SUCCESS STORIES:

Dana Corporation

“Dana saves 2.57 minutes, or $4.73, each time it threads a carrier.”
Production engineers will always adopt anything that shaves time off of a high-volume application's cycle time. Being a production engineer, Mike Cadwallader, who works for Dana Corp.'s Spicer Heavy Axle and Brake Division in Morgan, NC, had been looking for a way to thread holes in a cast-iron carrier housing in less time.
He was told by his tool distributor how much faster and less expensively a 14-flute thread mill from Advent Tool and Manufacturing could cut threads. To thread the holes, which measured at 6-5/8" diameter each, a thread mill has to cut 41.63 linear inches. Spicer's machinists were doing the job with single-flute tools installed in seven 20-hp horizontal machining centers. The single flute tools took 3.96 minutes to machine the two holes.
Dana's machines, which produced about 15,000 parts a year when running at full capacity, consumed approximately 76 inserts. At a price of $50 each, these 76 inserts cost Dana $3,800. Also because of the rapid and inconsistent wear present, the operation demanded the machinists' constant attention.

The Advent Advantage
Further discussions with Advent Tool's engineers convinced Cadwallader to give the Advent thread mill a try on one of his machines. The Advent Tool engineers recommended running the thread mill at certain SFM and IPM's. This made it possible to increase feed rates and the through-coolant design and the rigidity of the tool's one-piece construction also made it possible to produce high-quality threads with a faster feed.
The shortened machining time has saved Dana thousands of dollars. According to Cadwallader, the operation's time has dropped from 3.96 minutes to 1.39 minutes, Dana saves 2.57 minutes, or $4.73, each time it threads a carrier. A machine producing 15,000 carriers at faster machining rate could save Dana up to $70,950 over the course of a year.

Accurate Gauge & Manufacturing

One of the obvious features of Advent Tool's thread mill designs is the long length present in the insert. With ground surfaces throughout, the operators can be assured of excellent repeatability and location time and time again. Because inserts line up with each other so well with little preparation, we can develop form tools that are high performance, precise and can be reground by their respective parties. Another great example is a yoke form we needed to generate in a high production environment at a high production automotive account named Accurate Gauge & Manufacturing in Rochester Hills, MI.

In the bore(s) through the ears, the form calls for a chamfer on either side of the bore and an 'injection ring groove' for the injection of plastic later - during the assembly of the yoke and the universal joint. Being able to generate all of these forms at once had clear advantages, with a reduction in cycle time being the most obvious. Advent tackled the problem with one half of a 1.5" long standard insert blank (410A Class). The form was duplicated on the other half of the insert, for two forms per insert (See picture, left). Using a standard .978" Diameter tool, tool changes were reduced from two to one and tool life was increased dramatically to 6,000 parts per edge utilizing high pressure coolant through the tool. In addition, speeds and feeds were elevated to 'milling mode' @ 512SFPM, .0083" Chipload/Tooth & 50IPM measured at the center of the spindle. Tool life is nothing short of spectacular at over 5,000 holes per insert.

Vector Oil Tool Limited

“Advent Tool and Manufacturing is the only way to go.”

"Prior to being introduced to the Advent line of thread mills through your distributor here in Edmonton, Alberta, Moore Industrial Ltd., Vector Oil Tool Limited tried two or three "big" name brands of thread mills. With these we had no success. Having given up on thread milling altogether we went back to just drilling and tapping all of our threads. The rep at Moore convinced me to give your thread mill a try. Initially, I thought this might be a costly route to take. Later we would find this not to be true."

"The particular job we were doing consisted of drilling and tapping 6 - 1" line pipe threads into the side of a round tube, then moving the part to a milling machine to mill a slot. The job took about one and half hours to do and a new tap every three parts. We bought one thread mill and some spare inserts through Moore Industrial and setup one of our machining centers using the software program sent from Advent."

The Advent Advantage

"Well here's what happened, the part was done in nine minutes. The tool also went on to mill another 30 parts before having to change the inserts. That's 180 threads and even at that they probably didn't have to be changed, we just wanted to be sure. This was a major improvement from what we were doing. We went from two setups in two machines, to one setup, cut the part time down by TEN TIMES plus paid for the tooling in the first run! Needless to say we went on to buy several more cutters for a variety of threads and find that thread milling with Advent Tool and Manufacturing is the only way to go."

Hydril

"Hydril saves over 50 hours per unit by thread milling!"

A case history in cost savings, Hydril is a Premier manufacturer of a variety of outstanding products for petroleum drilling and production, especially for high pressure and severe service applications. The particular product to be thread milled was a 4130 forged steel ram body with Brinnell hardness of 217Bhn that must withstand 1500psi in hostile environments. The quality of every aspect in this product cannot be compromised due to the ramifications of a failure of any of Hydril Product.

The challenge was to thread mill 57 holes, 3.5 inches in diameter with an 8UN-2B thread 4 inches deep. At the time, this was being done with a high speed steel tin coated thread hob helically interpolated on a Giddings and Lewis series 450 horizontal boring mill. The elapsed time to perform the job was 1 hour and 40 minutes.

As you might guess with the close tolerances and the critical nature of the application the idea of changing the method and tooling was not welcomed readily by those intimately familiar with the process. But with the promise of better quality thread due to improved tool life and the superior product quality built into the tool, Don Fortune and Gary Hutchinson of Hydril's Manufacturing Engineering Staff had no choice but to investigate the performance of **Advent's** replaceable thread mill and our claims therein.

The tool selected by Hydril's team was a 12 insert, 2.750 diameter CAT 50 tapered thread mill with a gage length of 8" and through the spindle coolant. The inserts selected were a tin coated micro grain carbide with 6 degrees rake and straight relief for free cutting and long life. The choice was made easier by the fact that this was a standard tool and in stock. The holes were drilled to 3.125 x 5.45 deep. The machine was programmed to take three passes to achieve full depth of the thread form. The first two passes were run at 250 SFM, 347 RPM and .04 IPT feed after a 180 degree ramp into the cut at at 71IPM. The final pass was run at 300 SFM 416 RPM and a feed of .078 IPT.

The Result:

Each hole was threaded in 9.8 minutes as opposed to the 90 minutes it took with the HSS hobbing mill, at a cost saving of over $4,000 per unit.

At the end of the test period, the inserts had cut the equivalent of 2268 linear feet without any appreciable wear. The thread mill was supplied by **Advent Tool and Manufacturing** who are the exclusive manufacturers of a full line of carbide tip, solid carbide and insertable carbide thread mills. They will assist you in selecting the proper tool for your specific application and provide the technical expertise for programming the helical interpolation on your NC machines.

Roy Miller, Hydril

Productivity, Inc.

“Looking back, it seems the thread milling project far exceeded any expectations Oildyne or Productivity expected.”

"We started with five Leblond Makino A77 machines using a 1.2" solid carbide thread mill with a 1,0 mm pitch over 2" diameter I.D. thread in cast aluminum. Kevin finch of Oildyne contacted me at Productivity, Inc. Tooling & Accessories and mentioned he was having some troubles with burrs in the I.D. of their threads and asked if I would look into a solution for them. I contacted Laszlo Frescka at Advent Tool and Manufacturing and explained the situation to him. Laszlo's immediate solution was an Advent 1/2" solid carbide thread mill which would mill the full thread form of Oildyne's I.D. thread, eliminating any burrs that might be created by other conventional thread mills.

The tool was in stock, shipped immediately and was running in the A77 the following day. It was immediately clear there were improvements to the thread quality – the thread mill had created a burr-free thread. The tool ran at 10,000 rpm, 200 inches per minute, with a cut time of 5.5 seconds.

As the next step to improving the process, Laszlo from Advent Tool and I went to Oildyne with a 6 fluted Cat 50 Integral Shank tool. This tool was used, and it reduced the 5.5 second cut time to 3 seconds. An additional one-half of a day was spent on the shop floor fine tuning the tool so it would run at optimum performance. Our efforts paid off! We were able to get the cut time down to an amazing 1/3 of a second.

The tool is still in the machine today, running at 10,000 rpm, 325 ipm and the thread quality is as excellent as it was with the solid carbide tool. In fact, Oildyne liked the thread quality so well they purchased a tool holder to run that same insert in the Nakamura lathe. As a result of the success in the 6 flute Cat 50 Integral Shank tool, especially the speed in which it created the thread, Oildyne purchased four more – one for each A77.

Needless to say, their "productivity" has increased dramatically. Advent Tool tells us we are running the fastest thread mill in the world at 1/3 second cut time, and everyone at Productivity, Inc. and Oildyne tend to agree!"

Kip Shefveland
Sales Engineer
Productivity, Inc. Tooling and Accessories

Success in the Midwest I

A major production machining shop in Michigan soon had a major productivity gain after meeting with Advent Tool & Manufacturing during a recent trade show. The work piece, a ductile iron carrier housing had two large diameters threaded holes of 5 and 7" diameters with 2.0mm pitches. The existing tooling was developed as a special by a major tool builder and required a blanket order and a long lead time for a cutter of 4 flutes and 4.5" diameter. The inserts were specials also and were TiN coated carbide. Run dry because the tool was never designed to evenly distribute coolant on the cutting edge of the inserts, the customer had been running this tool for 1-1/2 years prior to Advent Tool's visit.

Utilizing their own 4.5" Diameter precision ground shell mill, Advent Tool sent two bodies along with TiCN Coated Inserts of the 2,0mm (ISO) form that were 1.5" long. This tool was capable of holding 14 flutes, but the original load was set for 7. Built for coolant through, the coolant was turned on for the first time as it was felt that coolant could be applied evenly to the inserts, unlike in the previous design. Initial tests were spectacular. Using a relatively new CAT50 class machining center with a relatively good setup, the original program involved running the tool at a .002" chip load per tooth – as that was the feedrate for the previous tool. As the previous tool was only a four (4) fluter, the Advent Tool at seven (7) flutes was nearly double the feed rate with the same speed. After inspection showed the thread form was to spec the fun began. Chip loads were increased to .004" per tooth and Surface Feet Per Minute was increased as well, from 350 to 550SFPM in light of the coolant application.

As tool life with the TiCN coated inserts was very good with 1200 holes per load, the tool has remained in the spindle with 7 flutes. It has been felt by both parties that loading all the flutes with inserts would be a difficult exercise due to the tool length – at over 8" from gage line. As such, productivity gains have been made in coatings; the customer is now using AlTiN inserts and running at 625SFPM. Tool life has remained consistent at 1200 holes before wear necessitates modifying the inserts. Modifying, you ask? As the thread form is only .425" long, the worn portion of the insert is ground off and the tool is reset in the Z axis to insert the cutting tool further into the work piece! This is done twice before the insert is discarded.

The end user, the one who receives the carriers, has never been happier with the fit and finish of the threaded form. At first they had asked how their vendor was "grinding that thread form" inside the bore! With a good, balanced and well made tool and with the right programming, this is what is possible!

Success in the Midwest II

Ever looked at a job that required an operation that you would have to outsource? Due to the nature of the part, and the form itself, Advent created a special insert on a standard body that provided for a "broached" part, by milling. How you ask? See the pictures below, left. Using a standard shell mill body in a horizontal machining center, precision ground form inserts and a patented system for insert location based on their thread milling design, Advent provided a very stable and repeatable platform with which to mill "serrations" on the bottom of the yoke. Similar in form to a Stub Acme pitch, duplicating the serration form was not difficult. Machining takes place with a qualifying pass with a standard milling cutter to obtain a uniform height on all of the cast lugs. The roughing tool uses 14 inserts and runs @ 600rpm and 14ipm feed. The finishing tool runs with 7 inserts and the same speed and feeds. The finishing tool only removes about .005" of material in its single pass. Both tools consistently see 10,000 parts before insert wear is significant. The real breakthrough here is best described by 'class of fit' in thread milling terms. Even a slight deviation from one tooth to another will adversely affect the form of the serration. As such, lining up of the inserts in the 'Z' axis is key, and the Advent system allows for this easily.

Smith & Nephew
Smith & Nephew is a proprietary medical implant parts maker in Tennessee. With a specialized thread and a specialized fastener with a triple lead thread form and a 60 Degree included angle, you just don't see these every day. Smith & Nephew was familiar with a very high cycle time for each thread form - not to mention very poor tool life. Advent quoted the production of the tools, the associated engineering and test runs in house. We found that we were wrong about cycle time - it was lower than advertised (less than 10 seconds!). Tool life was substantial in this exotic stainless steel part as well.

The trick? Having the correct form on the mill and using an innovative programming technique to generate the triple lead in one pass by using pitch and feeds together to "nail" the form.

No pictures! This is classified! But imagine the correct form on a mill combined with a program from Advent and you'll get the idea...

Parkway Machine Services, Inc.
Parkway Machine is a job shop specializing in the rebuild of gas compressors for the oilfield business. One job that comes in often is the thread repair of TAH Fluid Blocks. 4” Diameter, 4 Pitch Full Acme, 4” Deep in steel fluid block housing is typical. Parkway Machine had typically welded the bore to build up material, and then bored and single point threaded the hole in the block to bring it back to spec. As the block was square, with some difficulty in fixturing, this was done on a VTL and took around 6 hours per block to complete.
Advent Tool specified their 20-TA-125-F6-9 1.850” Diameter 9” Overall Length 6 Flute Indexable Thread Mill. Loaded with ATM-410A4FA Full Acme inserts (Stock Item) with 1.5” length of cut, this tool is now used in a Haas VMC where fixturing is a little easier. Due to the inconsistent nature of the hardness of the hole, Advent takes 4 passes at 4 different Z axis depths (1” depth per pass) to generate the thread form. Passes are started at the top of the hole and work their way down. 16 passes total with the Advent tool running at 370sfpm with .002” chip load per tooth. All told, it takes 45 minutes to complete the part now as opposed to 6 hours!

Davan Manufacturing

Davan Manufacturing in Pennsylvania is a new user of the Advent thread milling solution. Mark Vanistendael of B/G Industrial Supply (Irwin, PA) Writes, "We replaced a Seco-Carboly shell driven thread mill (p/n R396-19-0228-4003-6A insert grade F30M) with the Advent shell type thread mill (p/n SM25TA-F8 insert grade Z TIALN) as we were having great difficulty with Seco inserts moving in the pocket. We found the short insert screws were backing off and allowing the insert to move freely with disastrous and costly results. The application has less than ideal rigidity and allows undesirable vibration in the work piece. Another issue we had with Seco was insert inventory was not stocked in the USA. We searched for a suitable tool and found insert inventory to be a problem with all the tool suppliers. B/G Industrial Supply had offered Advent as an alternative solution. We found the application support to be top notch and we were pleased the product was made and stocked in the USA. The tool quality is also top notch and Advent's help in programming the tool path was invaluable. We only hope to get your next generation software in our hands as the control over the tool path will be unsurpassed.

The following parameters were used, 4340HT Rc34-38 sand castings for underground coal mining application. Cutting 3 external studs per part to M30X2MMX40MM Length studs on a 50 Taper CNC HMC with a custom made tome stone fixture to run 6 parts per pallet for a 1500 pc run.

Seco: 585rpm @ F25.3 ipm in one full depth pass to size in dia. Vs.

Advent: 1000rpm @ F34.2 ipm in one rough pass to depth with stock on dia and one finish pass to size at full depth.

Although the cycle time is longer with the new tool, the old tool simply would not work when this job was moved for a vise operation in a VMC to the HMC in a fixture and the tool life is averaging about the same for either tool at about 360 studs per edge."