

# Casting and Permold Product Portfolio



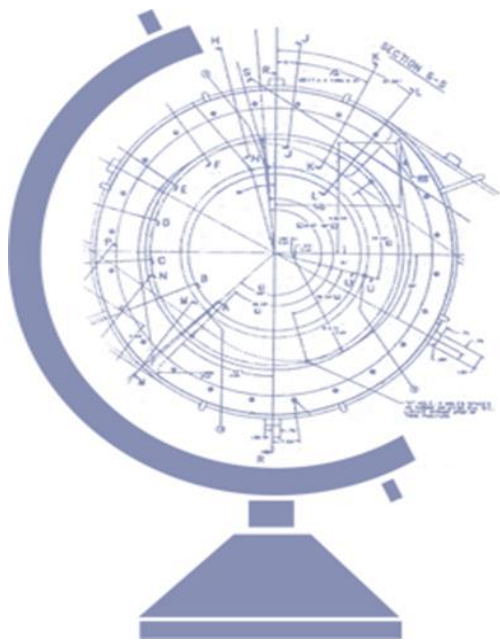
***SV & Industries, Inc.***

Sourcing and Supply Chain Solution for OEM

Serving  
Industry For



**25Yrs**



**Our Mission is to reduce our clients total cost of ownership**



Sourcing



Supply Chain Management



Consulting



Logistics & Warehousing



# Foundry Products

## Continuous casting process



**Bronze bushings**

**Graphite embedded oil less bushings**

**Zinc Aluminum bushings**

## Permanent mold process



**High conductivity Copper castings**

**Bronze and Brass castings**

**Aluminum castings**

# Alloys Available

Alloys

ALLOY	CDA STANDARD	CHARACTERISTICS & USES
<b>Coppers</b>		
R2, R0	C80100	Excellent Electrical & Thermal Conductivity
		Good machinability. Can be Electro plated
		Electrical & Thermal applications - Conductors, Connectors, Terminals, Heat Exchanger plates
<b>High Copper Alloys</b>		
R40, R75	C81400, C81500	Improved Strength along with high conductivity
		Arcing & Non Arcing Contacts, Terminals for MV & HV Switch gear applications
<b>Aluminum Bronzes</b>		
RA001	C95300, C95400	For applications of heavy load with good resistance to impact & corrosion
		High strength bearings, Wear plates, Mechanism parts for switchgear, Valve parts
RA002	C95500, C95800	For applications requiring high strength, excellent corrosion resistance & impact strength
		Ideal for thin walled parts, Automotive bearing & bushings, Valve bodies, Marine applications

# Alloys Available

# Cont...

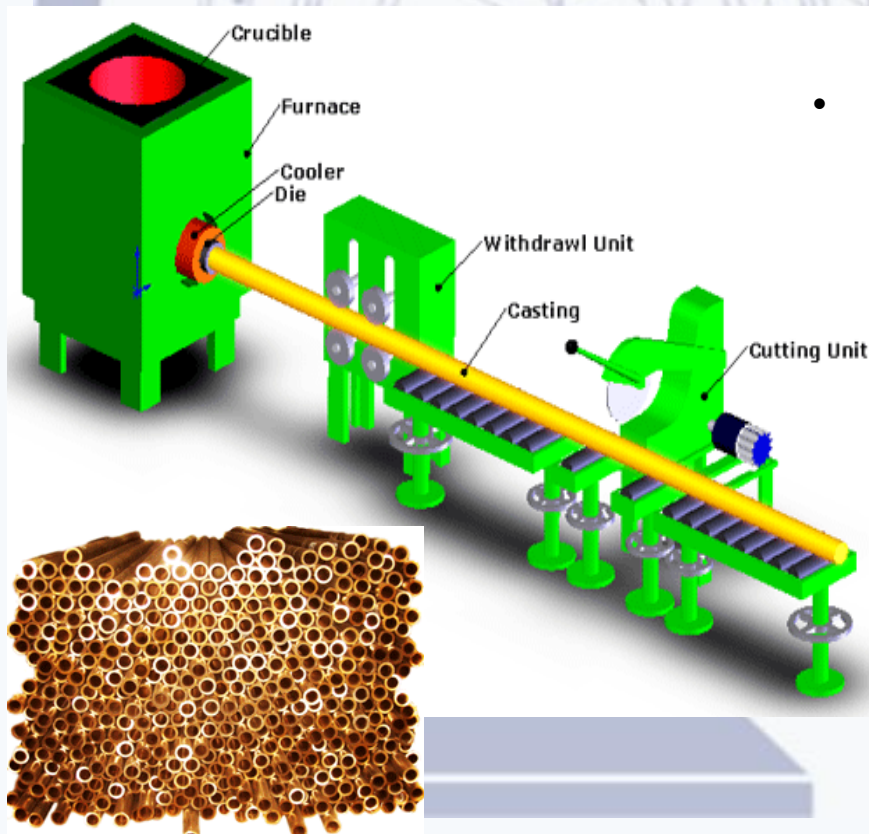
Alloys

ALLOY	CDA STANDARD	CHARACTERISTICS & USES
High Tensile Brasses		
RB001 RB002 RB003 RB005	C86100, C86200, 86300, C86400, C86500	High strength, Good corrosion resistance & machinability
		Well suited for high strength, thin walled castings. Bushings, Brackets, Valve stems
RB031	-	High Strength, Wear resistance, Superior bearing properties & increased machinability
		For applications of heavy duty & high strength, Automotive & Earth moving machinery bushings, Valve stems, Hydraulic cylinder parts

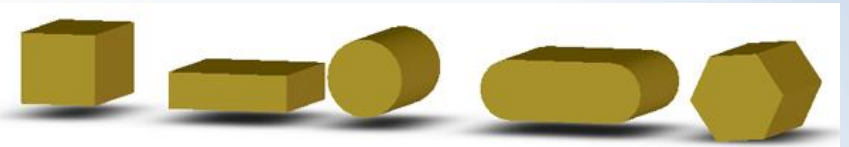


# Con-Cast Process

- Our Con-Cast is a resistance melting process where melting is carried out in a graphite crucible
- Melting in graphite crucibles provide a reducing environment for cleaner melts
- The process is completely PLC controlled, where the cast parameters are stored and recalled enabling reproducible heating properties

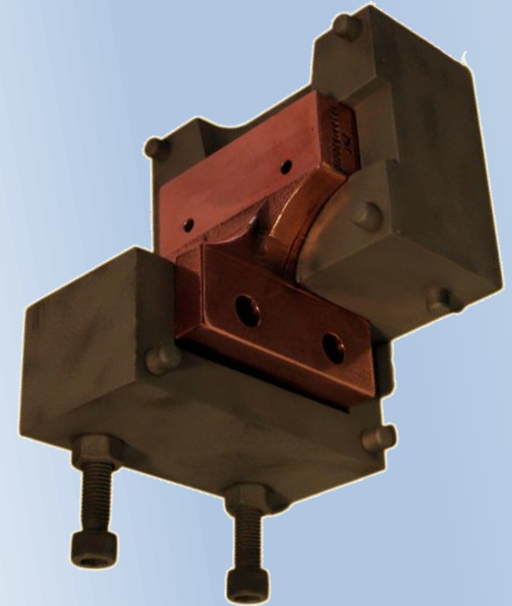
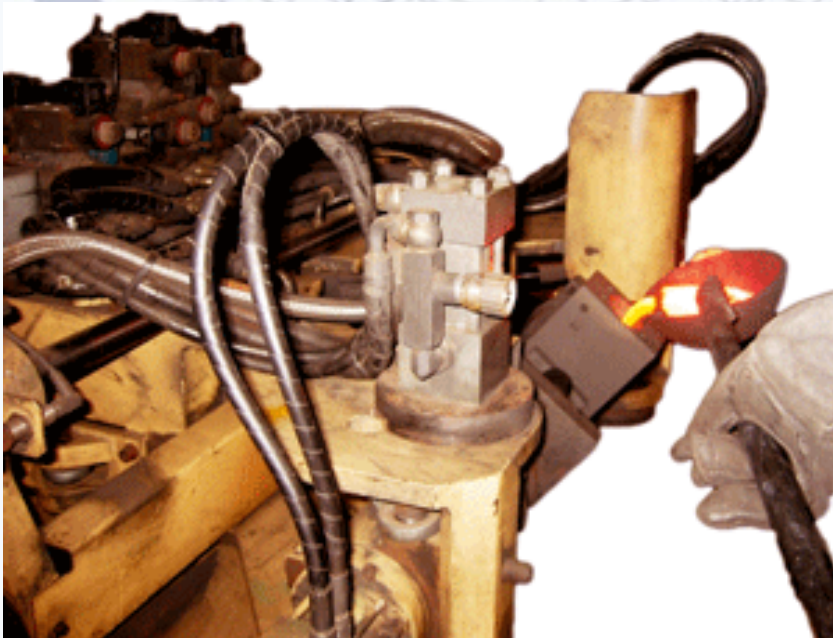


- Our Con-Cast is superior to the sand casting process:
  - Fine grained, uniform, reproducible microstructure
  - Lower machining allowance ~1mm per side
  - Size ranges from 10mm to 150mm can be cast
  - Various profiles like squares, rectangles, triangular, polygonal and any other symmetrical shapes profiles can be cast
  - Mass production as the process of Con-Cast is fully automated



# RAPSRI – PERMOLD PROCESS

- Permanent mold process consists of pouring liquid metal into metal molds dressed with a suitable coating under the influence of gravity, therefore, this process is also termed as gravity die casting.
- Unlike the sand castings, the molds in permanent mold process are re-usable and therefore, cost effective for bulk production runs.



- Our PREMOLD Process Advantages:
  - Fine grained, uniform, reproducible microstructure
  - Higher Density
  - Improved Surface Finish (125 RMS as-cast)
  - Tighter Tolerances ( $\pm 0.25$ mm as-cast)
  - Minimum machining required
  - Greater Finished casting Yield
  - Can be semi-automated

# Bushings and bearings with close tolerance machining



BEARING BUSHES



PRESSURE PLATE



ZINC ALUMINIUM BUSHES



THRUST WASHERS



GRAPHITE BUSH



ZA THRUST WASHERS



# Permanent mold chill cast process.



HIGH CONDUCTIVITY COPPER CASTINGS



# Bronze bushings Produced on Turning machines

- Machining Processes

- Turning (Single Spindle Automats, Chuckmatics, CNC Turning Centers, Hardinge Finishing Machines)
- Oil Grooving on SPM's (Single Loop, Figure Eight, Straight and Circular, Double Loop, Double Figure Eight, Half Fig Eight, Straight, Circulars)
- Milling (Face grooves)
- Drilling (Face, body and oil groove drill)
- Broaching
- Centreless Grinding
- Burnishing



- State of the art machining centers

- CNC turning
- Milling Centers
- Vertical Machining Centers
- SPM's for Oil Grooving,
- Single Spindle Automats
- Broaching Machines
- Drill-Mill Centers

# Complex geometries with several axes on vertical machining centers

- Machining Processes
  - Turning (Single Spindle Automats, Chuckmatics, CNC Turning centers, Hardinge Finishing Machines)
  - Oil Grooving on SPM's (Single Loop, Figure Eight, Straight and Circular, Double Loop, Double Figure Eight, Half Fig Eight, Straight, Circulars)
  - Milling (Face grooves)
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- State of the art machining Centers
  - CNC turning
  - Milling Centers
  - Vertical Machining Centers
  - SPM's for Oil Grooving,
  - Single Spindle Automats
  - Drill-Mill centers





# State of the art plating center

- Fully automated plant
- Silver plating of copper parts
- Silver plating of aluminium parts
- Antitarnish plating process
- Partial plating
- Tin plating





# Testing Facilities

- **Metrology**

- Coordinate Measurement Machine (CMM)
- Roundness Tester
- Monochromatic (Optical) Checklite for Flatness Testing
- Profilograph Computer Integrated
- Digital Height Gauge/ Gauges of various types
- Surface Finish Testers Digital



- **Lab/Process Testing**

- Vacuum Emission Spectroscope
- Metallurgical Microscope
- Universal Testing Machine
- Hardness testers
- Conductivity Meters
- Hot Sand Tensile Tester



# High conductivity copper castings



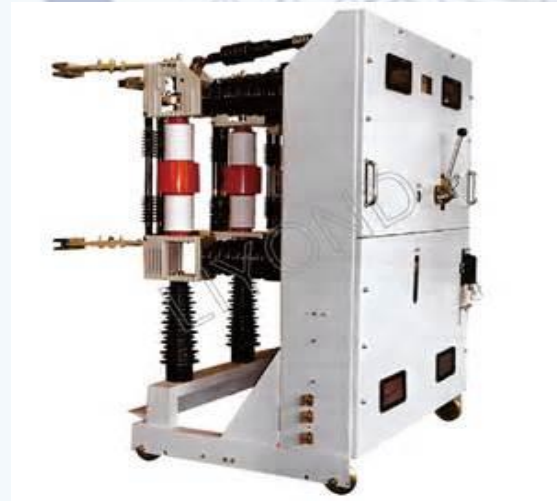
**LV Switch Gears**



**MV Switch Gears**



**HV Switch Gears**



**Vacuum Circuit Breakers**



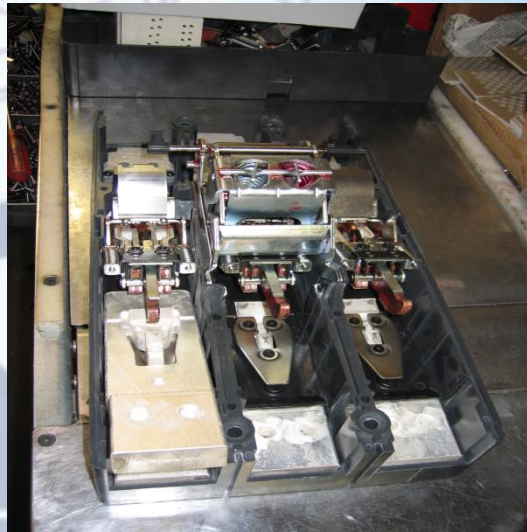
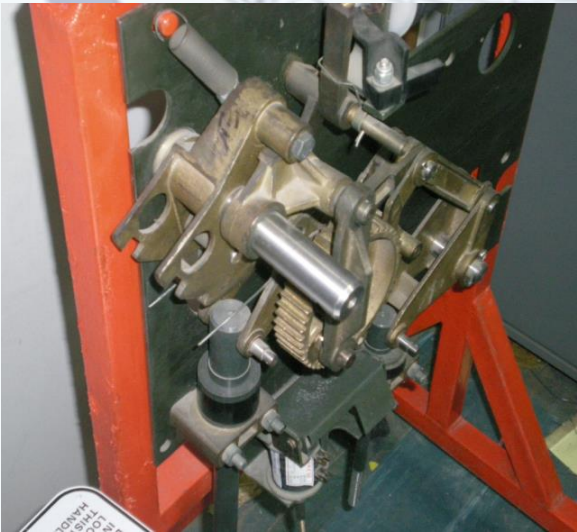
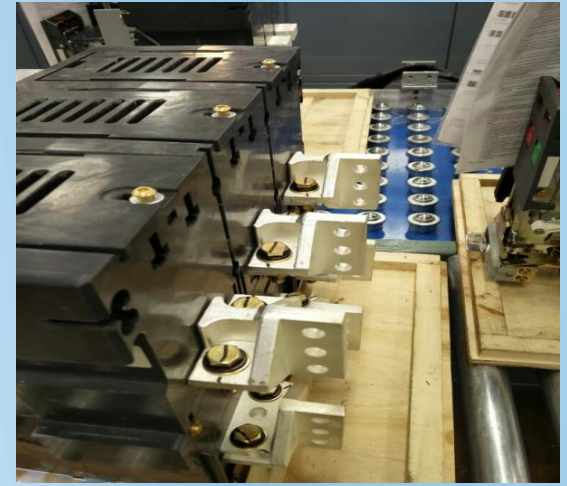
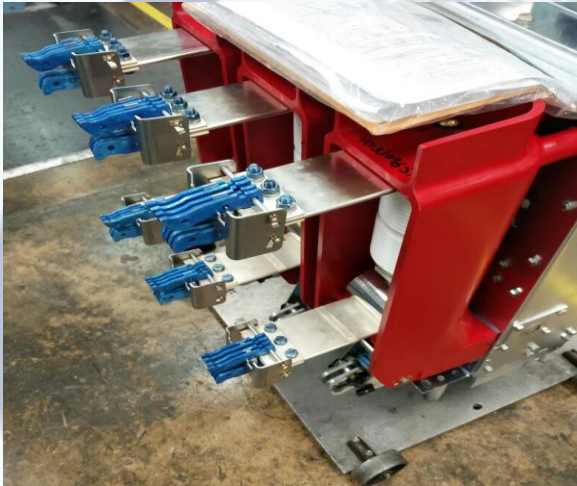
**Air Circuit Breakers**



**Gas Insulated Circuit Breaker**

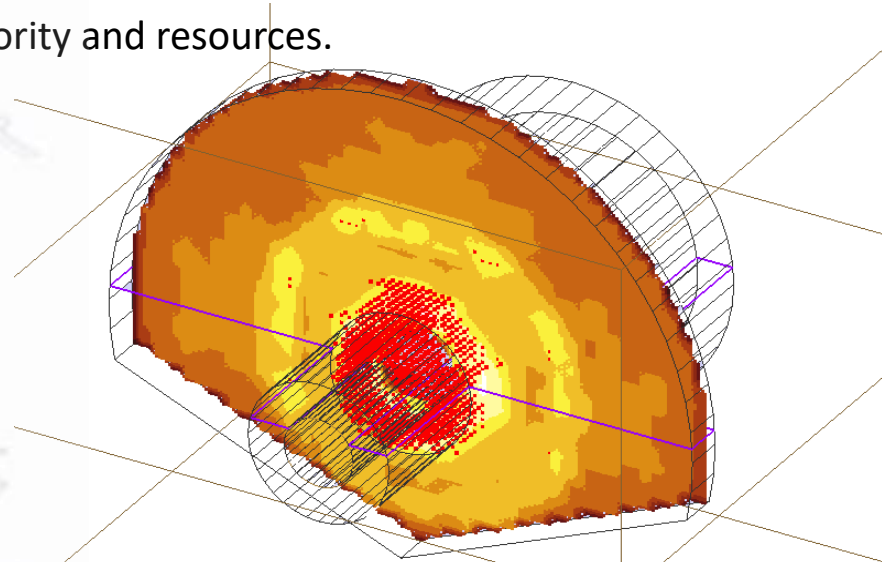


# Typical Applications– Switchgear



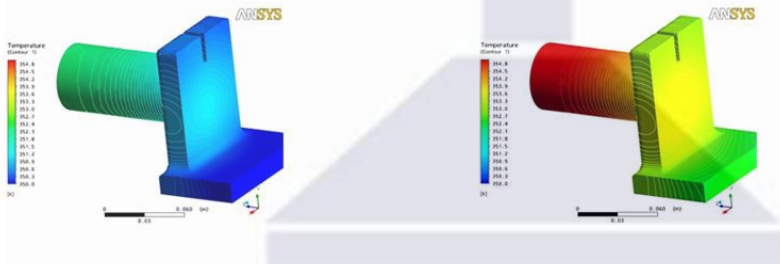
# Technology Focus

- Strong R&D team -independent responsibility, authority and resources.
  - ❑ Dr. P. Sriram- AFS Copper Topics Committee,
- Our R&D is focused in the following areas:
  - ❑ Alloy/Material Development
  - ❑ Process Development
  - ❑ Prototype & Design Development
  - ❑ Application Engineering
  - ❑ Fab to Casting Conversions



*No matter what the industry segment and what the application requirement is, our R&D group will provide an “out of the box” innovative solution that challenges convention and results in an advantage.*

*Even if we don't make it we will give you an opinion of what may work.*

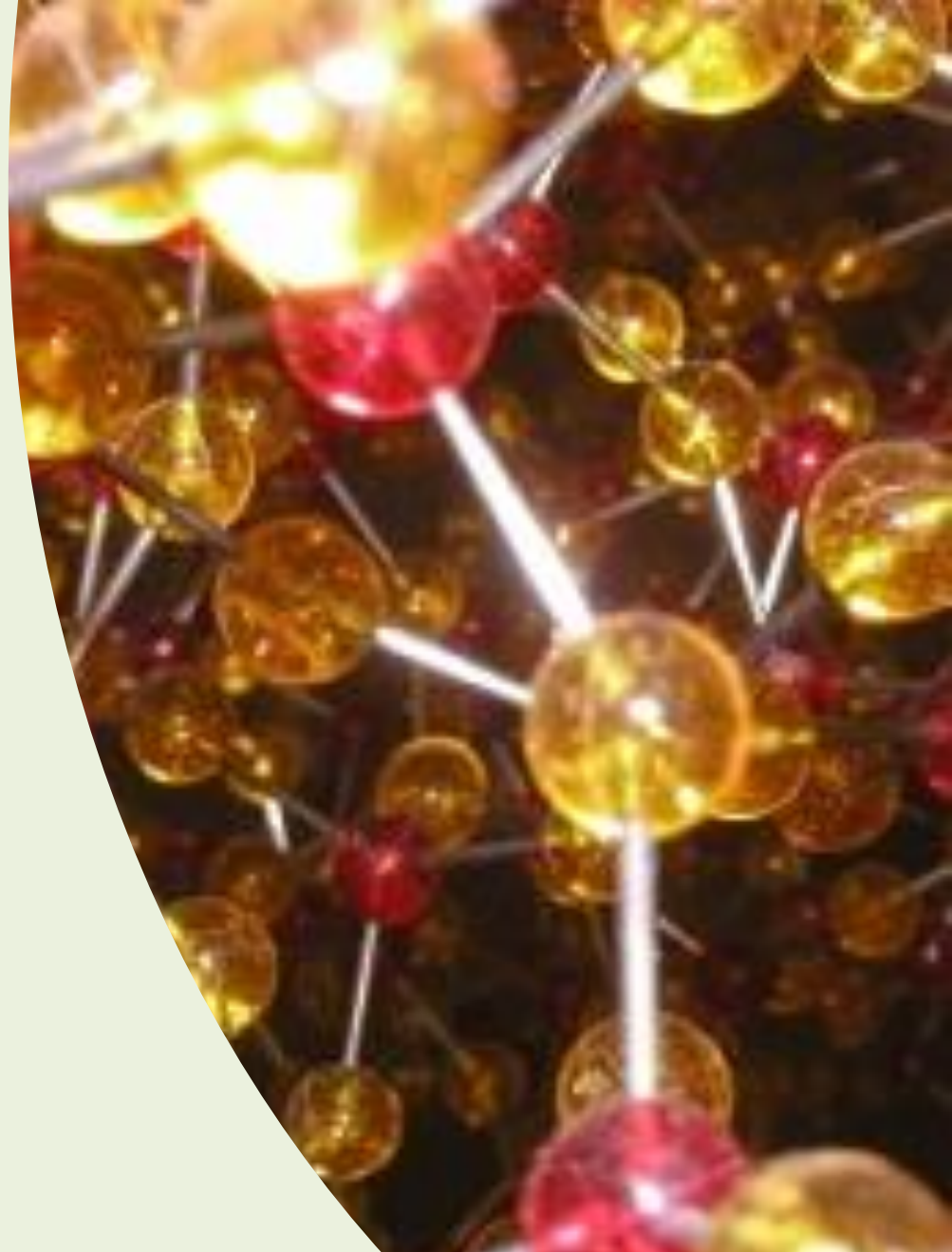




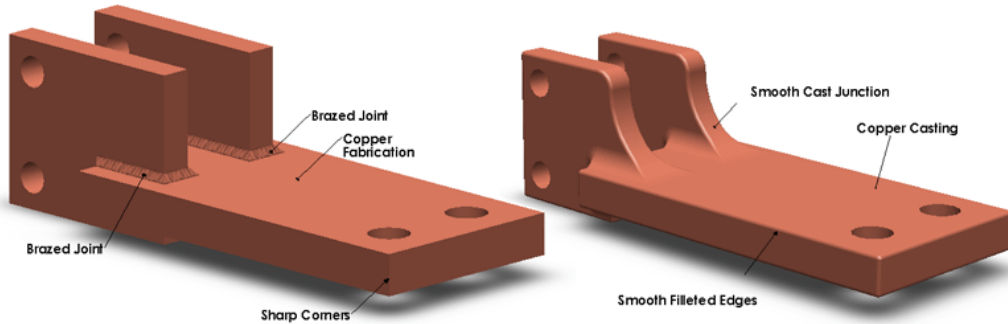
# Technology Focus

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- **Alloy/Material development- performance premium, cost reduction.**
  - Extremely high conductivity copper R0-99% IACS
  - Redesign of fabrications into castings for cost benefit and improved performance
  - Specialty Aluminum Bronzes, Brasses (RB031), Copper Berylliums and Copper Nickel Silicon's
- **Process Development- yield improvement, structural improvement, performance enhancement, environmental.**
  - Resistance melting
  - Permanent molding



# Fab Conversions

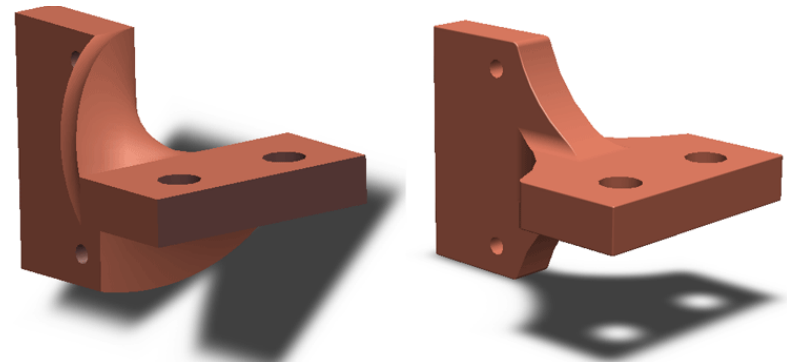


Copper Fabrication  
Brazed Joints  
Poor Electrical Conductivity across the joint  
Weight: 5.5 Kilograms

Copper Casting  
One Piece Component  
Excellent Uniform Conductivity  
Weight: 4.9 Kilograms

- Brazed assemblies of ETP copper converted to PERMOLD Castings to achieve better conductivity across the joints and lower temperature rise.

- Various copper/copper alloy fabrications, made from machined parts, brazed assemblies, extrusions, forgings, etc by bending and twisting operations can be converted to PERMOLD castings and thereby eliminating secondary processes like stress relieving etc to restore properties and particularly conductivity across the junctions.



Copper Twisted Fabrication  
Highly Stressed Twisted Joing  
Poor Electrical Conductivity across the Joint due to Residual Stresses  
Requires Stress-Relieving heat treatment for restoring properties

Copper Casting  
Casted as one piece Component  
Excellent Uniform Conductivity  
No such treatments required

# Fab Conversions & Savings

Temperature rise: 2 C drop from brazing (Improved conductivity)

Weight Reduction: 12,000\$/yr.

(200gms/pc- 1,500 kgs/year)

Machining cost eliminated:

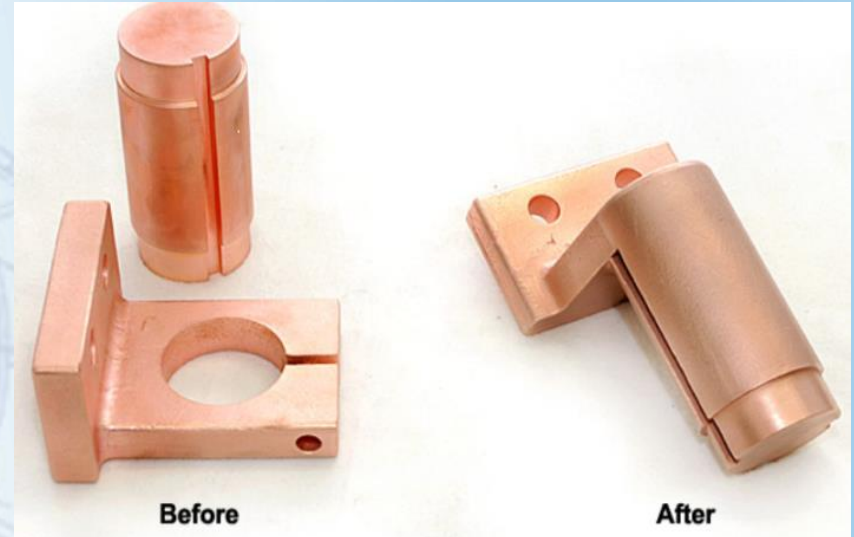
7,000\$/yr

Brazing cost eliminated:

8,000\$/yr

Total Cost Reduction:

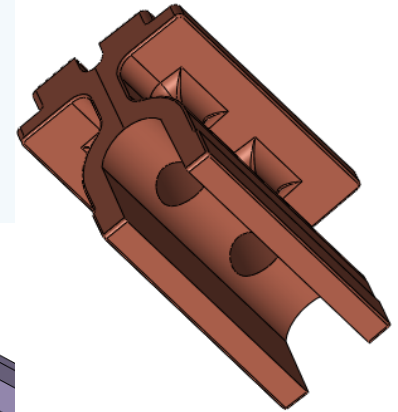
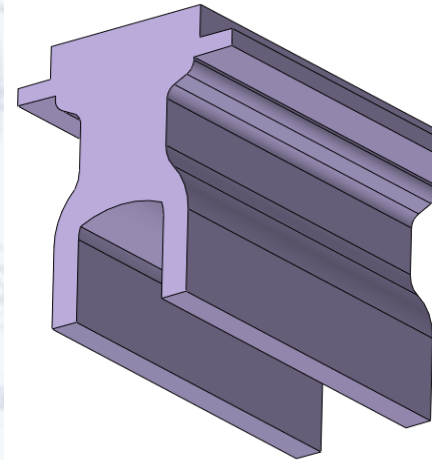
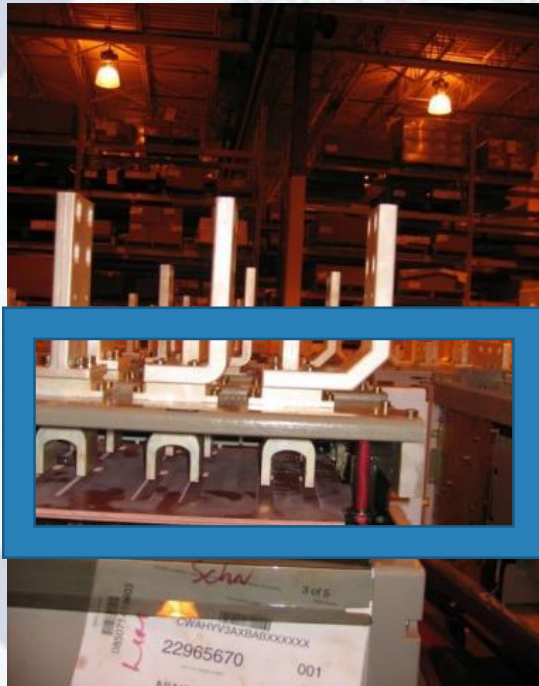
27,000\$/yr





# Fab Conversions & Savings

Cont....



Temperature Rise: No change.

Special Feature: Hardness on blade area achieved by special secondary process.

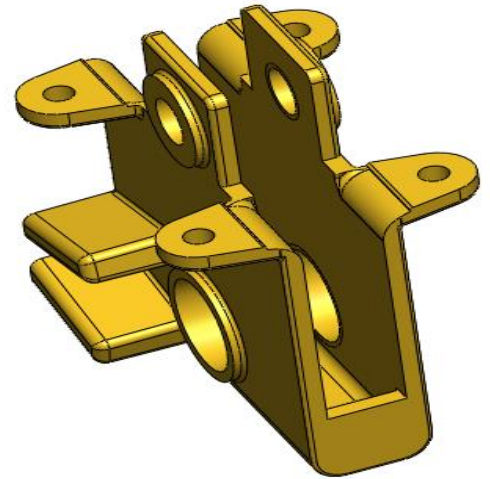
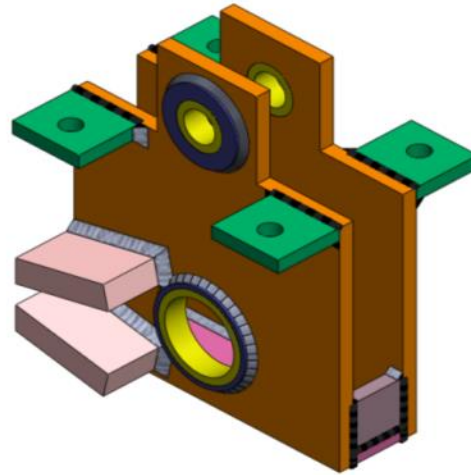
Weight Reduction: 225,000 \$/yr (1kg/pc, 30,000 kgs/yr)

Machining Cost: Not Known

Total Cost Reduction: 225,000 \$/yr++



# Fab Conversions & Savings Cont....



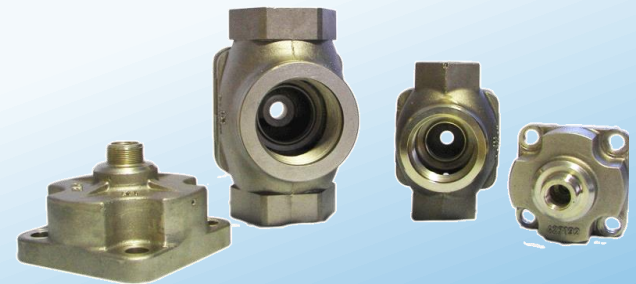
## Value Engineering

- Eliminated 6 welding operations, bending and punching in 3 stages and 4 bronze bushings.
- Assembly line productivity gain of approx. 30% due to reduced operations and ease of fitment.
- Improved performance due to superior cast strength as compared to weld joint strength.

# Bronze and brass Castings

- Flow Control, Fire & Safety

- ❑ Cast, Forged, Precision Machined Stems, Seat Rings, Yoke Sleeves and Retainers.(Gate, Globe, Butterfly and Knife Gate Applications)
- ❑ Valve Body, Cap castings with leak testing



**BUTTERFLY AND  
KNIFE GATE VALVE**

**REFRIGERATION  
VALVE**

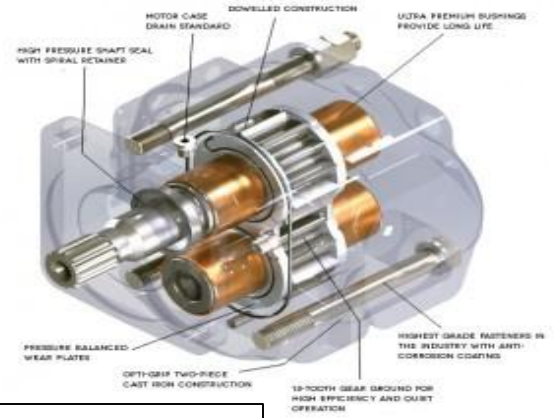
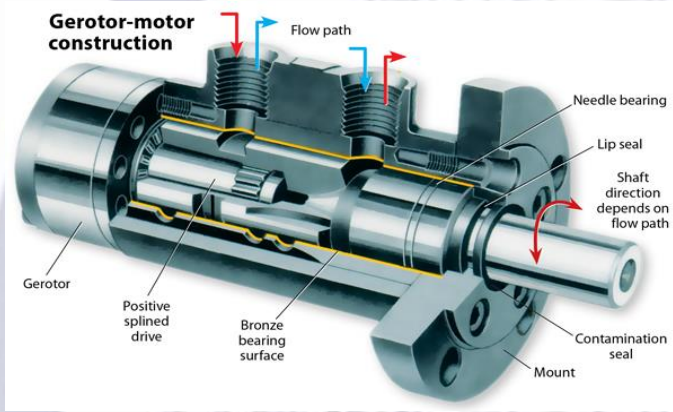
**FIRE AND SAFETY  
VALVES**

# High Strength Aluminum Bronze Castings and Packaging Assemblies

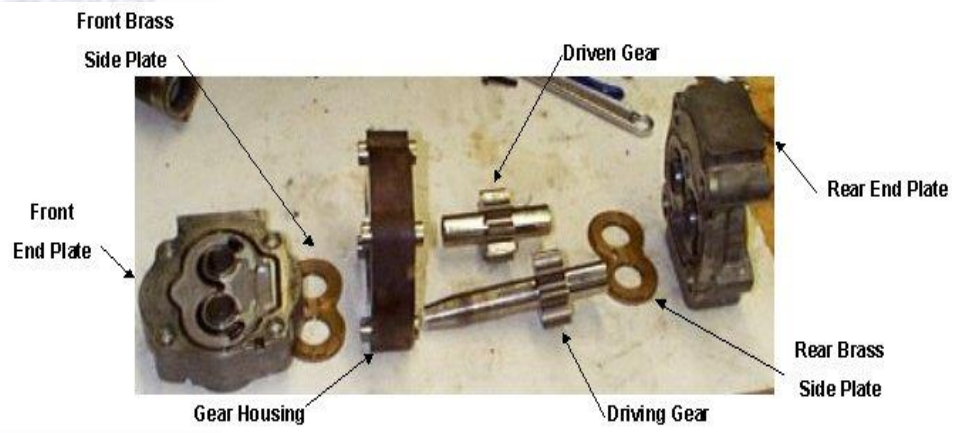
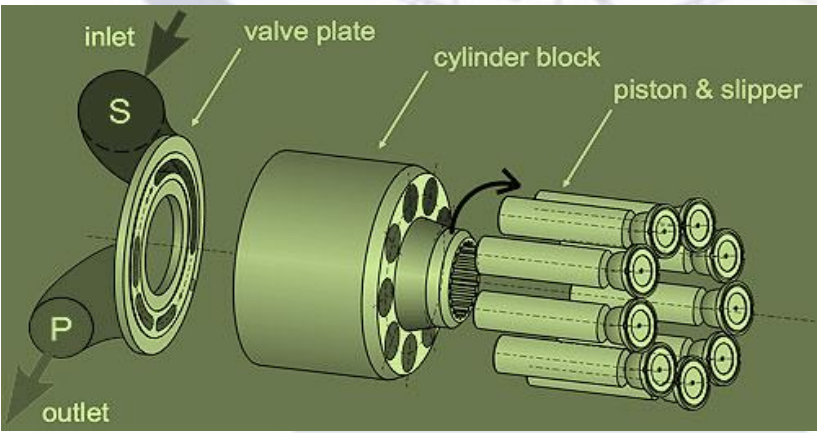




# Typical Applications



Thrust plates, Pressure Plates in Hydraulic Gear Pumps



# New Technology Focus



Graphite Embedded Self Lubricating bushes and Wear Plates

## TYPICAL INDUSTRY APPLICATIONS



Forging Press



Injection molding

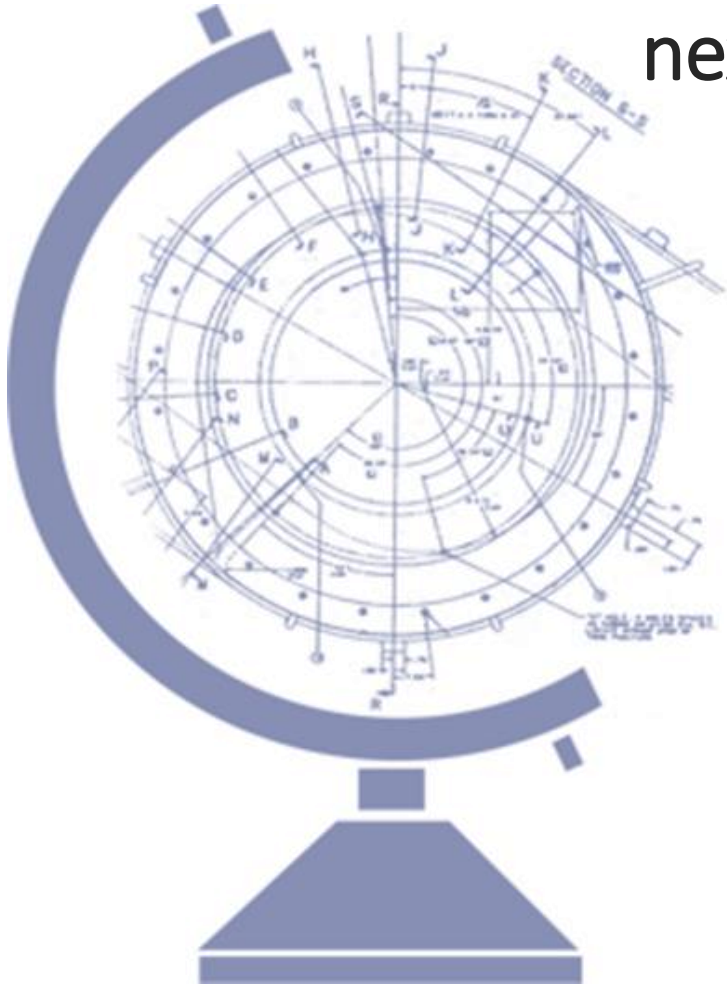


Construction



Steel plants

# Let S&V design and build your next project



- No project too large
- Engineering available for all designs
- Feasibility study's upon request
- Budgetary quoting available
- Feel free to contact us at:
  - 330-666-1986 or [sales@svindustries.com](mailto:sales@svindustries.com)





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