FEEDERCALC at Omaha Steel

Introduction

As foundries look into the 21st century, the lessons of the competitive 1990s and the tumultuous eighties are clear: continually improving efficiency and customer responsiveness is an absolute requirement for foundries that intend to survive. Foseco's FEEDERCALC family of risering software is a critical tool in meeting that requirement.

FEEDERCALC

The FEEDERCALC program is a computer based risering program that helps foundry engineers apply Foseco Feeding Systems to castings. It generates rapid and accurate feeding system product recommendations for casting applications.

As the market leader in feeding systems, Foseco developed the original versions of the FEEDERCALC program in the early '80s as a rapid application-engineering tool. Foseco operating companies found that the more a customer used FEEDERCALC, the better results they got.

As time passed, global acceptance of Microsoft Windows™ operating system grew, creating demand for Windows versions of software. In response to requests from customers, Foseco commissioned development of the first Windows version of FEEDERCALC in 1993. FEEDERCALC for Windows, Steel (v 1.0) was delivered in 1995 and proved to be a productive and popular refinement of the original FEEDERCALC for DOS.

Figure 1: Tapping the electric arc furnace

Current News

Foseco has recently announced that the latest releases of FEEDERCALC for Windows™, Steel (v 1.3) and FEEDERCALC for Windows, Iron (v 1.0) are scheduled for international distribution in 1999.

Both programs have been "internationalized" so users can easily switch between languages and measurement systems as required, allowing Foseco customers and staff around the world to use the same program. The systems support English, French, German, Italian, Portuguese and Spanish, while allowing metric or imperial dimensions and temperatures. The programs' product databases are customized to suit regional product availability.

How can FEEDERCALC Risering Software Improve Performance?

Every business is in business to earn a profit. In foundries, improving casting yield is one of the most direct ways of improving the profit margin. If you melt less metal, but still ship the same number of sound castings, you put more money on the bottom line. FEEDERCALC risering software makes the process of improving yield faster and more reliable. As a bonus, if FEEDERCALC risering software can improve your yield, the production capacity of your melt shop increases dramatically.

The design process itself consumes time and money. Because FEEDERCALC risering software provides rapid and accurate calculations of casting weights, feeder sizes and feeding distances and automatically converts that information into comparative cost analyses, foundries save time and money determining optimal riser designs. And, in the typical JIT (Just-In-Time) business environment many foundries encounter, rapid design equates to reduced time-to-customer and increased profits overall.

Omaha Steel

As an example of a foundry using FEEDERCALC risering software as part of a continuous improvement process, consider The Omaha Steel Castings Co., Omaha, NE. The foundry operates a five-ton capacity electric arc furnace and three coreless induction furnaces, and has a capacity of 800 ship tons per month. Molding is done both in no-bake and green sand.

Change in Strategic Direction

As the eighties drew to a close, Omaha Steel Castings began a fundamental change in strategic direction, diversifying its customer list in the construction equipment industry and expanding to serve new markets including the materials handing, mining, transportation, petroleum, and pump and valve industries. To serve the needs of its new customers, the company added a Specialty Division to its traditional carbon and low-alloy steel operations. Now the company product line also includes corrosion resistant high alloy steels, heat resistant high alloys, nickel-base alloys, tool steels, and boron-alloyed steels.

Expansion into new markets was facilitated by investment in new technology. The foundry also doubled the size of its pattern shop to provide faster turnaround and maintenance of tooling; added a machine shop to meet customer requests for either finished or pre-machined castings; and implemented a computerized production control system (PCS) to provide computerized quotations and mold scheduling, bar coding and creation of advanced shipping notices.

Figure 2: No-bake mold optimized with Foseco feeding systems

Re-Risering: Continuous Improvement

After investing $2.5 million to upgrade foundry operations during the late 1980s, this forward-looking job shop made a concerted effort to re-engineer many of its processes – including re-risering most of its active patterns.

The result was an impressive increase in both yield and profitability, as well as reduced manufacturing time, so castings that used to require two to three weeks to make can be poured on Monday and shipped on Friday – a critical competitive advantage to the foundry.

But even more efficiencies were realized when the use of Foseco's FEEDERCALC Steel program was implemented to provide rapid, accurate calculations of casting weights, feeder sizes and feeding distances and to quickly make cost analyses to determine the most cost-effective feeding system for any given casting.

Figure 3: Method design. (Tom Hoff, Omaha Steel Castings)

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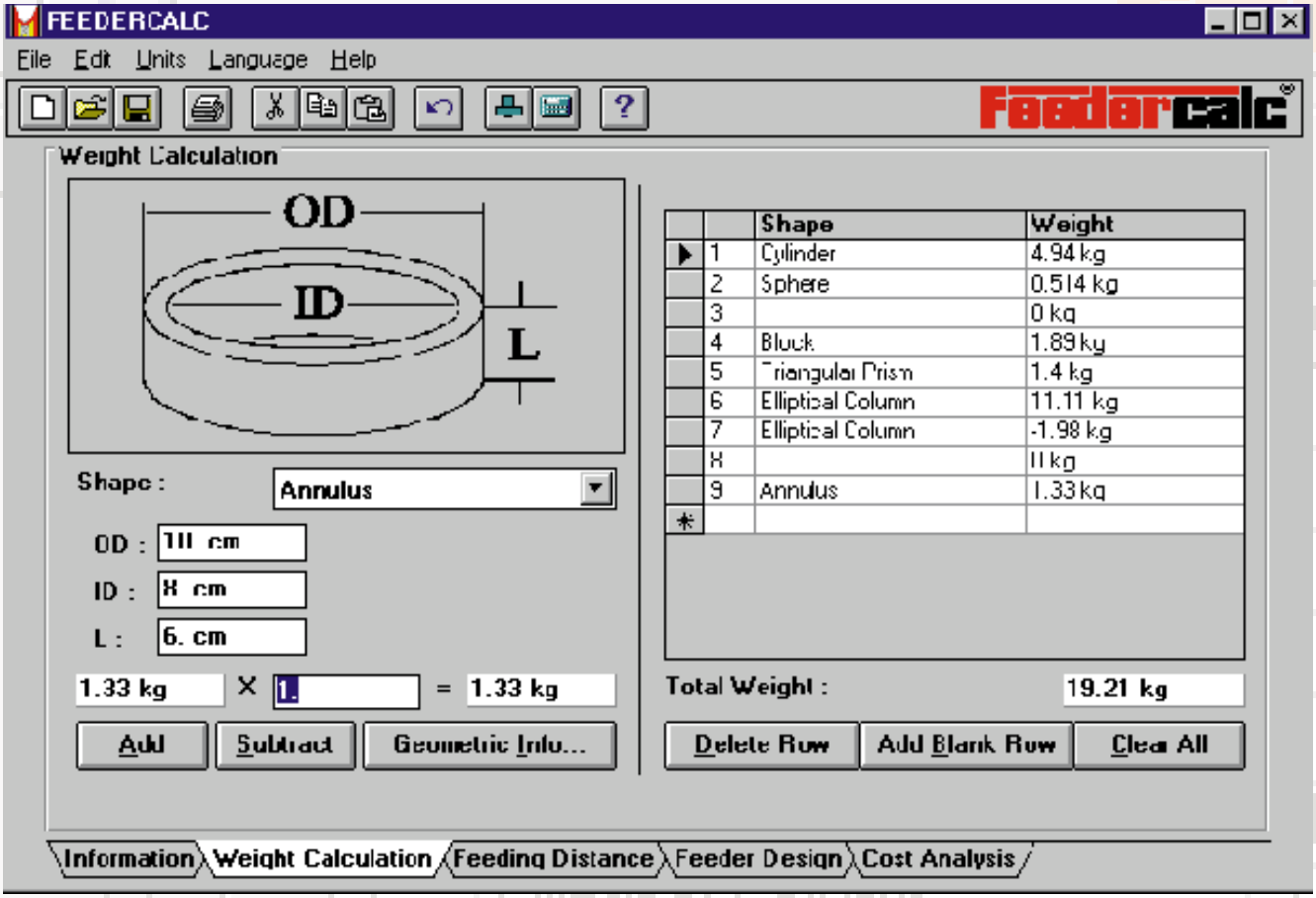
"We've found that computerized risering software provides the tools we need to produce accurate riser-size and side-neck predictions," said Tom Hoff, Omaha Steel Castings' technical director. "[Foseco's FEEDERCALC software] ...was a logical extension of our capabilities and enabled us to take our re-engineering process to new levels."

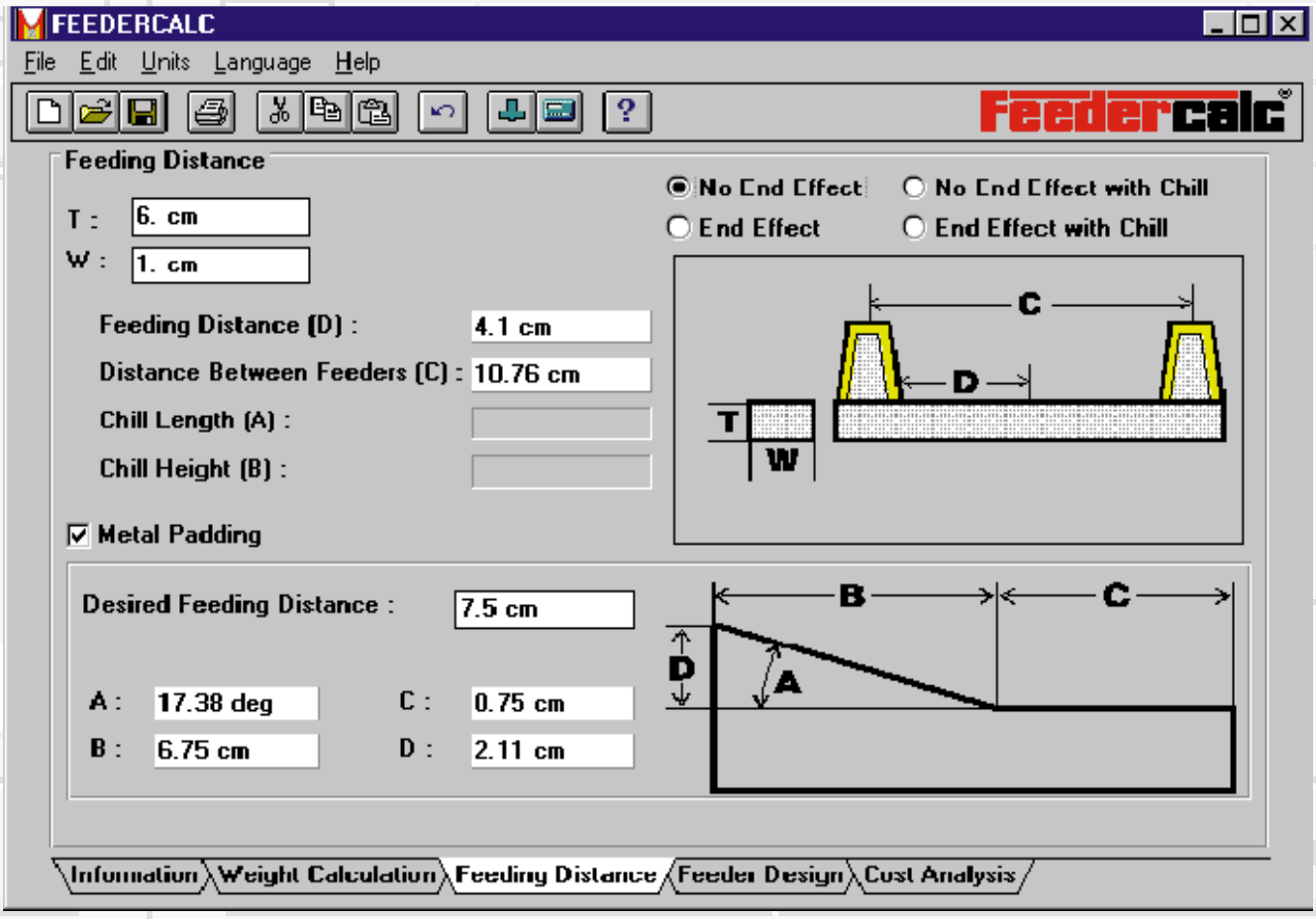
The program enables users to input the specific details of a casting method and to select the units and material density which will be used during the calculation to first estimate the weight of the casting, and then to determine how many feeders are required to feed the casting (see screenshot 1).

Figure 4: Bottom pouring in large bay

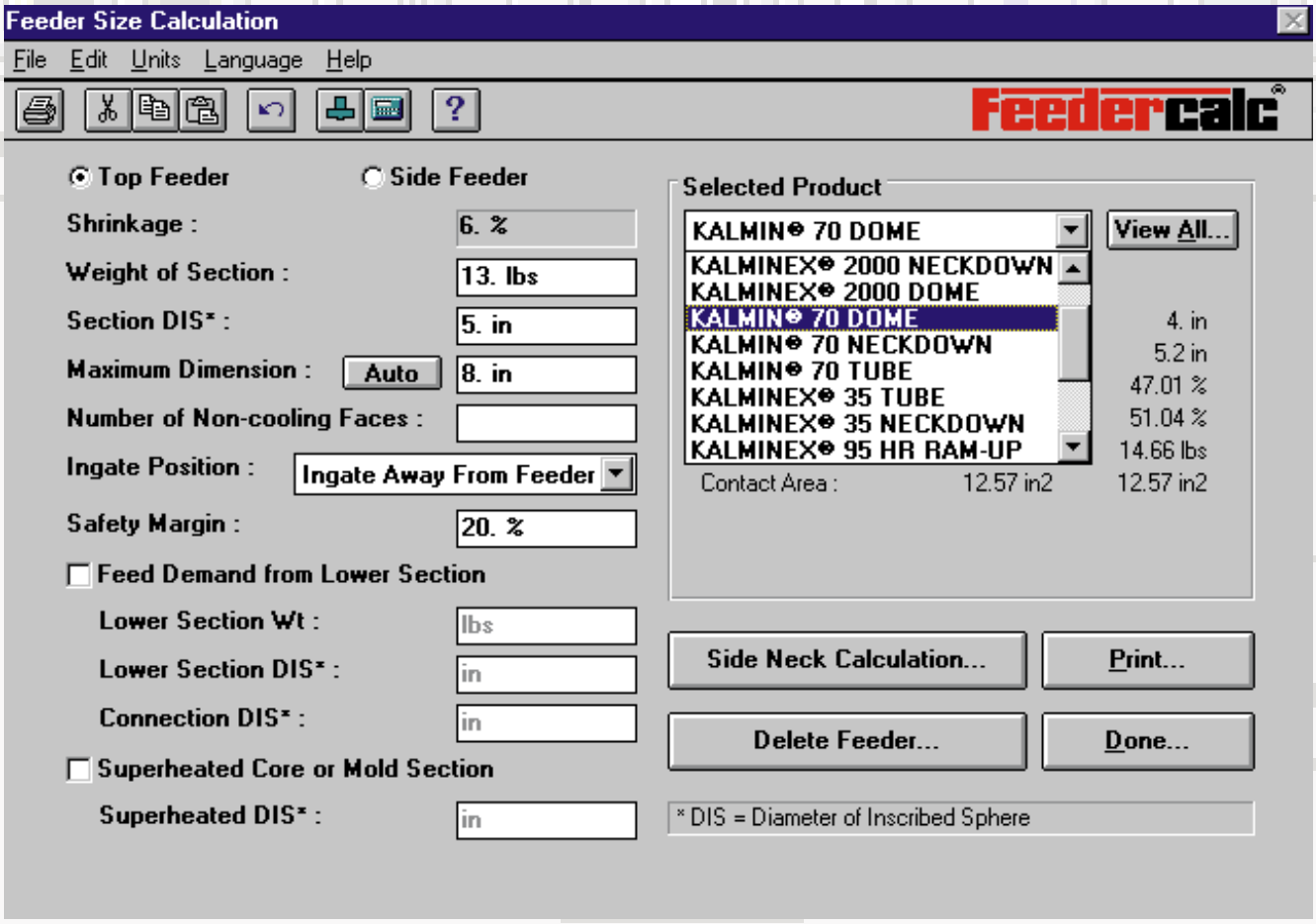
The feeding distance program (see screenshot 2), is based on horizontal feeding distance path data published by the Steel Founders Society of America and is recommended for low-carbon steel sections down to 1-in (2.5 cm) thick (to A1 radiographic standard) cast in green sand. If lower soundness standards are acceptable for the casting in question, the user may extend the feeding distances shown by the program based on the specific alloy or mold material be used, and the user's experience.



Screenshot 1: Defining casting parameters



Screenshot 2: Defining feeding distance



Screenshot 3: Selecting risers

A Tool, not a Replacement

Experience is critical to interpreting drawings, determining riser locations and accommodating the particular production practices of the foundry. The program is a foundry engineer's tool, not a replacement.

Once the feeding distance is determined, the software is used to predict the number of risers required to feed the casting, based on its geometry. Next, the program helps users to design risers for the casting, determining the optimum size for a given casting section. When all required data have been entered, the program determines the best Foseco sleeve sizes required for the casting sections being considered (see screenshot 3). The program also calculates the smallest possible sand risers required for these same conditions in order to establish a comparison between practices that utilize Foseco sleeves and those that do not.

In the cost analysis section the report screen produces a scrollable, line-by-line listing of all the costs entered and calculated. Various "what if?" scenarios may be investigated and compared by changing data. With this information, the foundry engineer can economically optimize the riser size, location and the type of feeding system product chosen.

Conclusion

FEEDERCALC risering software is an important tool for a foundry intending to improve its performance.

"Among other things, the program has been helpful in creating efficiencies that allow us to ship more tons out the door with the same amount of heats in a day," Hoff said. The program also helped Omaha Steel Castings switch from insulating to exothermic/insulating riser sleeves, which are more efficient because they provide additional heat to the riser. One job went from a 10-in. diameter by 10-in. high round-neckdown insulating sleeve to a 7-in. by 12-in. round-neckdown sleeve and the foundry took 75 pounds out of the pour. To reduce manufacturing time, breaker cores were used wherever possible for top risers to make cleaning more efficient.

One of the key reasons for Omaha Steel Castings' re-engineering success was that the job shop made a concerted effort to re-riser not only new jobs, but to go back and re-riser about 90% of all active patterns as they went into the schedule to make them much more efficient. Not all foundries bother to do this, but that's where Omaha Steel got their big gains.