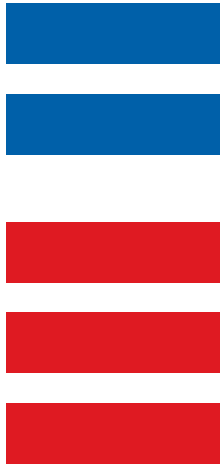


# Precision Extreme Pressure LDPE Production Equipment



**McCartney**<sup>TM</sup>  
Polyethylene Production Equipment

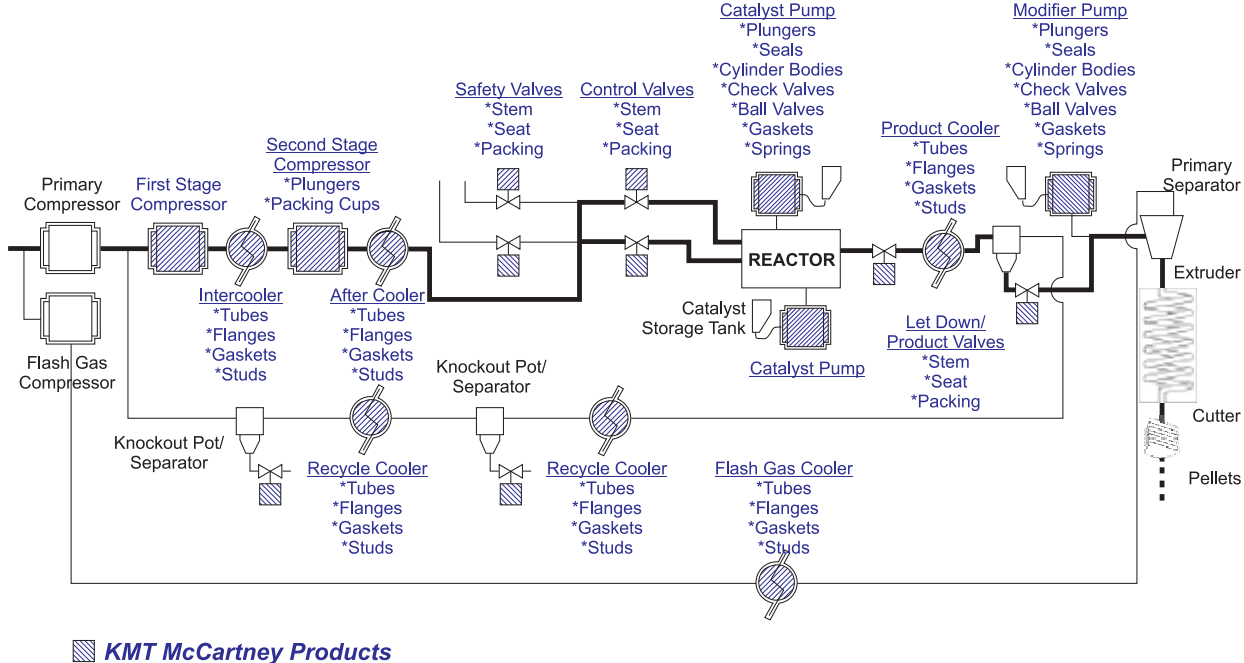


# Precision Extreme Pressure Equipment

KMT McCartney has been a leader in high-pressure equipment design and manufacture for over fifty years. We recognize the need for specialized, close-tolerance machining and have developed equipment and procedures to meet this demand. Our quality-oriented facility and skilled craftsmen provide you with practical design and ultra-precision manufacture.

KMT McCartney's extensive experience in the LDPE industry is available to you. We welcome your inquiry for special problems you may have handling extreme pressures, whether you need a single part or complete system.

Supplied materials go along with international and specific standards, such as European standard EN10204. KMT McCartney does meet latest pressure and explosion safety standards, so PED and ATEX certifications are available for every KMT McCartney product (where applicable).





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## PF-1 Phase Flow™ – Initiator Injection Pump

The Model PF-1 pump represents a breakthrough in intensifier technology. The independent nature of the PF-1 allows “phasing” of the HP cylinders. This unique feature pre-loads the catalyst in the second cylinder while the first is on its power stroke, essentially eliminating the pressure drop associated with shifting the supply from one cylinder to the other. With this innovative Technology the temperature profile within the reactor will get much smoother, allowing you to run closer to the optimum setpoint. As improved rates can be achieved, the PF-1 can in most cases improve production without changing the process itself.

The PF-1 features state-of-the-art elec-tronic controls which allow monitoring and adjustment of the pump operation from the control room allowing preventative maintenance procedures to be performed. The PF-1 pump unit is a self-contained, hydraulic powered metering pump with pressures up to 60.000 PSI (4.138 Bar). It offers the absolute most effective technology in high-pressure pumps available today.



## PMH – Reciprocating Initiator and Modifier Pump

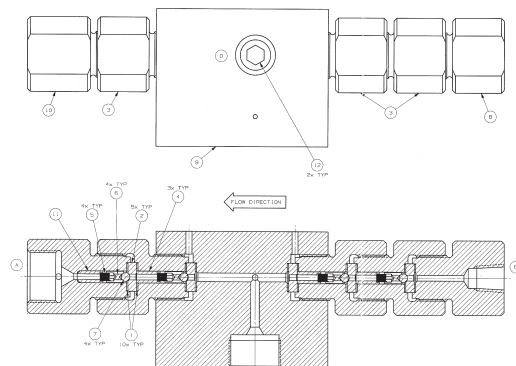
PMH pump units have been designed and manufactured by KMT McCartney for more than forty years. The PMH is an industry workhorse whenever catalyst or modifier injection is needed, with proven reliability over the years. This model was subject to an ongoing development process over the years providing improved performance and dependability. Pump units are designed to fit your specific requirements.

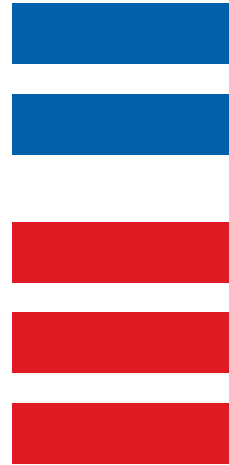
The PMH pump unit is a self-contained, hydraulic powered metering pump with pressures up to 60.000 PSI (4.138 Bar).



## Pump Check Valve Upgrades

KMT McCartney's continuous improvements on our Initiator and Modifier Pump Check Valves are now available for nearly every Injection pump used today. The compact design shortens maintenance time while enhancing reliability.





## Lubrication and Catalyst Feed

### Inline Poppet Check Valve

Poppet check valve designed to address the “hotcheck” problem common to many hyper compressor lubrication systems. Other applications may include catalyst/modifier delivery lines and reactor entry points.



## Letdown and Recycle Service

### Process Control Valve (PCV)

Valves are manufactured from selected heat-treated alloy steel forgings. Valve body and trim designs are furnished to meet customer specifications for particular service. Available pressure ranges are 5.000 to 75.000 PSI. Valves furnished with Electro-hydraulic or Pneumatic operators for precise control.



## Block Check Valves

The KMT McCartney Block Check Valve is a poppet design in-line valve available with removable seat. The McCartney Block Check Valve can be configured to meet specific process, mechanical, and material requirements for pressures up to 60.000 PSI (4.138 Bar).



## Shutoff and Safety Service

### High Pressure Angle Valves

Valves are manufactured from selected heat-treated alloy steel forgings. Valve body and trim designs are furnished to meet customer specifications for particular service. Available pressure ranges are 5.000 to 75.000 PSI. Gear Driven, Pneumatic and Hydraulic actuators are available.



## High Speed Vent Valve

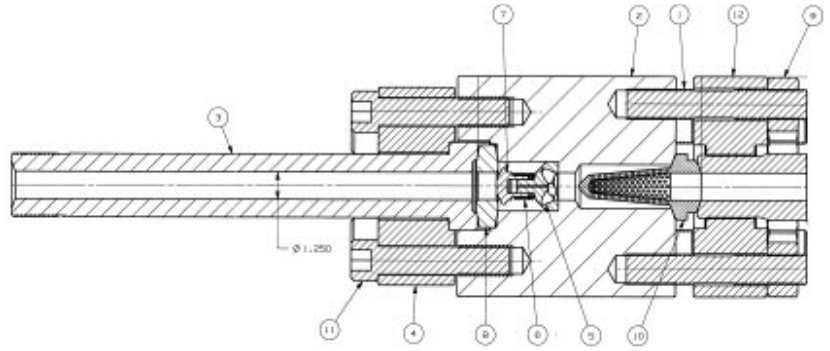
The KMT McCartney High Speed Vent Valve combines the 2-piece KMT McCartney vent valve design and pneumatic actuator with external manifold and oversize solenoid valve. The unique pneumatic actuator design allows for “stacking” of the 12” diameter pistons up to a total of six, reducing spare parts inventory



## Dual Let Down / Vent Valve

This unique design configuration combines the Let Down and Vent Valve, allowing for a very compact and efficient valve package. The dual valve design reduces the length of “dead leg” gas to an absolute minimum, greatly reducing related problems such as gas degradation in that area. Available pressure ranges are 5.000 to 75.000 PSI.





## Plungers

KMT McCartney has full carbide plunger fabrication capabilities to grind and finish a wide variety of plungers from 250" to 4.00" (6.4 mm – 101 mm). We also provide O.D. regrind service for worn plungers of all sizes.



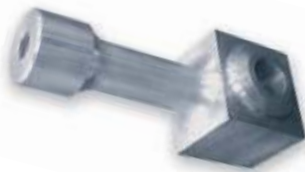
## Line Strainers

Strainers are designed and manufactured of any size to fit your working conditions, eliminating larger debris from your system before causing major problems. Materials per customer specification or according to specific application.



## Thermocouple / Injection

Thermocouple and Injection Lens Rings and Cone Rings are manufactured in a variety of configurations. These include the full flange design shown below, as well as the "Dogbone" design, and of course the basic ring with thermocouple silver soldered in place.



## Service and other Products

**Improved Designs for competitors existing equipment**  
Work is ongoing to improve on existing designs of KMT McCartney equipment as well as our competitors equipment. Contact us for details.

### Stud Tensioning

Hydraulic Stud Tensioner provides a safe, easy and accurate method of pre-stressing large diameter stud bolts.

### Design of high-pressure components

Autofrettaging, and custom fabrication are available to suit individual needs.

### Complete shop security

Permits execution of secrecy agreements to protect special designs you may desire to have made in our shop.

## Hyper Compressor Components

KMT McCartney markets, manufactures and reconditions Ingersoll-Rand / Dresser-Rand and Clark plungers and other Hyper Compressor internal components according to original OEM specifications.



# PF-1 Phase Flow™ Catalyst Injection Pump

The KMT McCartney PF-1 Phase Flow Intensifier represents a breakthrough in intensifier technology and another example of KMT McCartney's commitment to the advancement of Polyethylene Initiator Injection Pump Technology.

The independent nature of the PF-1 Intensifier's two side by side piston / plunger assemblies allow "phasing". This unique feature preloads the catalyst in the second cylinder while the first is on its power stroke, essentially eliminating the pressure drop associated with shifting the supply from one cylinder to the other. With this innovative Technology the temperature profile within the reactor will get much smoother, allowing you to run closer to the optimum set-point. As improved rates can be achieved, the PF-1 can in most cases improve production without changing the process itself.

The design of the PF-1 allows a slower cycle rate than conventional reciprocating style intensifiers, resulting in fewer pressure cycles on the cylinder components and check valves. The slow, steady plunger movement will result in extended life of the patented, non-adjustable pressure seals. Overall reliability is very good, with seal life in excess of 12,000 hours and a 98% on-line time being achieved by users.

Modern electronics give the PF-1 a very fast response time. Simple interface connections to client DCS hardware is all that is required for the PF-1 to automatically control process temperatures with immediate and repeatable servo valve accuracy. The PF-1 is rapidly becoming the industry standard for catalyst delivery systems.



## Standard Features

- Motion Controller
- Explosion Proof Electrical Enclosure
- Drip Pans
- Pressure Compensated Variable Displacement Hydraulic Pump
- 460 Volt Motor Class I Div. 2 Group C and D, T3C Temperature Code
- Packing Lubricator

## Options

- Alternate Voltages per Customer Requirements
- Air Purged Electrical Enclosure
- Electric Motor Class 1, Div. 1, Group C, D, T3C Temperature Code

## Advantages

- High Pressure Components Designed for up to 60,000 PSI (4,138 Bar)
- Superior Pressure Signal
- Slow Stroking
- Smaller Footprint
- Safe DC Control
- All External Control Cables are Protected with intrinsically Safe Barriers
- Longer Check Valve and Packing Life
- All Stainless Steel Hydraulic Tubing
- Seal Lubrication for safe operation and enhanced seal lifetime

## Control Features

- Manual/Reset/Auto
- Emergency Stop
- 4-20 mA Remote Flow Control
- 4-20 mA Phasing Control
- Plunger Position Feedback
- Fault Warning

# PMH Reciprocating Catalyst and Modifier Injection Pump

The KMT McCartney Model PMH hydraulic driven reciprocating metering pump has long been the industry workhorse for initiator and modifier injection. The PMH is equipped with pneumatic controls.

Pump units are available in single configuration or in a dual configuration when space is a consideration. Single and dual pump units are supplied with manifolded process suction and discharge piping with single point connections. Cooling jackets are available when initiator flashing is a concern.

Electric motor driven hydraulic power units are built on a robust steel frame and are designed for specific operating criteria. A large volume hydraulic fluid reservoir provides a



*New PMH Topwork*



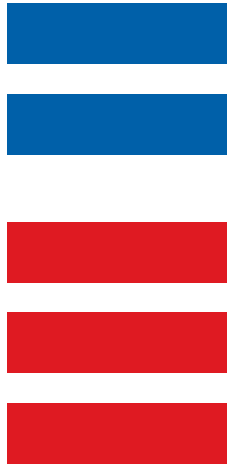
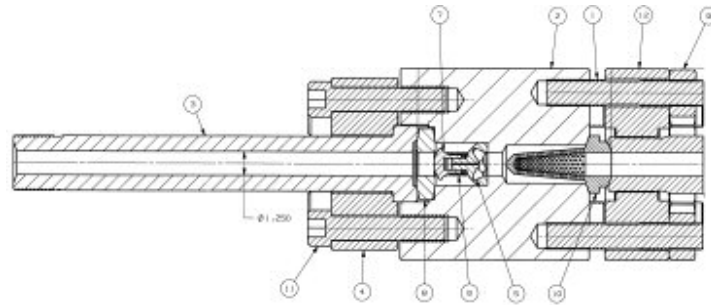
positive flooded suction to the pump. Unit is complete with suction and return filters, bleed valves, isolation valves, pressure gauges, and coupling guards, Electric motor is supplied ready to connect to motor starter.

HP intensifier is mounted above the hydraulic power unit on a common frame. HP cylinders and check valves are manufactured of VAR alloy steel for long dependable service. The new check valve design (double ball type on suction and discharge) enhances reliability.

The PMH model was subject to an ongoing development process over the years providing improved performance and dependability.

Pump units can be custom designed to meet specific operating requirements at pressures up to 60.000 PSI (4.138 Bar).





# Rings / Injection / Strainer

## Lens and Cone Rings

Cone Ring and Lens Ring gaskets can be fabricated in any size according to customer specifications, or we can design the parts to suit your working conditions. Materials will be selected per customer specifications or according the specific application.



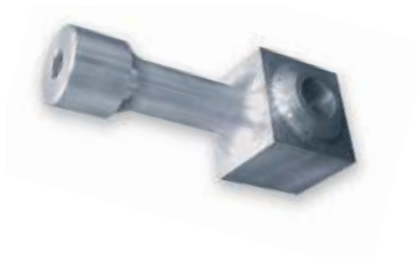
## Line Strainers

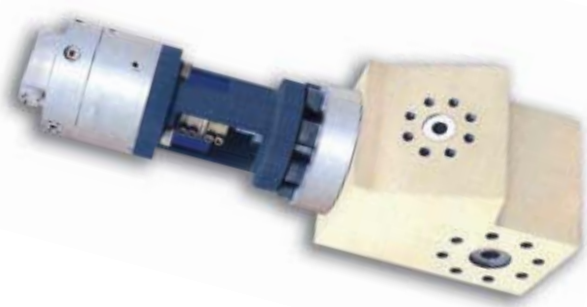
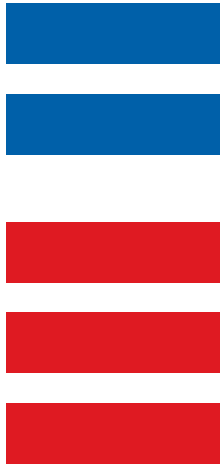
KMT McCartney can design and provide line strainers of any size to fit your working conditions, eliminating larger debris from your system before causing major problems down line. Materials will be selected per customer specifications or according the specific application.



## Thermocouple / Injection

KMT McCartney will design and fabricate Thermocouple and Injection Lens Rings and Cone Rings in a variety of configurations. These include the full flange design shown above, as well as the "Dogbone" design, and of course the basic ring with thermocouple silver soldered in place.





# Valves

## Dual Let Down / Vent Valve

This unique design configuration combines the Product and Vent Valve, allowing for a very compact and efficient valve package. The dual valve design reduces the length of "dead leg" gas to an absolute minimum, greatly reducing related problems such as gas degradation in that area.

The Let Down body mounts directly to an Autoclave Reactor discharge or it can be spooled to the Tubular line. Each of the mounting methods provide equally superb performance.

Each of the two valves is equipped with Bafco Inc.™ Electropneumatic Actuators, insuring quick opening of the Vent and precise stem position on the Let-Down Valve.

A complete hydraulic power unit is available along with field manifolds to insure long and dependable service.

Standard material for pressure-containing components such as body and inlet adapter is alloy steel forged to the special KMT McCartney specification #43-72. This superior material has provided long and dependable service with exceptional resistance to fatigue failure for nearly 30 years. Each customer's specific needs are considered in the valve trim design, including geometry and materials. Special attention is given to potential corrosion and erosion problems in the trim area. Each of the two valves can be configured to meet a customer's specific process, mechanical, and material requirements.



All KMT McCartney valves can be custom designed for pressures up to 60.000 PSI (4.138 Bar).

## High Speed Vent Valve

The KMT McCartney High Speed Vent Valve combines the 2-piece KMT McCartney vent valve design and pneumatic actuator with external manifold and oversize solenoid valve.

The unique pneumatic actuator design allows for "stacking" of the 12" diameter pistons up to a total of six, reducing spare parts inventory.

Optional manual lock is available, providing an additional measure of safety during maintenance.

Standard material for pressure containing components such as body and inlet adapter is alloy steel forged to the special KMT McCartney specification #43-72. This superior material has provided long and dependable service with exceptional resistance to fatigue failure for nearly 30 years. The KMT McCartney valve can be configured to meet a customer's specific process, mechanical, and material requirements.

Valve assemblies can be custom designed to meet specific operating requirements for pressures up to 60.000 PSI (4.138 Bar).



*High Speed Vent Valve*



## Process Control Valves (PCV)

### Process Control Valve

The KMT McCartney PCV is a modern design of the Fisher CZA industry workhorse. This valve is dimensionally interchangeable with valves in service today.

The internal configuration is a KMT McCartney stem and seat design. High wear resistance and high corrosion resistance was a prime consideration during the design of the PCV. Simple, robust construction has fewer parts and is more easily refurbished than other valves.

The two-piece body design was chosen to ensure less maintenance while an even higher reliability will be achieved. Routine maintenance can be done easily by on site staff. A very specialized alloy steel material, forged to KMT McCartney #43-72 specifications, was chosen for its workability and high-pressure performance. A 15-5PH stainless steel option is available when corrosion is a problem. Seat material is nitrided for increased life and corrosion resistance during service in your toughest applications. There is no cage to remove as part of a valve rebuild.

The PCV can be fitted with a variety of actuators. Bafco™ electrohydraulic actuators take full advantage of the sophisticated process control systems in use today. KMT McCartney pneumatic piston type and saginaw style actuators can also be used. We will be happy to consider other actuator options upon request.



*Process Control Valve with  
Bafco Actuator*

### Positive Position Process Control Valve

The KMT McCartney Positive Position Process Valve incorporates the Limitorque™ L120 Series electric motor driven gear actuator. This robust KMT McCartney / Limitorque™ combination eliminates unintended valve cycling and provides dependable service day after day under the most demanding conditions. The L120 actuator is available in weatherproof and explosionproof configurations. An internal clutch provides dependable control of stem load to greatly reduce the possibility of damage to the stem and seat due to overloading. Handwheels are furnished for manual operation in the event of power failure. The declutch lever is padlockable in the motor position.

Standard material for pressure containing components such as body and inlet adapter is alloy steel forged to the special KMT McCartney specification #43-72. This superior material has provided long and dependable service with exceptional resistance to fatigue failure for nearly 30 years. The KMT McCartney valve can be configured to meet a customer's specific process, mechanical, and material requirements.

Valve assemblies can be custom designed to meet specific operating requirements for pressures up to 60,000 PSI (4.138 Bar).



*Special Positive Position  
PCV*



# Check Valves / Gear driven Valves

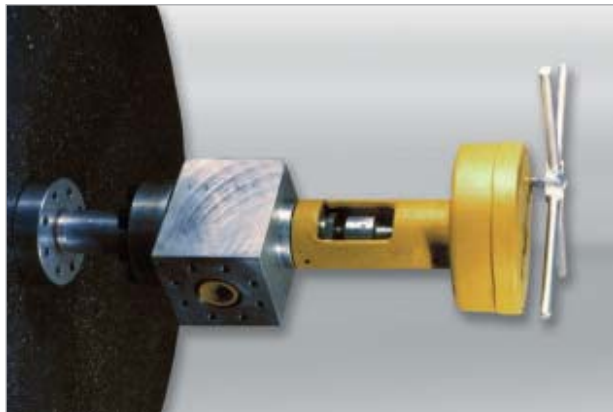
## Manual Gear Actuated Valve

All KMT McCartney designed valves are available with 3:1 or 6:1 ratio gear actuators. Housings are made of steel, precisely machined internally to accept precision steel drive and pinion gears. Bronze bearings provide smooth operation of the hand-wheel and actuator stem. The actuators are capable of producing stem loads up to 50,000 lbs. (22,700 kg) with a hand-wheel torque of 100 ft-lbs. or less.

Valve configurations including angle and parallel flow are available, each being designed and manufactured to meet specific customer requirements.

Standard material for pressure-containing components such as body and inlet adapter is alloy steel forged to the special KMT McCartney specification #43-72. This superior material has provided long and dependable service with exceptional resistance to fatigue failure for nearly 30 years. The KMT McCartney valve can be configured to meet a customer's specific process, mechanical, and material requirements.

Valve assemblies can be custom designed to meet specific operating requirements for pressures up to 60,000 PSI (4.136 Bar).



## Inline Poppet Check Valve

KMT McCartney's new poppet check valve was designed to address the "hot check" problem common to many hyper compressor lubrication systems. Other applications include initiator delivery lines and reactor entry points.

The new valve offers a larger contact surface, which provides a more positive seal while resisting the inclination to brinell at the point of contact. The new internal design positions the spring around the outside diameter of the poppet guide. This provides the spring with extra support while allowing flow to move around and not through the spring.

The use of 15-5PH stainless steel material for the bodies, seat, and poppet guide provide excellent resistance to fatigue, corrosion, and fluid contamination. Extensive testing indicates this combination extends the service life 4 – 10 times over that of a conventional ball and seat design. Inlet and outlet connections are available in standard 9/16", 1/4" and 3/8" HP sizes. Special connection designs are available upon request. Design Criteria: 60 GPH (227 l/hr) at 60,000 PSI.

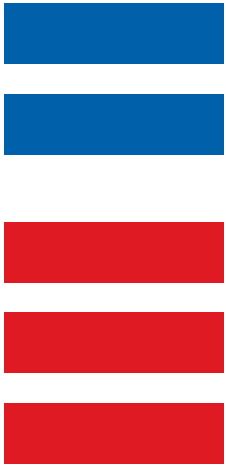
## Block Check Valve

The KMT McCartney Block Check Valve is a poppet design in-line valve available with removable seat.

Standard material for pressure containing components such as the valve body and inlet/outlet adaptor is alloy steel forged to the special KMT McCartney specification #43-72. This superior material has provided long and dependable service with exceptional resistance to fatigue failure for nearly 30 years. Internal components including the poppet, poppet guide, and removable seat are made of AISI 4340.

Block Check Valves can be configured to meet specific process, mechanical, and material requirements for pressures up to 60,000 PSI (4.138 Bar).





# Plungers / Stems / High Pressure Fittings

## Plungers

KMT McCartney has full carbide plunger fabrication capabilities to grind and finish a wide variety of plungers from 250" – 4.00" (6.4 mm – 101 mm). Using Ke-nametal™ carbide blanks, we commonly grind and polish plunger OD surfaces to 1-2 RMS finish.

We also provide O.D. regrind and polish service for worn plungers of all sizes.

## Valve Stems

KMT McCartney will design and fabricate valve stems and seats in any size and for any application including on/off and modulating service. Materials will be selected per customer specifications or according to the specific application.



## High Pressure Fittings 1/4", 3/8", 9/16"

KMT McCartney offers a complete selection of HP fittings including nominal sizes of 1/4", 3/8", 9/16". KMT McCartney enhanced some designs to provide the maximum fatigue life available today.



## High Pressure Block Fittings

KMT McCartney's flanged block fittings are available in a wide range of sizes and pressure ratings up to 55,000 PSI. Higher pressure designs will be considered upon request.

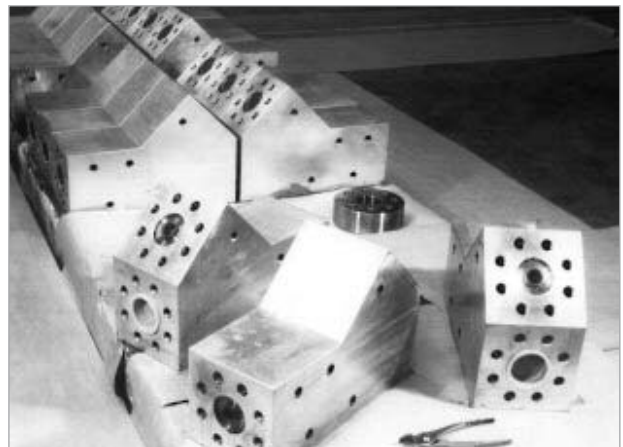
Fittings can be designed and manufactured to comply with customer-supplied data sheets or we can manufacture to customer designs and drawings.

Standard materials include forged AISI 4340, Special KMT McCartney alloy steel forged to Spec.#43-72, forged 15-5ph stainless steel, and ASME SA723.

KMT McCartney's computer modeling capabilities ensure all design considerations are recognized and addressed.

Our abrasive honing process can be implemented upon request, providing 4 RMS surface finishes, eliminating stress riser concerns in small internal radius and intersecting bore areas. The standard bore surface finish is 32RMS.

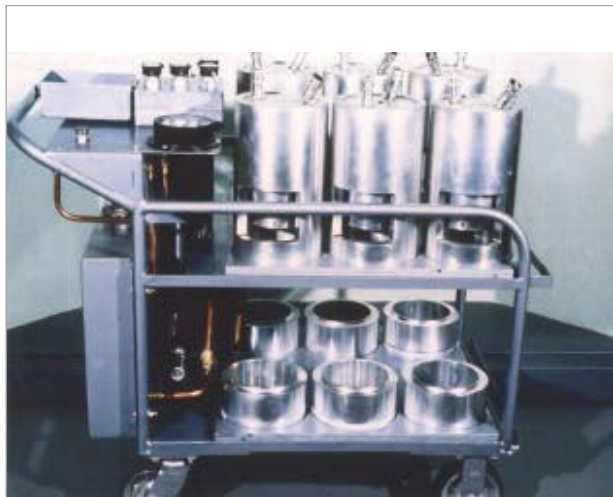
When cyclic stress is a concern, fitting bores can be autofretted, effectively prolonging in the service life of the fitting. Autofrettage pressures are calculated based on material properties and design pressure to ensure maximum benefit.





## Other High Pressure Products

### Hydraulic Stud Tensioner



The KMT McCartney Hydraulic Stud Tensioner provides a safe, easy and accurate method of pre-stressing large diameter stud bolts such as those used on Hyper Compressor cylinders and large block valves. Tensioners can be supplied for bolting sizes of 1 1/4" (31.8 mm) and larger, providing tensioning forces up to 275,000 lbs. (124,700 kg).

The Stud Tensioner Unit is self-contained and portable, needing only plant air of 100 PSIG (6.9 BarG). A simple push button controls the flow of plant air to a one or two stage diaphragm pump, which in turn supplies hydraulic fluid to each of the tensioning heads.

Hydraulic pressures of up to 12,000 PSIG (827 BarG) is adequate to torque even the largest stud bolts. Custom "dial indicators" monitor stud stretch, insuring precise results. A small 1-gallon (3.8 l) hydraulic reservoir located along side the diaphragm pump provides for flooded suction. Each tensioning head is supplied with a hydraulic hose of adequate length for easy positioning. Large air and hydraulic pressure gages provide easy monitoring of each tensioner cylinder while a hydraulic relief valve insures safe operation.

### PMP Reciprocating Test Pump

The KMT McCartney Model PMP air-driven test pump package is designed as a convenient and economical alternative to the stationary hydraulic pump. The unit is totally self contained and mounted on a heavy structural steel skid or a pneumatic wheeled cart for easy maneuvering.

Pneumatic piping is complete with filters, regulators, shutoff valves, and a safety relief valve. Customer supplied plant air with 1" pipe connection is all that is required for operation.



The 3-stage High-Pressure Intensifier is supplied with manifolded discharge piping complete with pressure gauge and isolation valves. A single 9/16" HP discharge connection is located at the panel.

HP Cylinders and Check Valves are constructed of VAR 4340 material to insure long and dependable service. A 24 gallon (91 liter) test fluid reservoir is mounted along side the intensifier to provide a constant positive flooded suction.

Pumps are available with design pressures up to 100,000 PSIG (6,897 Bar).



# Hyper Compressor Components

## Hyper Compressor High Pressure Components

State of the art machining capabilities has enabled KMT McCartney to produce most critical high-pressure internal components for Ingersoll-Rand™ / Dresser-Rand™ and Clark Hyper™ Compressors for more than 30 years. Extreme dimensional tolerances, flatness requirements of 2 light bands, and surface finish requirements of 2 RMS are routine requirements.

KMT McCartney and Dresser Rand's Partnership and company histories insures spare parts to be manufactured according to original specifications. Improvements such as poppet check valves are 100% compatible to original equipment.

Our ISO 9001:2000 certification insures total compliance with industry standards as well as any customer-provided specifications.



## Dresser-Rand





Trained and Certified Technicians

Worldwide Sales and Support Network

State-of-the-art Research and Development Center

ISO 9001:2000 Certification, PED Approval ATEX and TSSA Certification

CSA and CE Certified

Highest Quality Products Made Using the Most Advanced Processes

A Focus on Advancement of Our Customers



**McCartney™**  
Polyethylene Production Equipment

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