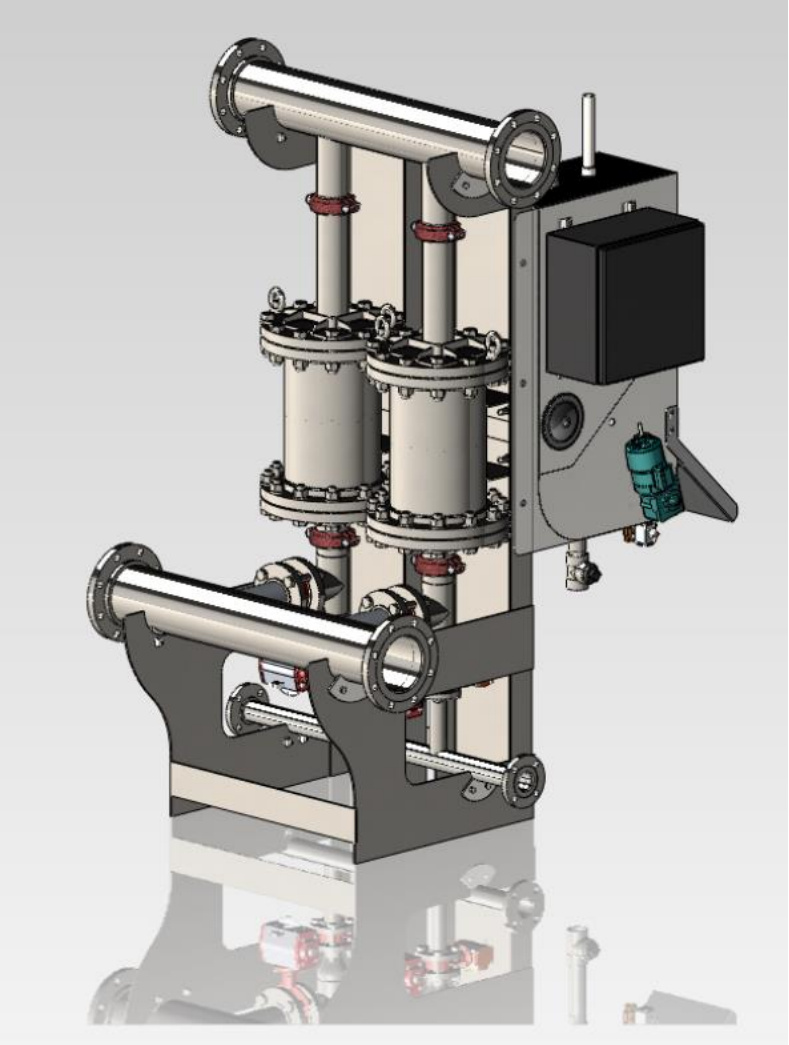


Maggie

The ZGF Maggie is an innovative and patented magnetic separation technology. Maggie is an effective, efficient and environmentally responsible solution that can optimize life-cycle cost and minimize the environmental footprint of industrial operations where ferrous contaminants are present/introduced.

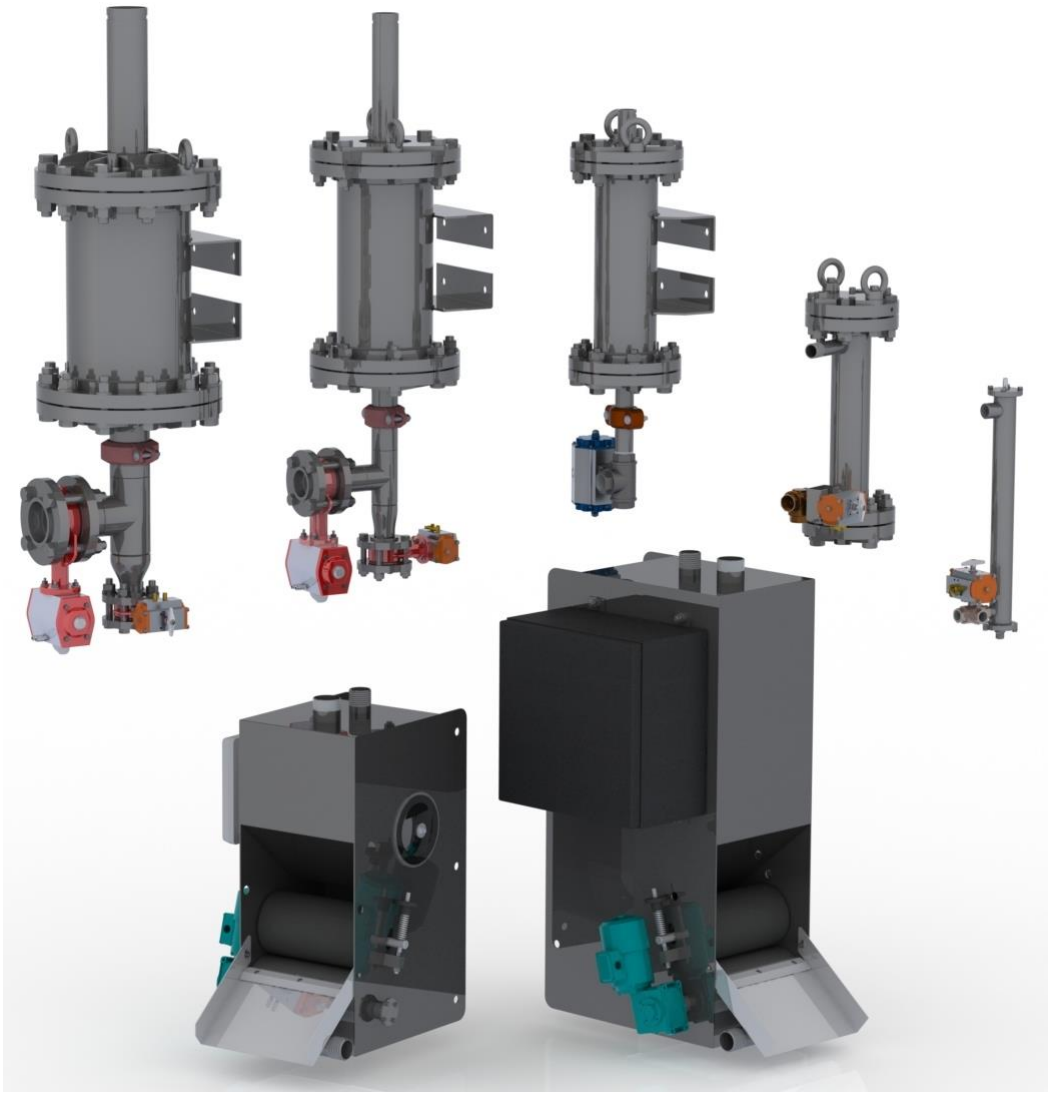
The fully automatic, in-line, high intensity, self-cleaning, patented magnetic separator is the best available technology for separating magnetic contaminants from process fluids. Maggie technology can remove particles down to 1 micron without damaging critical process fluids such as machining coolants, cleaning / degreasing solutions or polymer quench fluids.

Maggie has a stainless steel body that houses our proprietary magnetic cores. The magnetic cores are thin walled, seamless stainless tubes that seal magnetic shuttle assemblies. Each magnetic core contains several magnet/pole combinations that can generate in excess of 10,000 gauss on the tubes surface. The magnetic cores are assembled into different Maggie sizes/models to best accommodate the flow and loading characteristics of the application/process.

The five Maggie models (MG100, MG300, MG600, MG1200 & MG2600) are designed to handle flow rates from 1 gpm to 250 gpm. Multiple Maggie's can be assembled in a manifold arrangement to meet any flow requirement. The Maggie product family also includes the Smart Drum and Smart Drum PLUS (SD) fluid recovery devices. The purpose of the SD is to physically remove the magnetic fines from the Maggie purge fluid and return the fluid back to the process.

Model	Product	Flow Rate (gpm)		Inlet / Outlet / Purge
		Coolant	Oil	
MG100	Maggie 1-core	12	8	0.75”/ 0.75”/ 0.75”
MG300	Maggie 3-core	35	25	1”/ 1”/ 1”
MG600	Maggie 6-core	70	50	1.25”/ 1.25”/ 1.25”
MG1200	Maggie 12-core	125	85	2”/ 2”/ 1.5”
MG2600	Maggie 26-core	250	175	3”/ 3”/ 1.5”
Manifold Arrangement	MG1200 or MG2600	Unlimited	unlimited	user determined
Smart Drum	Fluid Recovery	Batch Process		1.5”/ 1.5”
Smart Drum PLUS	Fluid Recovery	Batch Process		1.5”/ 1.5”

The Maggie Family

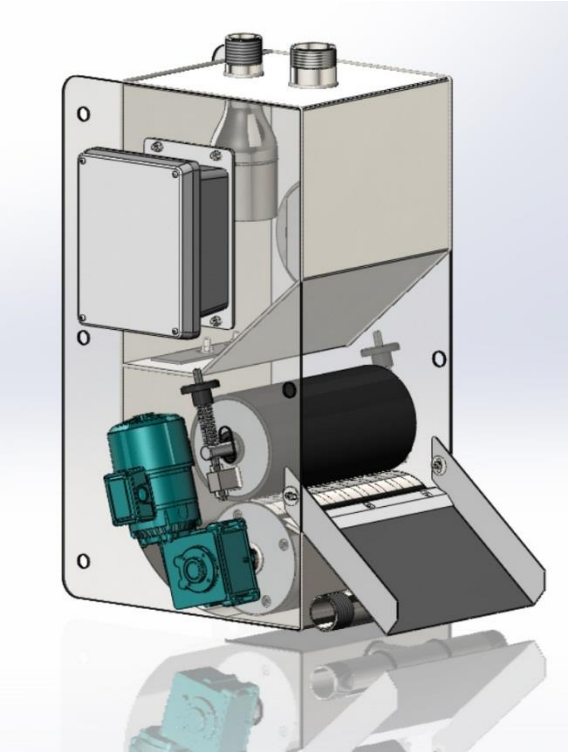


Maggie is fabricated from stainless steel. It is fully compatible with a wide range of liquids and operating conditions up to 170ºF and 100 psi. Maggie is available with three standard elastomers (seals and o-rings) – Viton, Buna and EPDM. Elastomer material selection is based upon compatibility with the process fluid.

Maggie is available with three control options:

- analog timer – for use with MG100, MG300, MG600 & MG1200
- solid state controller – for use with all stand-alone, individual models, and when an individual Maggie is used in conjunction with Smart Drum or Smart Drum PLUS
- logic module (Siemens LOGO!) – for use with any Maggie model or Maggie system

Maggie features two modes of backwash control - automatic based on time interval and manual override.



The Smart Drum / Smart Drum PLUS (SD) product is a fluid recovery device. The SD is a fully automatic, batch process, magnetic separator that is used in conjunction with Maggie in-line separators. The purpose of the SD is to physically remove the magnetic fines from the Maggie purge fluid and return the fluid back to the process.

Purge fluid from Maggie flows to the SD at system pressure. The inlet diffuser and upper tank serve to reduce the pressure and act as a surge tank. The fluid drains via gravity from the upper tank into the lower pan and across the magnetic drum before exiting the system. All fluid must pass across the magnetic field prior to discharging from the front of the unit. There is no by-pass flow. The drum rotates and captures the chips/fines in the pool of liquid in the pan. As the drum continues to rotate, the fines/chips are removed by the plastic scraper, and they drop onto the tray situated at the front of the drum. The fines/chips fall off the tray and into a customer supplied chip bin located below (*ZGF can provide the chip hopper as an option.*). The fluid from the SD is directed back to the process. Flow out of the SD is via gravity.

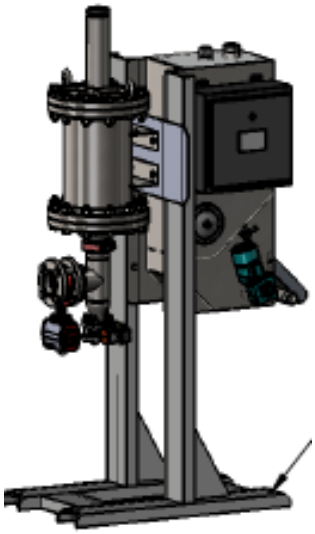
An optional wringer roller is available. The wringer roller is designed to reduce the liquid/moisture content of the solids/sludge that is removed by Maggie. The wringer roller is spring tension adjustable.

Smart Drum versus Smart Drum PLUS						
	MG100	MG300	MG600	MG1200	MG2600	Multiple Maggie's
Smart Drum	✓	✓	✓			
Smart Drum PLUS				✓	✓	✓

When the Maggie and Smart Drum products are configured together as a system, <u>ZGF can provide the best available & most environmentally responsible technology and lowest 10 year lifecycle cost in the industry.</u>

For example, a Maggie MG2600 with Smart Drum PLUS provides

- **250 gpm design flow capacity**
- **4' x 2.5' footprint**
- **particle removal down to 1 micron (most particles 5 micron and larger)**
- **virtually no fluid loss (fluid recovery system)**
- **no additional waste (no disposable media)**
- **annual operating and maintenance cost of <$350 per year**



Maggie / Smart Drum PLUS – Basic Description & Operation

Below is a basic description of operation for the Maggie and Smart Drum PLUS.

Maggie: Liquid enters the Maggie at the top via the inlet connection at system pressure (no additional pumps required). The velocity of the fluid is reduced as it enters Maggie, maximizing the time that particles are in contact with the magnetic field. Maggie's patented design forces the dirty liquid to follow a tortuous flow path within Maggie. A baffle plate located in the center of Maggie forces the liquid to the outside wall. The liquid must then travel to the inside of Maggie, across the magnetic tubes, before exiting Maggie from the bottom. Given the reduced velocity, coupled with high intensity magnets, and the patented flow path, particles down to 1 micron are captured.

The purge valve is fitted immediately below Maggie to enable the debris to be removed as quickly and effectively as possible. Consequently, all debris is removed from the inside of Maggie. This results in a very efficient purge, requiring very little fluid. The purge duration is typically 4 to 6 seconds.

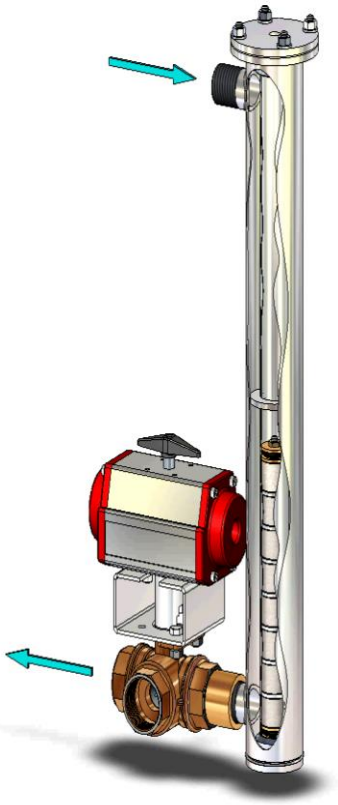
Smart Drum PLUS: Purge fluid from Maggie flows to the Smart Drum *PLUS* at system pressure, and enters the upper tank via the 1.5" inlet. The fluid drains via gravity from the top/inlet tank into the lower pan and across the magnetic drum before exiting the system. The drum is rotated and captures the chips/fines in the pool of liquid in the pan/drum tank. As the drum continues to rotate, the fines/chips are removed by the plastic scraper and drop onto the plate situated at the front of the drum. The fines/chips fall off the plate and into a chip bin located below. The fluid from the Smart Drum *PLUS* is directed back to the process.

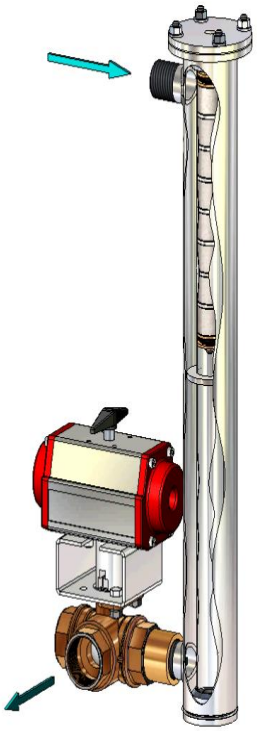
Purge Cycle: The purge cycle is initiated either automatically via a user defined timed event, or manually by pushing the manual purge button. Upon purge cycle initiation, the following sequence occurs:

1. The Maggie purge process commences. The Maggie purge time is typically 4 to 6 seconds. By having this time adjustable, optimum purge efficiency can be achieved. The Maggie purge process sequence is as follows:
    a. A pneumatic signal causes the clean discharge port to close while simultaneously opening the purge port.
    b. Using compressed air, the magnets are quickly shuttled above the baffle plate. Magnetic debris trapped by the magnets on the tubes cannot travel upwards due to the design and positioning of the baffle plate, and the continuous flow of fluid from the inlet.
    c. Because the magnets have been shuttled above the baffle plate, the magnetic debris has no attraction to the tubes and is quickly purged from Maggie via the 1.5" purge valve. The purge is directed to the Smart Drum *PLUS*.
    d. After a brief delay, the magnets are shuttled below the baffle plate.
    e. The clean discharge valve is opened, and the purge valve is closed.

2. The Maggie purge is discharged into the inlet tank of the Smart Drum *PLUS*. The inlet tank is designed to handle the initial surge of fluid. The fluid then flows through the engineered orifices and into the lower pan containing the magnetic drum.
3. As the magnetic drum rotates and collects magnetic debris, clean fluid exits the Smart Drum *PLUS* through the 1.5" discharge.
4. In summary, the Maggie purge flows into the inlet tank, through the engineered orifices, into the pan and across the drum, and exits via the 1.5" discharge port.
5. Magnetic particles are captured on the drum due to the low velocity in the tank, close proximity of the fluid to the drum, and the strength of the magnetic field. The magnetic fines caught by the drum are removed by the plate situated at the front of the drum tank that scrapes off the fines as the drum rotates past. The fines/chips fall onto the Smart Drum *PLUS* tray and into a customer supplied chip bin located below, while the clean, magnetic particle free fluid drains back to the system.

Maggie Operation





Maggie – Filter Mode

- Dirty fluid enters in top
- Clean fluid is discharged through the bottom / outlet port
- Purge port closed
- Magnetic shuttle assembly in lower position

Maggie – Purge Mode

- Dirty Fluid enters in top
- Solids laden fluid exits through the bottom / purge port
- Discharge port closed
- Magnetic shuttle assembly in upper position

The purge (automatic, self-cleaning) process is:

- ✓ Quick - 4 to 6 seconds
- ✓ Efficient - < 0.50% of the process volume
- ✓ Effective - 100% clean with each and every purge

Simplicity, consistency, reliability, and lowest cost of ownership make Maggie technology the only choice when ferrous contaminants are present in your process fluid!

Let us help you meet your objectives.

To get started, fill out the *Application Data Sheet* or call us at 248.486.3500

Features & **Benefits**

- High intensity magnets generating in excess of 10,000 gauss → **removes particles down to 1 micron**
- Selective removal → **will not strip any components or ingredients from the process fluid**
- Consistent and reliable performance → **creates steady-state conditions reducing process variability resulting improved quality and lower operating costs**
- Full 1-year warranty on Maggie assembly → **reduces operating and maintenance costs**
- Fully automatic, self-cleaning operation → **requires no manual intervention freeing up labor for other value-added plant services**
- Pressure fed, zero by-pass design → **provides a three dimensional magnetic field that increases particle capture efficiency and allows for particle removal down to 1 micron**
- In-line design → **eliminates need for additional pumps, motors and controls reducing maintenance and operating costs**
- Compact design → **saves valuable floor space**
- Low energy requirement → **reduces load on plant utilities and lowers operating costs**
- Efficient and environmentally responsible design → **uses <0.50 % of total volume for purge**
- Secondary batch processing system (Smart Drum) → **allows for recovery of the purge fluid**
- Permanent media, stainless steel body and cores → **do not require replacement thereby reducing labor and disposal costs, and increasing productivity**
- Minimal moving parts through simplicity of design → **increases reliability thereby reducing maintenance and operating costs**

ALL OF THE ABOVE = BEST AVAILABLE & MOST ENVIRONMENTALLY RESPONSIBLE TECHNOLOGY AND LOWEST 10 YR LIFECYCLE COST IN THE INDUSTRY

THE ANNUAL TOTAL COST FOR A 250 GPM SYSTEM (MG2600 with SMART DRUM PLUS) IS <$5,000 / YEAR, INCLUDING:

- **ANNUALIZED CAPITAL COST & REFURBISHMENT AFTER 10 YRS**
- **OPERATING COSTS – COMPRESSED AIR & ELECTRICITY (<$5 / YR)**
- **SPARE PARTS (<$150 / YR)**
- **MAINTENANCE – LABOR FOR SEMI-ANNUAL INSPECTION (<$200 / YR)**

ANNUAL O & M COST → <$350 / YR