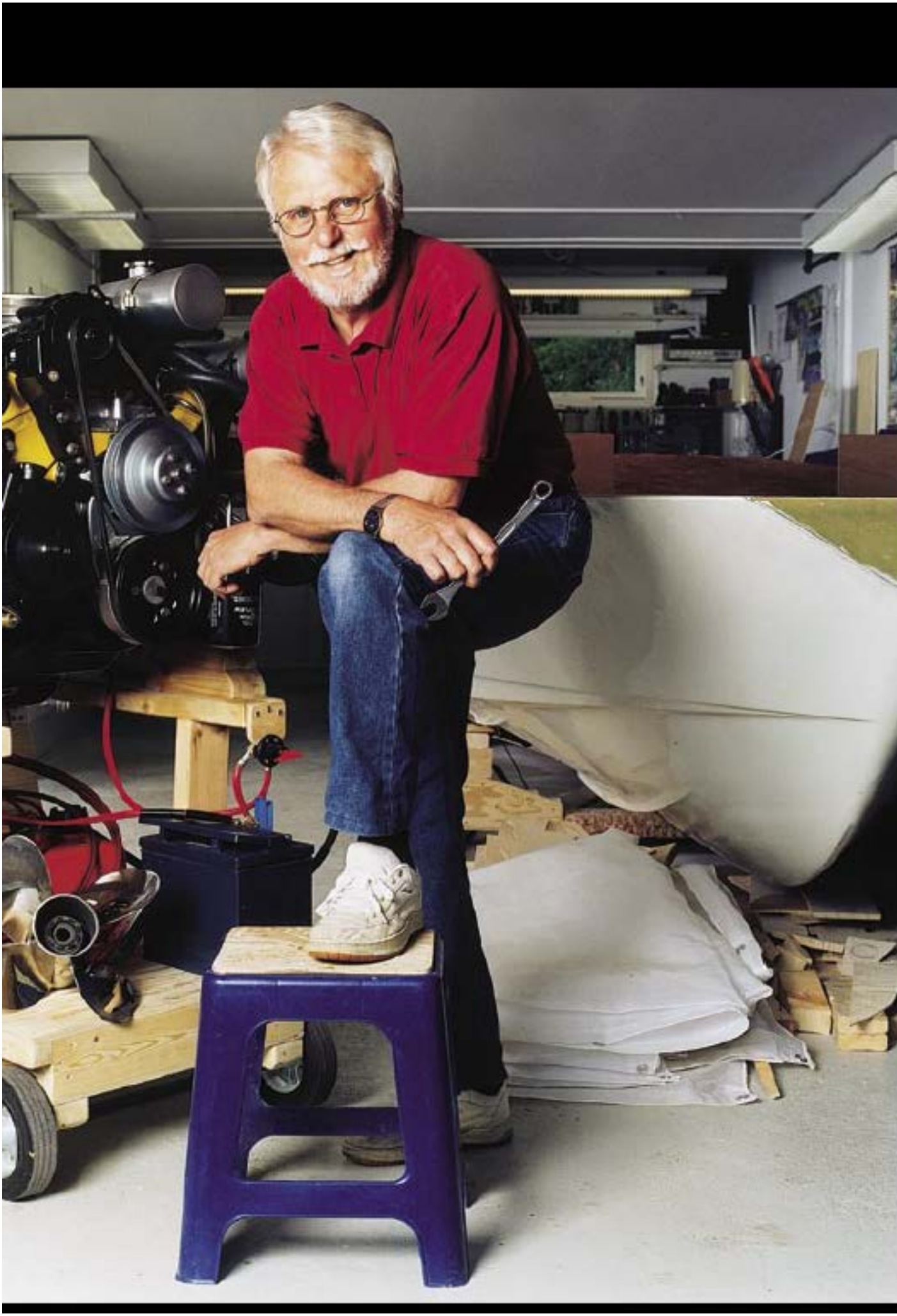

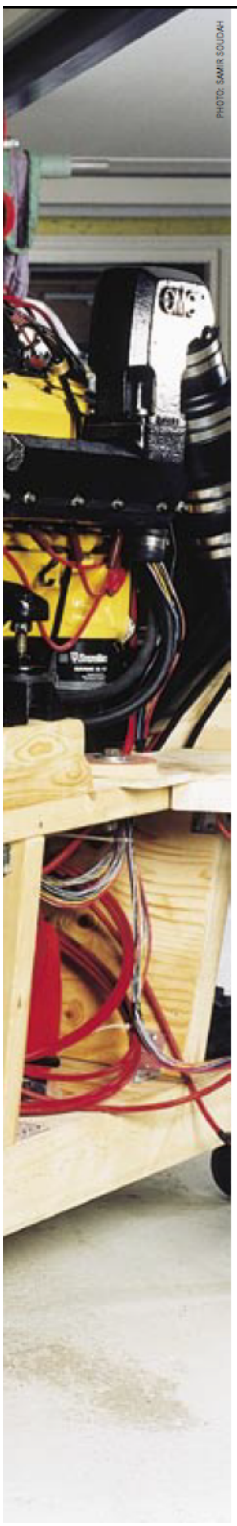

PHOTO: SAMIR SOUDAH

WHEN JUST GOING ROUND GETS YOU NOWHERE

THREE SIDES TO A STORY – THE BIRTH OF CAPTO

Coromant Capto is the leading modular tooling system on the market. When it was presented at the 1990 IMTS show in Chicago. Coromant Capto was the first tooling system that made it possible to use only one coupling for all machines in the workshop – milling, drilling and turning tools. Here, Ken Andersson, former Sandvik Coromant project leader, explains how the system was conceived.

TWO YEARS HAVE PASSED since Ken Andersson retired from Sandvik Coromant. When he walks through Sandvik Coromant headquarters in Sandviken, people stop and greet him warmly, asking him if he is back to lead another project. Andersson responds to all well-wishers, although you get the sense that he is a little overwhelmed by the reception. Our talk soon turns to the challenge that led to the creation of the unique modular tooling system Coromant Capto.

Even though it was almost 20 years ago, it is still vivid in Andersson's memory. "We started out trying to come up with a modular system that would make the same basic coupling equally effective for milling, drilling and turning," he says. "It had to be as good as solid tools in each category."

Andersson had tackled multitask couplings before Coromant Capto. In 1979, at the Milan fair, in Italy, Sandvik Coromant introduced the Varilock modular system, which worked well for both drilling and milling but was not adequate for turning. And in 1980 the company introduced the block tooling system, or BTS, for external and internal turning. Both systems were developed by Andersson.

But Andersson realized there was a need for a modular coupling that could achieve »

"My original thought with Coromant Capto was, why use different holders for the different tools?"

"I knew it was possible to create a modular system with three sides," says Andersson.

» all three applications effectively, easily and securely. He also knew that the competition was doing just that. His contacts with machine makers around the world made him aware of which way the wind was blowing. And Sandvik Coromant management grasped the accuracy of his analysis.

With the necessary backing, he began work on the coupling.

"MY ORIGINAL THOUGHT with Coromant Capto was, why use different holders for the different tools?" Andersson recalls. "My idea was that the same coupling ought to be used for all the tools. One really is doing the same kind of work with them all. It was decided to put great effort into developing an all-encompassing modular system. I accepted the responsibility to lead the effort."

Andersson had a lot of freedom in attaining the goal. But one essential criterion was that the coupling must be able to be changed either manually or automatically in the machine.

Andersson's tiny team consisted of Sven Engstrand and design manager Lars Åsberg, who had a broad knowledge of the

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SPEED, FLEXIBILITY AND STABILITY

Using Capto is a lot more than just buying into the brand

• How much time does a machine tool actually spend machining?

Much less than most would like it to. A lot of machines do not spend even half the time they are in production actually machining components.

There lies a considerable potential in reducing the idle time of most machinery to make better use of available production hours and to increase output.

There are usually several causes of idle time in CNC machines: stopping to change tools, resetting for new components, measuring cuts and finding tools.

The development of modular tooling has provided a way to increase the amount of time spent

CAD software program. With the goal of developing a modular coupling that could surpass anything competitors would produce, they began analyzing the competition.

To fully dedicate himself to developmental work, Andersson gave up his position as project manager in 1985.

DURING THE SECOND HALF of the 1980s, Andersson lived constantly with the challenge of creating a simple all-around modular system that would remain fully stable, stay strong and fully eliminate vibrations, even with long overhangs. And, of course, in this case the cutting edge had to remain constant, despite high cutting speeds.

Andersson is not a believer in flashes of genius. To him, it's all about hard work.

"At times, I spent all day and night thinking about how to solve the problem," he says. "We started out investigating the modular systems on the market. No one could offer a coupling that could effectively hold all three cutting tools. Our goal was to do that and offer the best solution."

Andersson understood that the shape had to be totally different from anything he had experienced thus far.

The breakthrough came with the question, "Why does the modular system have to be circular?" The team then constructed a coupling with two corners for all three purposes, but there wasn't enough stability. But, says Andersson, "when we experimented with three corners — a polygon — something interesting happened. Stability introduced itself."

These days, Andersson spends most of his time in a garage, building his own version of the Italian motorboat Riva.

Through an engineer at a truck-engine manufacturer, Andersson learned that many large engines in trucks used three sides on the axle to eliminate the risk of cracks. "When I heard this," he says, "I knew that it was possible to create a modular system with three sides." And three proved to be the right number. More sides would have made the system unstable.

Andersson also determined that the corners could not be too sharp, as that would also increase the risk of cracks.

So Andersson had his solution, but how would it be received by the Coromant management? "Their response was very positive, maybe because the solution was so different," he recalls with a big smile.

Another challenge was that the Coromant Capto coupling and the chosen working tool had to fit precisely and tightly together, even when the forces tearing at the tools were very strong.

"The gap between the tools had to be eliminated completely," Andersson says. "This was achieved by pulling the coupling and tool cones tightly into each other. We developed both automatic and manual mechanics to do this.

"I knew this was something that had to be achieved easily," he says. "Manually, one should only need to use an easy hand movement, because the time it takes to change tools had to be kept to a minimum."

An additional challenge was that the modular system would have to be able to withstand repeated use without loss of precision, and repetitiveness when holding the tools for drilling, milling or turning.

WHEN THE MODULAR SYSTEM was finally working, the next step was to find a company that could create the program software »

actually machining. But a modular system has to fulfill certain criteria to make full use of the potential that is available.

THE POTENTIAL BENEFITS of a modular system such as Coromant Capto in lathes, machining centers, milling machines and multitask machines vary, depending on the application.

For turning applications, benefits are derived from quicker set-up times and, in turn, quicker through-put times. There is more uptime and greater consistency as well as faster metal removal.

For rotating applications, productivity is increased by having assemblies built to the right length for each operation, and at the same time, tooling costs are reduced through the multiple use of tool elements.

In addition, with Coromant Capto, stability and flexibility are increased, and there is access to a huge program of modern cutting tools.

It's not unusual to convert hundreds of hours per year of downtime into actual machining time by implementing modular tooling. The time-to-payback calculation (calculated by multiplying the number of hours saved by the machine hourly rate) shows that the extra cost of modular tooling can usually be recovered in six months or less. Additional savings comes from improved tool management and improved tool stock.

MORE THAN 10,000 Coromant Capto installations are estimated to be in use in machinery worldwide. These vary from machines that are completely equipped to »

» to operate the machine cutting the Coromant Capto coupling. A German company with an enthusiastic engineer was chosen for the task.

Success for the team came one day in 1989, when the first prototype was set into operation and it worked.

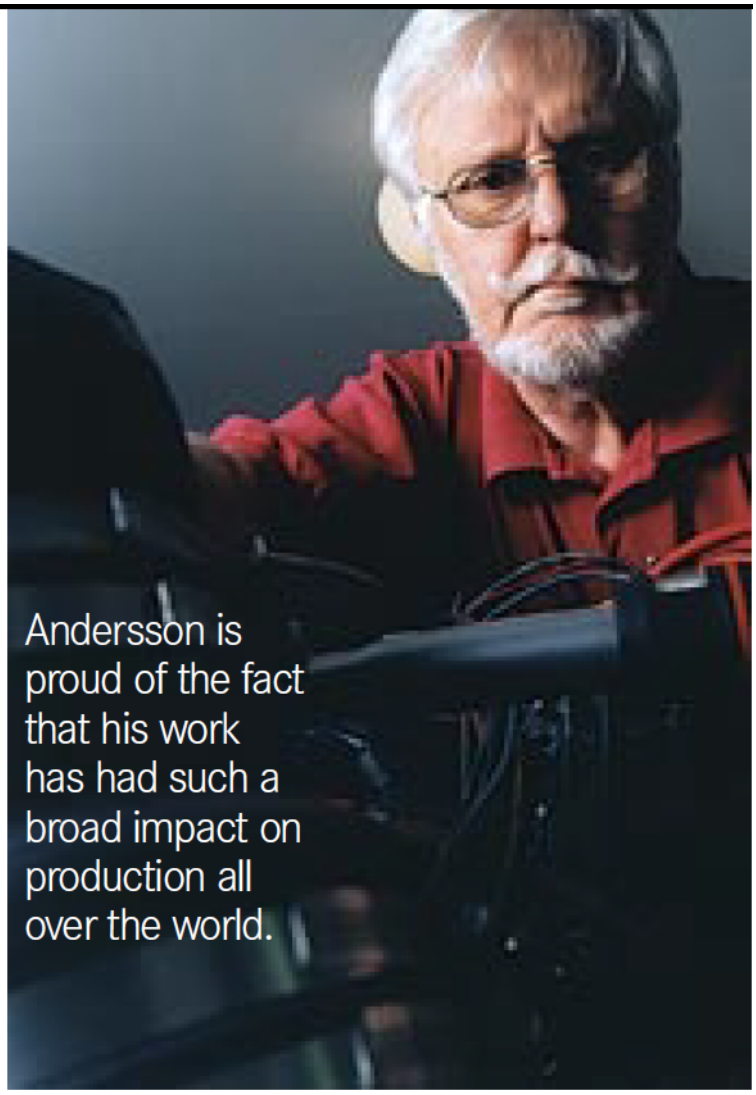
Greater success for Coromant Capto came in the early 1990s when Mazak, a major Japanese machine builder, agreed to offer Coromant Capto couplings on their machines. "We thought that they would sell 10 machines with Coromant Capto," Andersson says. "A year later, Mazak's CEO told me they had sold 50."

Many more leading machine builders in the world are offering pre-installed Coromant Capto couplings today, fulfilling a long-time wish of Andersson's that the Coromant Capto would be the pre-installed first choice of machine buyers.

Andersson says he has seen the Coromant Capto put to many different uses. The range is impressive. In Germany, he once watched a massive motor block for a ship being made from an enormous piece of casting, using a machine with the Coromant Capto system. At the other extreme, he's seen a denture manufacturer make implants, using the smallest Capto coupling. "He used it for constructing tiny screws and other small dental objects," says Andersson.

Andersson is obviously proud of the fact that his work has had such a broad impact on production all over the world. And his pride is well deserved.

TIMOTHY TORE HEBB



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» machines that have a few strategic tool positions in a turret. The number of machine tools with modular systems is growing, but not at the rate one would expect, given the potential for improvement.

There are several reasons for this. Users may lack confidence to manage the new technology and ensure that routines change. Equipping machines with a new tool system may seem like a big step, and there may be a logistical aspect also.

For some, premeasuring and reasonable tool logistics may not be in place to take advantage of the benefits that the modular tooling system offers. In some instances, operators have been known to still change inserts on a machine after the system has been installed.

Multitask machining is becoming increasingly important today. Here, unlike HSK, Coromant Capto serves as an ideal universal system and a spindle interface. The majority of major machine tool builders can now offer a Coromant Capto integrated spindle and Coromant Capto positions in the magazines.

ON A CNC LATHE, turning center or any type of turning or boring machine that is manually attended, consider how much time and effort is spent changing, handling and finding tools. The length of time it takes to set up for a different component or batch. It should be minutes – a fraction of an hour. Consider how much the tool units that have to be changed weigh, how cutting units are managed and stored, and how premeasuring or pre-setting of tools is carried out. What measuring cuts have to be