Costs and Benefits in Two Manufacturing Plants

Ergonomics for Productivity and Safety

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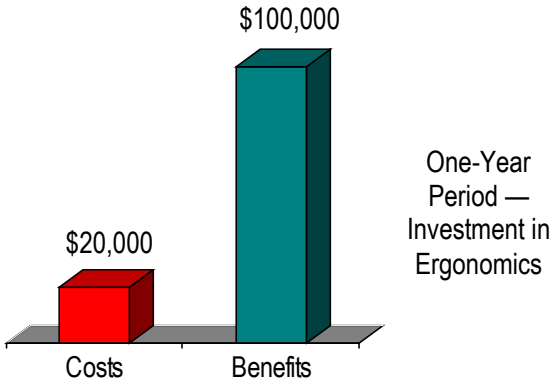
Plant 1: 500% ROI in one year



This example involved a machine shop of 60 employees where the insurance carrier cancelled the plant's workers' compensation policy because of the high number of musculoskeletal disorders. The plant was forced to turn to the state insurance pool with its extremely high premiums.

The ergonomic improvements were all very low cost (and some very innovative – see below) and the plant returned to normal insurance a year later. In some ways, this case example is atypical because the costs were horrendously high. Yet, these situations do exist, and undoubtedly companies fail every year because of the absence of good ergonomics.

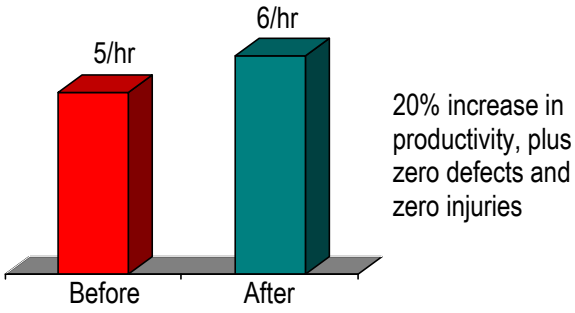

Before: Left-hand manipulation


After: The potter's wheel


Continuous improvement

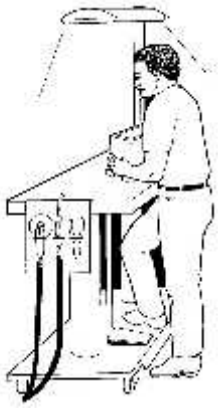
Deburring the parts was the source of most injuries, plus the defect rate was unacceptably high because employees had a difficult time doing the work effectively. The worst single job was dramatically improved by using a Potter's Wheel as the basis for a fixture. The creative workstation yielded a 20% increase in productivity, while simultaneously both the injuries and defects dropped to zero. Ultimately, the engineers and machine

operators (who previously had been unaware that deburring was causing injuries) found ways to eliminate the burrs mechanically.*



Another set of deburring jobs in this plant were improved by using converted die carts for workstations to replace the generic tables that had been in use. The capabilities of these adjustable stations opened the door to a number of features that improved the ability of the employees to do the tasks more easily.

Before: Traditional generic workbenches



After: Workstations created from converted die carts, set up for the particular deburring jobs

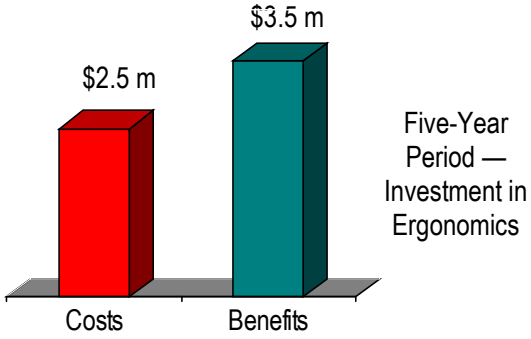
Quantitative before-and-after studies were not made for these individual tasks. However, the reduction in injuries and overall increases in efficiency are included in the plant-wide financial benefits.

The lessons learned during this project eventually evolved into step-by-step guidance on *How to design a workstation.*[**]

* These case examples are described in more detail in MacLeod, 2006 *The Ergonomics Kit for General Industry (2nd Edition)*, Taylor and Francis. Particularly instructive are the descriptions of the process for developing the innovations and the lessons learned from the whole project.

** See www.danmacleod.com

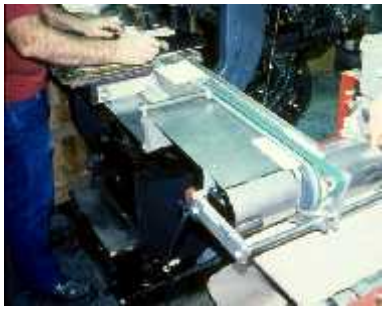
Plant 2: $1 million savings in 5 years



This company of 1200 employees involves several paper mills and paper converting operations. The company was cited by OSHA for musculoskeletal disorders, paid a $300,000 fine, and was required to establish a formal ergonomics program. Fortunately, the company set up an excellent process that resulted in a $1 million savings over five years.

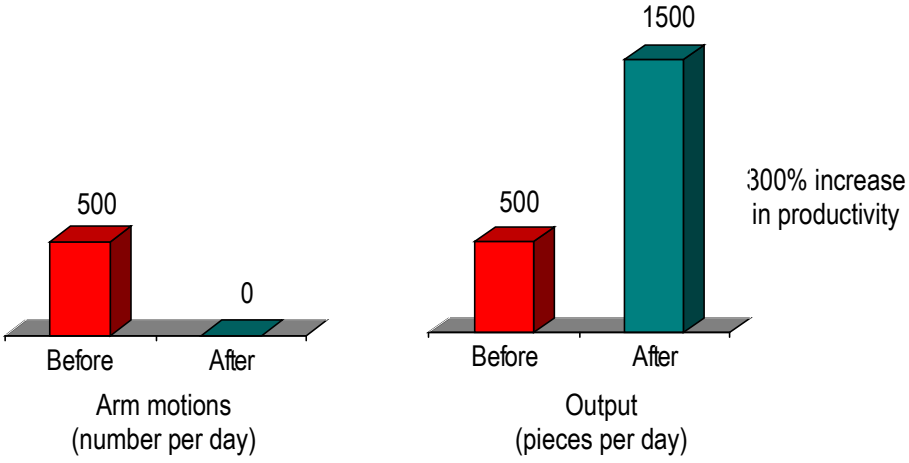
Mechanical flipper

Before: Manual flipping



After: Mechanical flipper

An example of one of the improvements at this facility were innovative mechanical flippers that were added to engraving presses that eliminated repetitive arm motions and freed the printers to perform other, more important tasks. The idea for the mechanical flipper came by adapting a mechanism on a large automatic press. Arm motions were reduced to zero and productivity increased 300%.

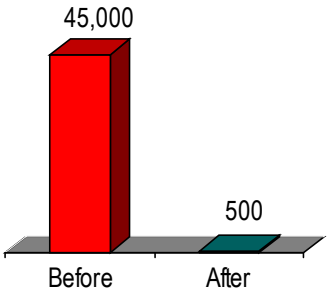


Paper counting

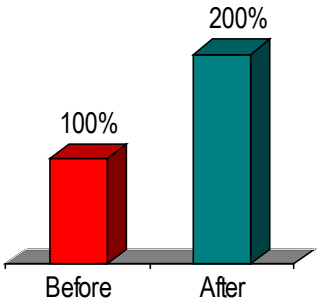
Before: Manually counting stack upon stack of paper

After: Workstation with lifts, paper counter, and air table

The task involved counting stacks of folio-sized paper and inserting a slip sheet every 50th or every 100th sheet. The work involved 45,000 to 50,000 finger motions per day, mostly while working in awkward, static postures. "No one wanted to do this job." In this case, the employee took the initiative to develop a plan to recycle some used equipment, change the layout, and buy a single piece of new equipment. The time required to do the job was cut in half. The results are shown below, involving a payback period of about one year.



Finger motions
(number per day)



Output
(% of original)

Employee invention: A ribbon-tying device

Before: Tying ribbons by hand

Employee's homemade prototype: Paper clips, a manila folder, and clear tape.

After: A more polished device

The final example from this plant involved an employee who invented a device to improve a manual ribbon tying task. She made a prototype at home on her kitchen table, which engineers used to create a more durable device. Hand problems dropped and productivity increased about 40%.