a variety of industrial and IT applications, including vertical sectors such as the transport industry, power generation, mechanical and plant engineering, IT and telecommunications. Rittal is active worldwide with 9,300 employees and 58 subsidiaries. Its broad product range includes infrastructure solutions for modular and energy-efficient data centres with innovative concepts for the security of physical data and systems.

Leading software providers Eplan and Cideon complement the value chain, providing interdisciplinary engineering solutions, while Rittal Automation Systems offers automation systems for switchgear construction.

Founded in Herborn in 1961 and still run by its owner, Rittal is the largest company in the Friedhelm Loh Group. The Friedhelm Loh Group operates worldwide with 18 production sites and 80 international subsidiaries. The entire group employs 12,000 people and generated revenues of €2.6 billion in 2018. For the tenth time in succession, the family business has won the accolade "Top German Employer" in 2018.

A Germany-wide survey by Focus Money magazine named Friedhelm Loh Group as one of the nation's top companies in terms of vocational training for the third year running in 2018.

Further information can be found at www.rittal.com and www.friedhelm-loh-group.com.

