Heat Transfer Rollers Technical Bulletin
A chill roll or heat transfer roll is designed to cool or heat the web to a specific temperature. They are used in applications that, in order to achieve optimal results, require substrates to be temporarily cooled or heated. And today’s advanced processes require very precise temperatures, so heat transfer rolls must deliver target temperatures consistently and evenly.

This is why top converters choose Menges Roller. With our rock solid fabrication and state-of-the-art modeling services, Menges delivers heat transfer rolls that perform absolutely perfectly in your application.

Menges Sales Engineers work closely with customers to determine the optimal roll design for each situation. We’ll help you reduce waste, increase linespeeds and generate a better end product.

Benefits of Menges Chill / Heat Transfer Rollers:

- Provide consistent web temperature across entire rollface, even through long production runs or increases in linespeeds. Menges heat transfer rollers can maintain a consistent temperature to within ± 1 degree F.
- For use with all types of thermal transfer fluids: glycol, hot oil, water, and specialty chemicals
- Precision engineered to your exact specifications, with performance guaranteed
- Variety of coatings available including chrome, nickel and elastomer-based finishes
- Dynamically balanced and structurally optimized for long life and minimal maintenance
- Large sizes are a Menges specialty: we construct precision rolls up to 48 inches in diameter & up to 30 feet long

Providing Key Industries with Heat Transfer Rolls:

- Plastics
- Cast Film
- Paper
- Textiles
- Non-Wovens

- Laminating
- Extruding
- Converting
- Flexographic
- Specialty Applications

Available Fabrication Materials:

- High-Grade Carbon Steels
- Stainless Steel Grades
- Heat-Treated and Tempered Options
- Stress Relieved Steel
- Aluminum & Aluminum Alloys

The majority of our double-shelled rolls are chrome plated. Mirror finished chrome on a roll creates a smooth finish on the products it contacts. This optical mirror finish, or “SuperFinish” features an Ra value between 0 - 1.

At Menges, large-sized thermal rolls are precision engineered and fabricated. With an exceptionally robust facility, we’re capable of manufacturing rolls to 48 inches in diameter & 30 feet long. We also work with many material types: these are stainless steel.

These twin heat transfer rollers are designed to work together: one was fabricated to turn clockwise, the other counter-clockwise. Both have a highly-efficient double-shelled monoflow design. They are chrome plated and polished to an Ra value of 16.
Menges Design & Engineering Services Take the Guess-Work Out of Predicting Roller Performance.

Need to model flowrates for a chill roll running glycol in an application requiring a 100 degree drop in temperature? Our Engineering Department can do that.

How large should your heat transfer roll be to achieve 300°F across an 8 foot web of five-layer laminated film? Menges Roller can tell you.

Our Advanced Simulation & Design Software Considers Every Possible Parameter:
To tell us what the exact roller temperature will be as it runs in your application.

- Rollface Width
- Rollface Diameter
- Dimensions & Properties for Journals & Collars
- Fluid Cavity Dimensions
- Spiral Baffle Angle
- Properties of Steel Grades Used in Fabrication
- Rollface Finish/Chrome Properties
- In-Feed & Siphon Tube Dimensions
- Rotary Union Specifications
- Linespeed & Roll Rotation Speed
- Chemical Properties of Thermal Fluids
- Temperature of Thermal Fluid
- Flow Rate of Heat Transfer Fluid
- Fluid Cavity Pressure
- Web & Substrate Thermal Properties
- Web & Substrate Dimensions
- Temperature of Web at Roll Entrance
- Target Temperature / Change in Temperature
- Ambient Air Temperature & Humidity Factors
- Coating & Drying Time Factors

With the latest Computational Fluid Dynamics software, Menges Engineers generate very accurate images & data. In addition to seeing exactly how much hot or cold energy a roll will generate, we can visualize even the slightest variations in temperature across the rollface.

We can see how a roller will perform before we build it.
Our goal is designing top-quality rollers that perform as promised every time.
Menges Roller Offers an Array of Technology-Driven Modeling, Design & Testing Services:

Computational fluid dynamics (CFD) simulates processes & reactions. This technology is essential in designing heat transfer rolls. All the factors are plugged-in (roller & rotary union dimensions, rotation speed, thermal fluid factors, web information, and more). Our software then accurately calculates the temperature of the roller and the thermal energy transferred to the web, plotted across hundreds of points along the rollface, so hot-spots or cold-spots will not occur. By revising and testing the value of key factors, Menges Engineers can determine optimal roll dimensions & flowrates to achieve the desired thermal profile for your application.

Computer aided design (CAD) technology is used to create 3-D images and prints. CAD inputs are often based on CFD models, especially for heat transfer roll projects. But our CAD services can be independently contracted for any roller project as a way to simply visualize designs, calculate new component measurements, or generate schematics.

Finite Element Analysis (FEA) is another popular engineering service offered by Menges. FEA tests a roll’s stability and strength so engineers can identify its load-bearing capacity and deflection (bending) profile. This powerful tool can test the strength of any steel grade. FEA applications ensure journals and components can handle high-capacity loads at any linespeed.

With these services, you’ll see what your roller can do before you order it.

Menges Engineering & Modeling Services are available for new rollers and redesign projects for existing rollers.

Engineering & Design Services from Menges Roller:

- **CFD (Computational Fluid Dynamics) Modeling**
  - Primarily used for Heat Exchange Modeling
  - Considers All Factors & Inputs:
    - Linespeed & Roll Rotation, Thermal Fluid Type & Flowrate,
    - Steel Properties & Dimensions, Web Temperature at Input,
    - Desired Output Temperature, and Many Other Factors

- **CAD (Computer Aided Design) Services**
  - Print & Schematic Creation
  - Component Fitting / Retrofitting Calculations
  - Available for Rebuild Projects & New Rolls

- **FEA (Finite Element Analysis)**
  - Weight & Load Capacity Calculations
  - Deflection & Stress / Bending Calculations
  - Roll Size vs. Strength Testing

State-of-the-art software facilitates complex process calculations. Menges Engineers combine advanced technology with 40+ years of practical, problem-solving experience.

FEA images & performance data show areas of stress under a load (usually at the journals, endplates & shoulder). This data helps our engineers design very strong rolls, without over-engineering them.

CAD applications are regularly used to generate prints based on the results of CFD models. But our CAD services are also available for modifying & reverse-engineering existing rollers. Your Menges Sales Engineer can advise you on which services your project requires.

Menges Roller - Your Partner in Process Optimization

When it comes to heat transfer rollers, customization is critical. Your processes are unique, so you need custom-built heat transfer rolls. Menges Roller’s Design & Engineering Services are the key to this customization. Our technology and people make sure every roll works as promised - without exception.

Speak to a Menges Sales Engineer today about our full range of heat transfer roll solutions.

Offices: 847-487-8877          Email: sales@mengesroller.com          www.mengesroller.com
The Right Design for Your Application:
With 40 years of experience, we understand your plant’s challenges. We know your machines, materials and needs: so we know what it takes to help you reduce waste, increase output and produce a better product.

Whether you’re working in laminating, coating, extruding or another specialized application, we can design and build a heat transfer roll to optimize your process. If you’re building a new line or customizing existing machines, count on Menges to provide advice on which heat transfer/chill roll design would be most appropriate for your unique situation. Buying direct from Menges represents a substantial savings versus the cost of OEM replacement rolls.

The double-shell design is the industry standard for most advanced applications, providing consistent temperatures, even across wide webs and long production runs. Double-shells are available in two configurations: Mono-Flow and Duo-Flow. Both use a spiral baffle wrap around the inner shell, which works to evenly circulate the fluid.

In some cases, a double-shell design is not required and a single-shell unit will suffice. Your Menges Sales Engineer can help determine the best design for your particular situation.

Double-Shell Mono-Flow:
The roller core allows the heating/cooling liquid to flow in one end and out the other end of the roller. This configuration provides outstanding temperature control and high flow rates. Our expertise in fabricating these rolls is absolutely unsurpassed.

Double-Shell Duo-Flow:
The roller core contains one fitting, through which the heating/cooling liquid flows both in and out. This type of thermal roll offers excellent temperature control and keeps the infeed and output components on one side, which is sometimes desirable.

Single-Shell Design:
Also known as the “flow through” or “can” design, this economic thermal roller meets basic temperature control needs. Menges can engineer and manufacture single-shells to fit your exact size, finish and core specifications.

Menges fabricated this heat transfer roll, with a 30 x 72 inch face, for a major food packaging company. Large, precision-engineered heat transfer rolls are designed and fabricated every day at Menges.

With this duo-flow design, fluid is pumped in and out of the same end. This is made possible by special siphon components inside the roller and an advanced rotary union.
Heat Transfer Rollers Can Be Repaired
Menges can restore your current heat transfer roller to like-new condition or re-engineer it to perform for a new application.

Maintenance and Reconstruction Services:
- **New Chrome:** Removal of old chrome via cylindrical grinding, then applying new chrome, polished to any Ra value
- **Leak Checking & Repair:** Menges uses magnetic particle inspection to check for even the smallest of leaks
- **Journal Repair & Replacement:** We fix cracked journals, repair threads, and modify diameters to fit new rotary unions
- **Acid Flushing the Interior Chamber:** Regular acid flushing service eliminates buildup & maintains good flowrates
- **Complete Rebuild:** Removing the outer shell, rebuilding the inner shell & spiral baffles, and installing a new outer shell
- **Balancing:** Chill rolls can be balanced for smooth, vibration-free operation at high rotation speeds
- **Re-Engineering the Roll for a New Purpose:** We can modify the flow capacity, change the roll’s dimensions, etc.

Complete Refurbishing
Especially for rolls that have never been acid flushed, the interior cavity can become clogged, reducing fluid flow and delivering poor heat transfer.

We remove the outer shell, remachine the inner shell, fabricate & install new spiral baffles, then install a new outer shell (with new chrome plating).

The roll will perform like new and represents about a 40% savings versus the cost of a new roll.

Acid Flushing Services
Over time, liquid-filled rollers may become clogged with coagulated chemicals, rust or scale deposits.
This lowers flowrates and decreases thermal conductivity.

Menges offers a very effective acid flushing service that breaks down and removes residue and debris. Typical results include improved thermal conductivity, better fluid flow and a longer
Manufactured for a large OEM, these twin monoflow chill rolls will be used in an extrusion application. We nickel plated these rolls to protect against corrosion. Custom finishes like this are standard practice at Menges Roller.

**Special Finishes Are Our Specialty:**
- Chrome Plated (polished to any Ra)
  - Mirror & SuperFinish available
- Nickel Plated
- Flame Spray (including Tungsten Carbide)
- Shot-Blasted Options
- Acid Etched Matte Finishes
- Standard Lathe Finish
- Knurled Textures
- Rubber & Silicone Rollcovers

Finishes can be applied to new or existing rolls. We removed this old chrome with our cylindrical grinding process, then replated with new chrome which was polished to a mirror finish.

This heat transfer roll has been covered in a heat-resistant silicone. We have a large in-house rollcovering department, so specialty rollers & covers like this are no problem for the Menges Team.

Flame sprayed finished are increasingly popular, a testament to their durability. A wide variety of formulations are available, including tungsten carbide, which is seen here.
The Hybrid Advantage:

Menges Roller Company is at the forefront of Heat Transfer Roller development. We embrace innovation, consistently using our industry knowledge and advanced technology to improve existing products and develop new roller solutions.

We developed the Hybrid Chill Roller to extend the lifespan of interior shells on double-shelled chill rolls. Our Hybrid Chill Roll Technology won a 2013 AIMCAL Technical Excellence Award.

With the Hybrid Chill Roll, a proprietary elastomer compound is extruded directly onto the outer wall of the inner shell. Bonding agents marry the elastomer to the shell, which is built-up to a fairly thick jacket around the inner shell. The cured elastomer is then machined to form raised spiral flutes, the same size and angle of traditional metal baffles.

This elastomer-based inner shell will not rust or allow mineral deposit buildup; this works to eliminate hotspots / coldspots. So by reducing rust, oxidation and scaling, the roll performs at a higher level for a longer period of time.

Hybrid Chill Rolls do not require acid flushing: there is no buildup or rust to remove! This reduces maintenance costs.

See a Menges Sales Engineer for more on our Hybrid Chill Roll Technology to see if it’s right for your application.

The inner shell fits inside the outer shell. Our hybrid roll performs just like a standard chill roll, with good flowrates & even temps.

Hybrid inner shell with spiral baffles made from our proprietary synthetic compound; it will not rust or oxidize.

AIMCAL Technical Excellence Award for Menges Roller’s Hybrid Chill Roll

This is a chill roll for a major plastics company. It was completely rebuilt using our Hybrid Chill Roll Technology. We utilized our elastomer-based Hybrid inner shell and installed a new outer shell, complete with “SuperFinish” chrome.

Menges also offers an optional thermal spray protective coating on the interior wall of the outer shell.

The Menges Team works closely with customers to analyze the requirements of each project. We know every plant has unique machines, applications, materials and process challenges. Our high-performing solutions are custom-designed to solve your unique challenges.

Call or click to get started on an heat transfer roll project from Menges Roller. We'll help you run faster, waste less and produce a better product.