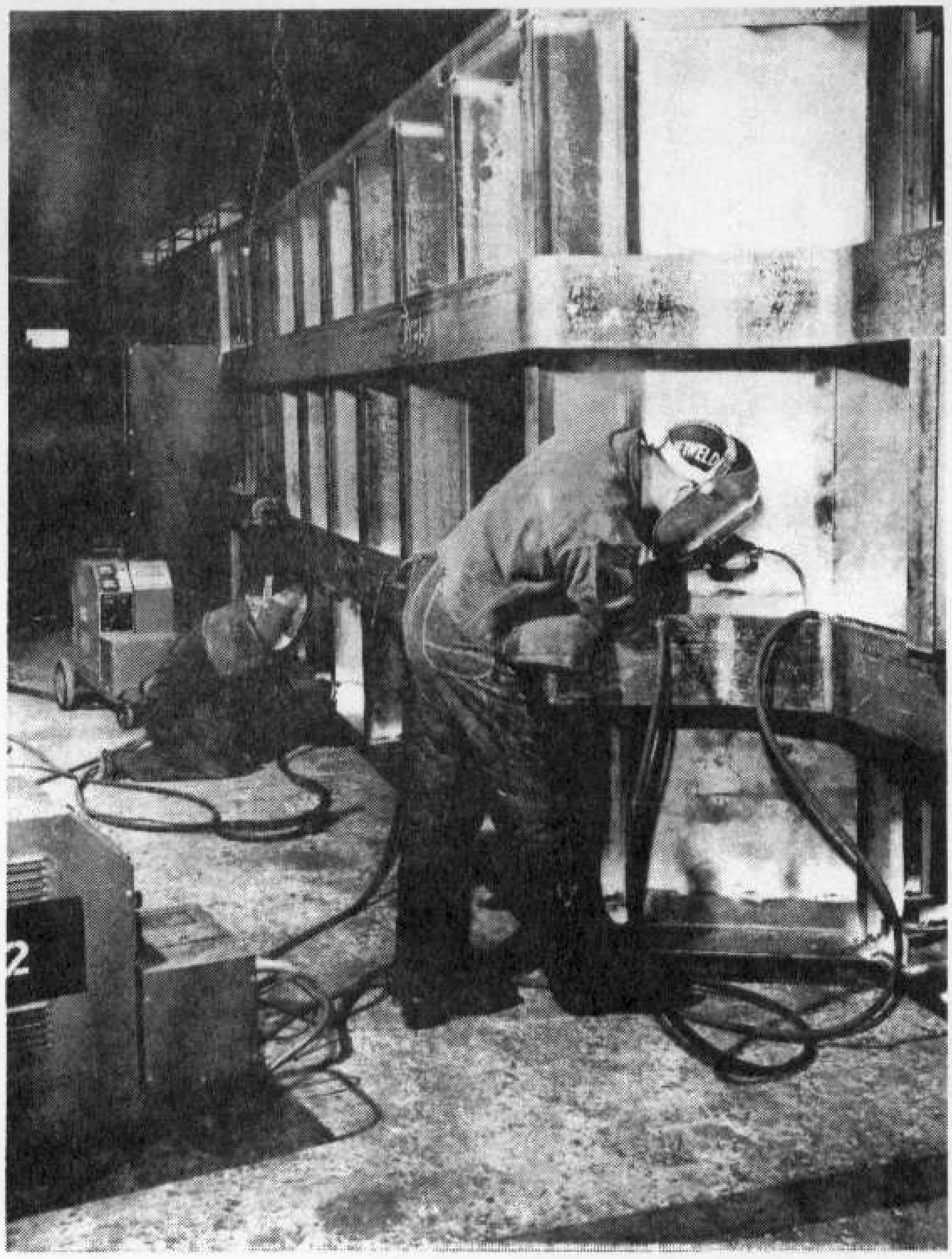
Trailer Manufacturer Saves $250,000 Per Year By Updating Welding



Although he still wears a cap that advertises a stick electrode, the weldor in the foreground and his teammate in the background have practically forgotten the feel of a stick electrode holder. They are now accomplished operators of the semiautomatic Innershield welding process, which is the key to a $250,000 per year cost savings at Wausau. The electrode wire is fed automatically to the welding gun as these workers weld the heavy steel members making up this low bed trailer.

WHEN RAYMOND E. MILLER was made executive vice president of the Wausau Iron Works, Wausau, Wisconsin, in 1965, and given the responsibility for tightening up operations and improving profits, he had no difficulty in spotting the point for frontal attack.

Of the some 200 people on the plant's payroll, well over half were classified as weldors. Of the floor production workers, fully 80% were weldors. Obviously, if production cost savings were to be realized, the welding operations should be studied for efficiency.

He had no trouble finding inefficiencies at the welding stations distributed throughout the large truck trailer and body building plant. Not that Wausau weldors weren't doing a good job turning out indisputable quality, but old "job-shop" practices were still being followed in a company that had become a world leader in several product lines.

Manual welding with stick electrodes was being used at welding stations, in spite of the fact that semiautomatic and full automatic welding processes had long since been proved cost reduction assets in hundreds of other steel product manufacturing firms. Furthermore, each weldor practically dictated the operations at his station, setting welding machine controls to his personal liking and being governed by no standard procedures designed to give welding efficiency. As Miller puts it: "We were using blacksmith shop procedures."

The Courage to Change

When an executive is given the task of making something better that is already good, it takes considerable courage to come forth with dicta for revolutionary changes. The company had been in existence since 1907, and its history of growth in plant, product line, and sales reads like an iron and steel oriented IBM.

In addition to its own line of blade and rotary snow plows; soil compaction rollers, stabilizers, mixers and pulverizers; road-shouldering machines; and similar road-building and road-maintenance equipment, the company was a major custom fabricator of low bed truck trailers, garbage truck bodies, front end loaders, and structural steel for bridges and steel framed buildings.

But Miller reasoned that just because there is high demand for a company's products and services doesn't mean that the company is operating at its peak and couldn't stand a little shaking up, aimed at cost reductions and profit improvement. He decided to take a big step: Make the stick electrode unwelcome in the company's shop—practically eliminate it in production welding.

When you have more than 100 weldors making their living by stick electrode welding—and some have been at it a quarter century—telling them that the tool of their trade will soon be verboten is like telling the homestead farmer that Old Nellie must go and henceforth the soil will be turned with a diesel tractor and gang plow.

But Miller knew that the potential for cost savings in changing from stick electrode to semiautomatic welding was almost of a similar order. There was at least the possibility of doubling the weld production per man, and a good chance of increasing it threefold. Since welding costs represented two thirds of the company's production costs, what better tack could be taken to improve profits?

Innershield Welding Process

Miller investigated the various mechanized welding processes that might be substituted for stick electrode welding. He met and discussed his problems with welding experts—one of whom was Jack R. Barckhoff, area technical representative of The Lincoln Electric Company. Barckhoff suggested a fast semiautomatic welding process called Innershield, that required no gas or flux granules for arc and molten shielding and had handling qualities similar to those of the stick electrode holder. Any experienced weldor could become proficient with the lightweight welding gun after a few hours of practice.

At the press of the trigger completing the welding circuit, electrode wire would be automatically fed to the arc from a 50 pound coil. There would be no need to stop welding every few seconds to replace a stub with a new electrode. Miller, as he states, was "sold on non-gas process"—and there are now 24 Innershield stations in the Wausau plant.

All-Position Electrode

Selection of the process was only the first step in Miller's reorganization of the welding activities. There was now the question of how to get the most from semiautomatic welding. Barckhoff advised the use of 3/32" diameter and 5/64" diameter NR-202 electrode wire for welds ¼" and under in size. This "Freeze-fill" type electrode wire would not be the fastest but it would be the most versatile. It would enable the weldor to work in any position—make single pass welds on materials as thin as 14 gauge sheet —or deposit multiple pass welds on thick plate, welding flat, vertical, or overhead. This all position electrode could be used for roundabouts, short assembly welds, tack welds, seal beads, stringers, and work in confined V grooves. With this basic electrode, practically every weld in the manufacture of Wausau products could be made semiautomatically and at two to three times the speed of stick electrode.

To supplement this basic electrode, Barckhoff suggested the use of 3/32" diameter NS-3M, "fill" type electrode for some of the heavy multipass groove welds and fillets beyond ¼" leg size required in Wausau's fabrication. This electrode would give the fastest deposition of weld metal, but to get the added gain in efficiency the weldment would have to be positioned for downhand welding. Only a few stations would need to be equipped with this electrode.

In determining what should be done to improve welding efficiency, Miller—aided by Barckoff—also discovered other ways to reduce welding costs. For instance, he found that operator after operator, on his own initiative, was adding "a little bit more" weld metal to the joint than required by the blueprints or specifications "to be sure the weld is strong enough." Other welding practices leading to wasted time and material, were also uncovered.

Barckhoff decided to work out a "Wausau Iron Works Welding Handbook." This he prepared, working closely with Miller and his staff, breaking it down to eight illustrated sections—two on welding procedures, five on welding information as applied to five lines on Wausau products, and one on equipment maintenance. This handbook gives the information that is not given or noted on the blueprints and drawings, but which the operator should know if he is to do the best job at the least cost to his employer.

Welding Practices Revamped

The old practice of allowing the operator to weld as he wanted to was discarded. Rigid procedures were established for the current and voltage to be used with the different types of Innershield electrodes. These procedures are aimed at giving the best quality of weld at the greatest deposition efficiency, and the operator adapts himself to them rather than changing the controls to his personal liking. The established procedures are rigidly enforced, and, after a few hours, the operator finds them the "natural" procedures for him.

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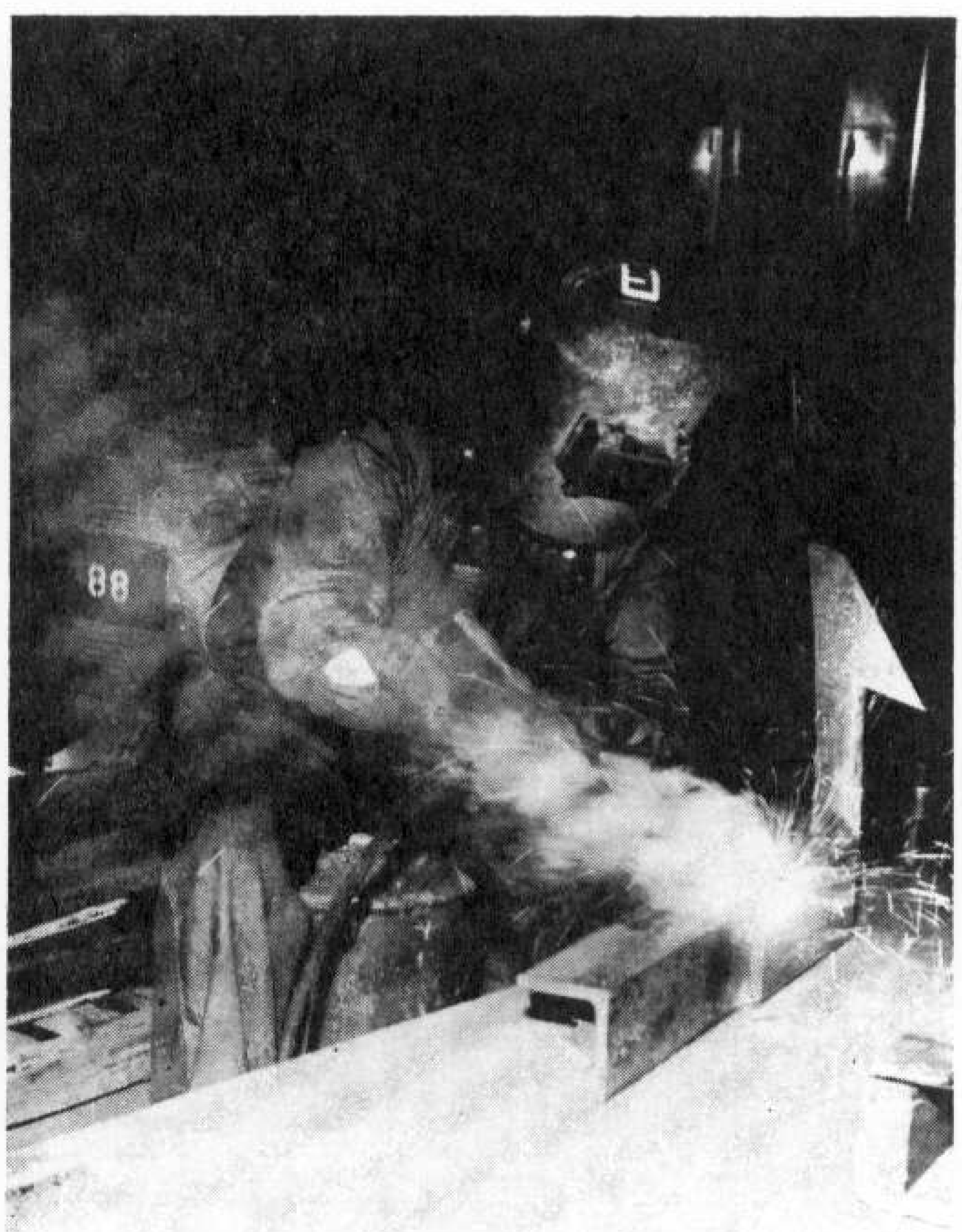

Assembly size, big or small, makes no difference to the Wausau weldor using the semiautomatic Innershield process. With the all-position electrode, he is prepared for the mechanized welding of any work coming to his station. About 80% of the welding is now done with the versatile process.

The trailers shown here are products of Wausau Iron Works in Wausau, Wisconsin. The company experienced a substantial reduction in manufacturing costs as a result of total production reorganization.

Updating Welding . . .

There were still opportunities for improvements. New equipment was purchased, and changes in shop layout were made to improve the flow of work. Where welding machines might interfere with floor traffic, they were mounted on booms to get them off the floor, yet make them readily accessible for work.

Cost studies were made to pin down opportunities for minor cost reductions. These showed using welding helpers not trained to weld resulted in wasted man hours. A program was initiated to make all personnel at the welding stations qualified for welding. Thus, there would be no need for "time-out" while one man waited on the other for finishing a particular operation.

The cost studies also spotted the percentages of total production cost acounted for by welding cost. These ranged from 39% to 70% with various product lines. The data indicated where cost reduction attacks should be given priority.

The Wausau executive vice president went even further—he had a study made of the efficiency of product designs. As is often the case in manufacturing, the design used is not necessarily geared to production efficiency, and there may be one or two alternatives that will give a product of similar or better quality at lower production cost. This is particularly true in weld fabrication where small design "tricks" can lead to exceptional savings.

As an example, a small overlapping where two plates join at right angles allows the use of an inexpensive fillet weld, whereas wasteful and unsightly corner welds or expensive square or groove butt welds would be required without the overlap. Where redesign opportunities were found, they were exploited.

$250,000 Yearly Cost Savings

The benefits to date? The cost savings now aggregate to about $250,000 per year. The products are as good or better, and the workers are happy and feel that they are part of an organization geared to move. They are seeing evidence of this movement, as Wausau gets deeper into the truck-trailer field—having acquired the LaCross line.

The fact that the workers are happy—are "with the company"—have empathy for its cost reduction aims—is possibly a more important accomplishment than the $250,000 a year cost savings. A shop in which everyone was practically his own boss and worked as he saw fit is now under control and mobilized for integrated effort.

Miller took a calculated risk when he ascertained that stick electrode welding had to go. Had semiautomatic welding not proved itself on the floor, he would have lost the confidence of the workers. But he also knew that once he had a dramatic success in an area everyone understood, there would be no question about a following when other changes were instituted.

Although the innovations in fabrication procedures were drastic and absolute, Miller's approach was far from dictatorial. He explained to affected parties "why we've got to do this"—"what it means to the company and you." Before rigidly enforcing the rules against over-welding, workers were educated about its effect on cost, how engineers determined the proper weld sizes, and how heat distortion damage to the product could result with the use of too much weld metal.

Since the workers were overwelding not because they wanted to be wasteful but out of concern for building a good product, once they understood that what seemed good could actually be bad, overwelding practically disappeared. Demonstration and chalkboard explanations of points proved to workers that management knew what it was doing—and it would be for everyone's good.

Today, fully 80% of the floor welding is done with the Innershield process. The fabrication time for various assemblies has dropped from 35% to 60%. Because of its flexibility, it may be possible to push semiautomatic welding to 85%, although there will also be a need for full automatic submerged-arc and for other mechanized welding processes to use with stainless steel and aluminum.