



U.S. Metalcasting: Competing Globally

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Modern Casting, MetalCasting Design & Purchasing and IJMC

Anatomy of the Presentation

- U.S. Metalcasting Profile & Forecast
- Gray & Ductile Iron
- How Does the U.S. Compete?



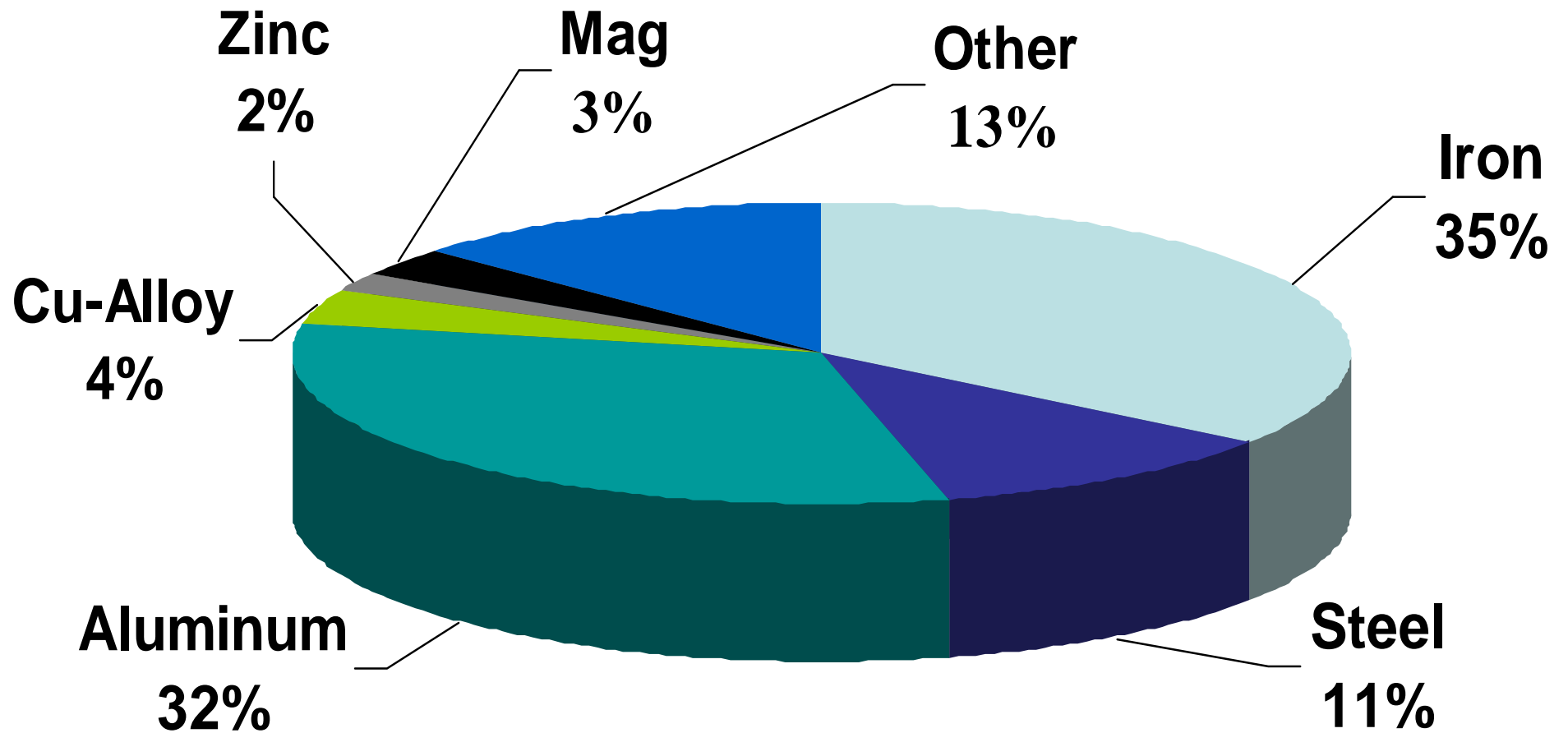
Profile of the U.S. Metalcasting Industry

2060 Casting Facilities

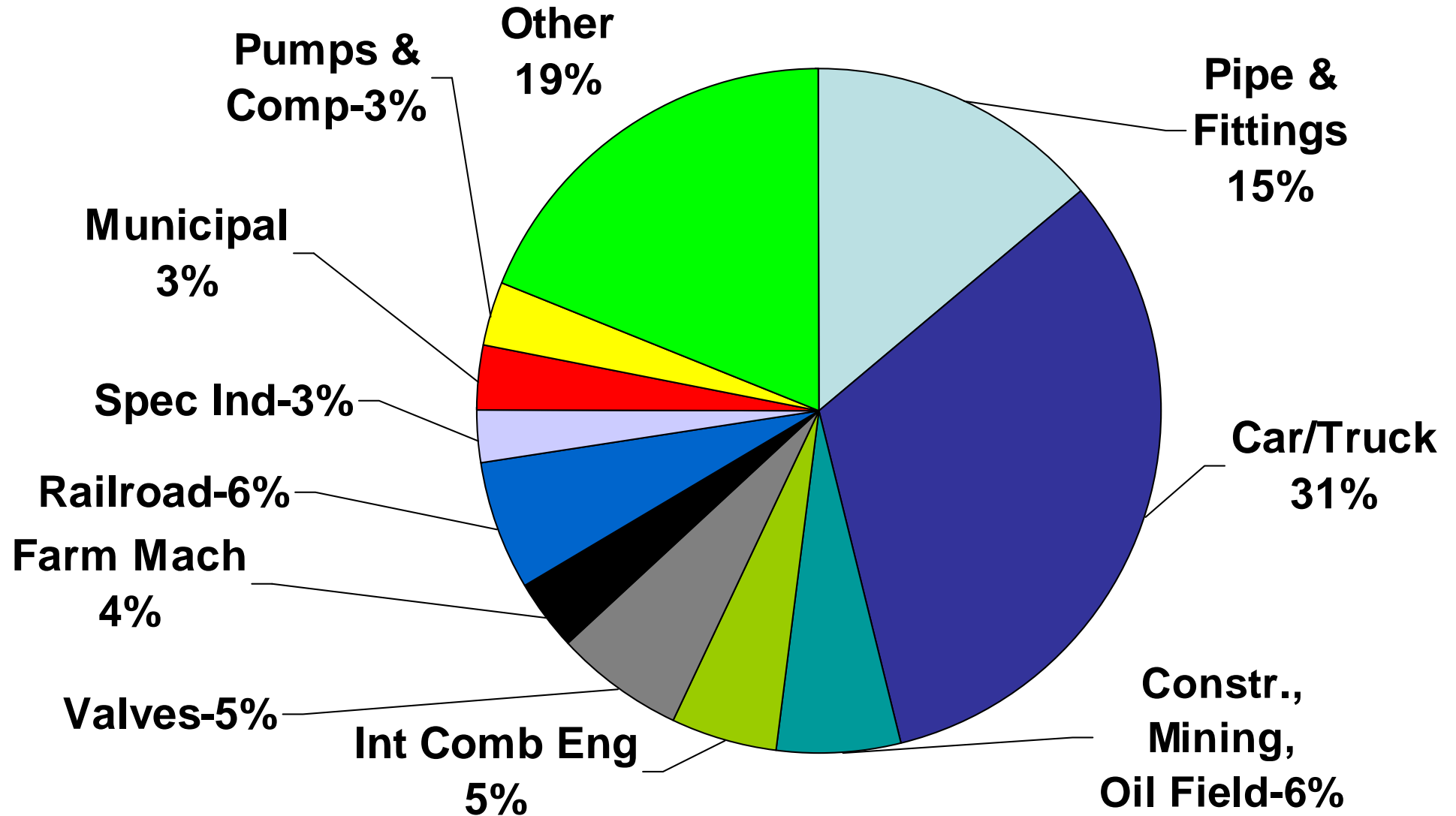
- 700+ Ferrous (600 iron, 200 steel);
1400+ Nonferrous
- Employs More Than 200,000
- 80% Are Small Businesses
(less than 100 employees)
- 2007: \$31.8 Billion; 13 Million Tons
- 2008: \$31.5 Billion; 12.2 Million Tons
- 2nd in Production in World
- From '91-'08, Alum growth at 80%+, Mg growth at 300%+
- 1955—6150 Plants; 1991—3200 Plants



2008 Shipment Mix: Sales



Casting End-Use Markets



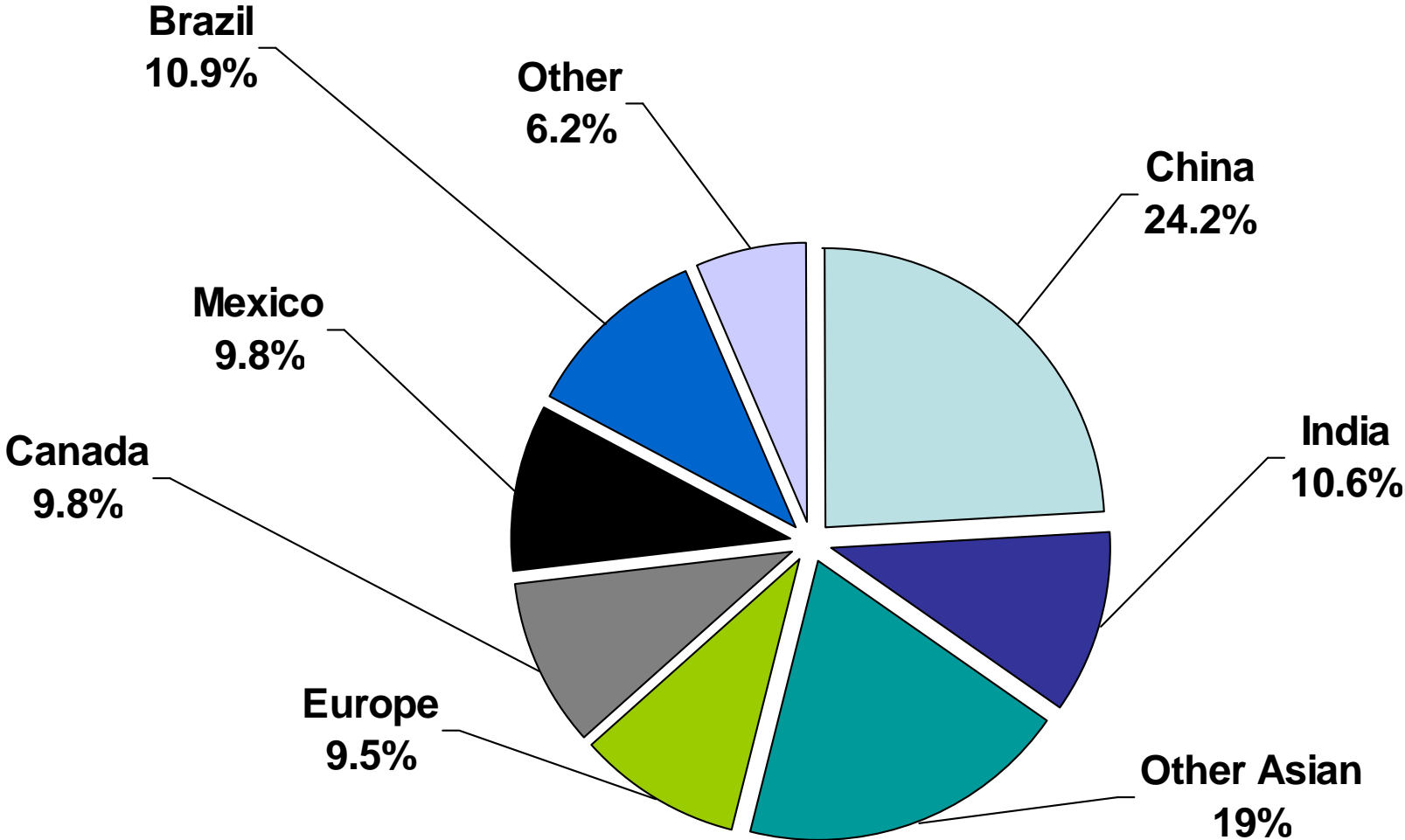


Imports 2008

3.1 million tons of
castings imported

23% of demand
up from 7% in 1998

Imports to U.S. By Country: 2008



Global Production

2008 (metric tons)

1. China: 33 million—26,000 plants
2. U.S.: 10.8 million—2130 plants
3. Russia: 7.8 million—1650 plants
4. India: 6.8 million—4750 plants
5. Germany: 5.8 million—619 plants
6. Japan: 5.6 million—1701 plants
7. Brazil: 3.2 million—1372 plants
8. Italy: 2.6 million—1171 plants
9. France: 2.4 million—469 plants
10. Korea: 2 million—851 plants

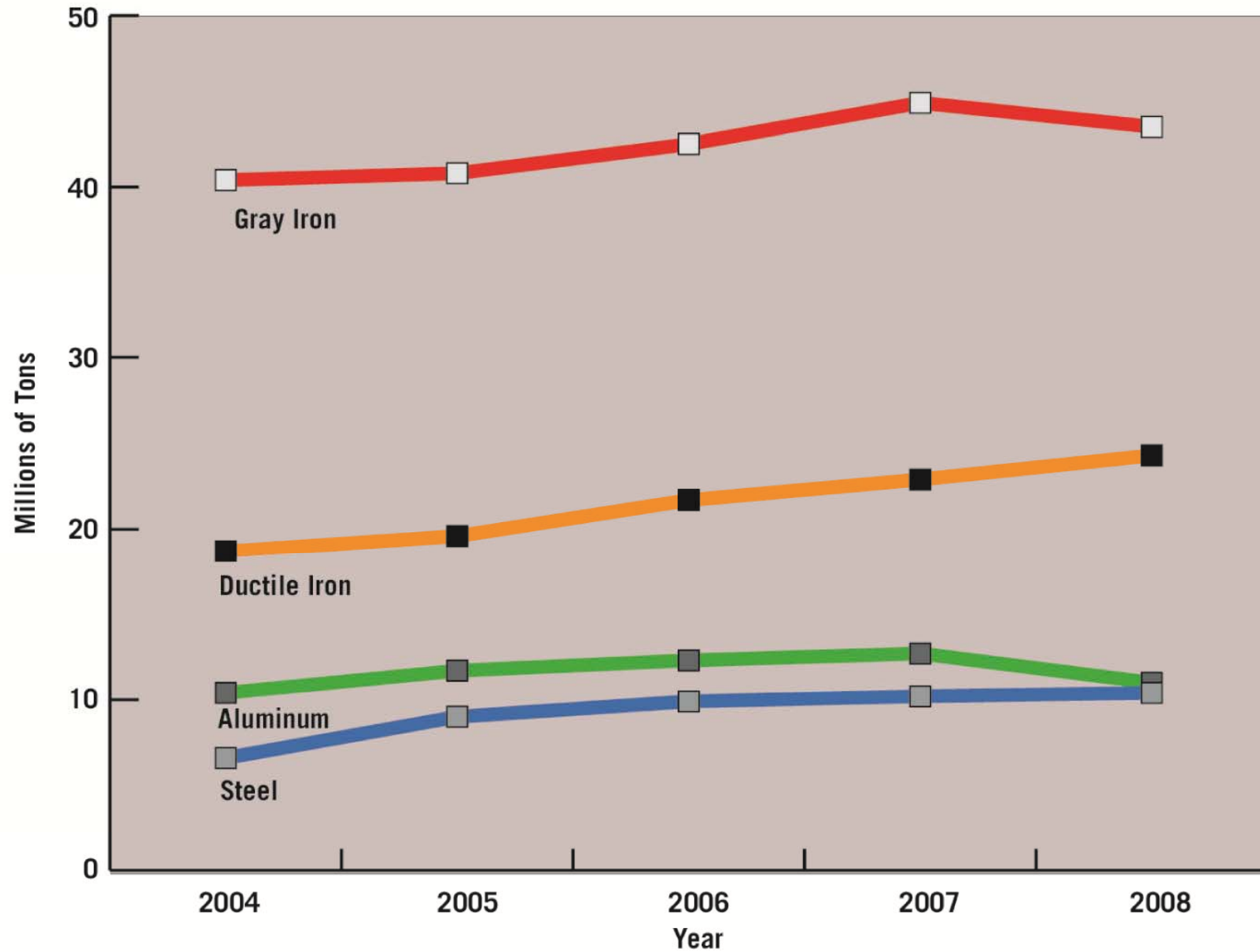


Global Production (in 000s metric tons)

	2004	2006	2008
Gray Iron	40,435	42,539	42,958
Ductile Iron	18,706	21,685	23,841
Mall. Iron	1,122	1,150	1,504
Steel	6,594	9,938	10,538
Cu-base	1,239	1,485	1,808
Aluminum	10,357	12,278	10,932
Mag	134	256	268
Zinc	907	941	664
TOTAL	79,745	91,368	93,449

Global Forecast to 101.7 million tons by 2015

Global Production By Metal



Where Are We Going?



U.S. Metalcasting Forecast



From 2008 to 2015

- **2% Annual Growth Rate in Shipments from 2008 to 2015**
- **2008: 11.07 Million Metric Tons**
2009: 8.17 Million Tons
2015: 11.8 Million Tons
- **From \$31 Billion in sales in 2008 to \$38 Billion in 2015**
- **Return Close to 2005-06 Production by 2015**

Forecast based on GDP, housing starts, auto, railcar and truck production, construction activity, end-user and supplier interviews.

Where Are We Going?

2008 to 2015 Growth

- **Gray Iron**
 - 2008: 3.4 Million Metric Tons
 - 2015: 3.5 Million
- **Ductile Iron**
 - 2008: 3.5 Million
 - 2015: 4.1 Million
- **Steel**
 - 2008: 1.1 Million
 - 2015: 1.2 Million
- **Aluminum**
 - 2008: 1.7 Million
 - 2015: 2.3 Million
- **Copper-Base**
 - 2008: 270,000
 - 2015: 270,000
- **Magnesium**
 - 2008: 110,000
 - 2015: 125,000



Typical Iron Foundry Charge Makeup in U.S.



- Ductile Iron
 - 40-60% returns (gating system, scrap)
 - 20-40% scrap steel
 - 20-35% pig iron; minimize due to cost.
- Gray Iron
 - 40-60% returns
 - 40-60% scrap
 - 0-10% pig iron; Minimize due to lesser chemistry requirements

Iron Markets (LTG to '19)



Gray Iron

- Municipal (4%); Valves/Fittings (2.9%); Construction (3.8%); Light Vehicles (3.7%); Med to Hvy Truck (10.3%)
- Household Appliances (-3.6%); Soil Pipe (-1.3%); Electrical (-1.6%)
- 270 lb of gray iron castings/vehicle in 2005 to 140 lb in 2010 (down from 650 lb in '81).

Ductile Iron

- Construction (5.4%); Valves/Fittings (4.6%); Gears/Power Transmission (6.9%); Light Vehicles (7.6%); Med to Hvy Truck (6.6%)
- All Major markets show growth
- 190 lb of ductile iron per vehicle in 2003 to 150 lb. by 2016



Switch to Al, Mg in Auto

Part	2010	2012
Engine Block	80%	85%
Cylinder Head	99%	99%
Diff Carriers	55%	60-%
Wheels	70%	70%
Suspension	70%	80%

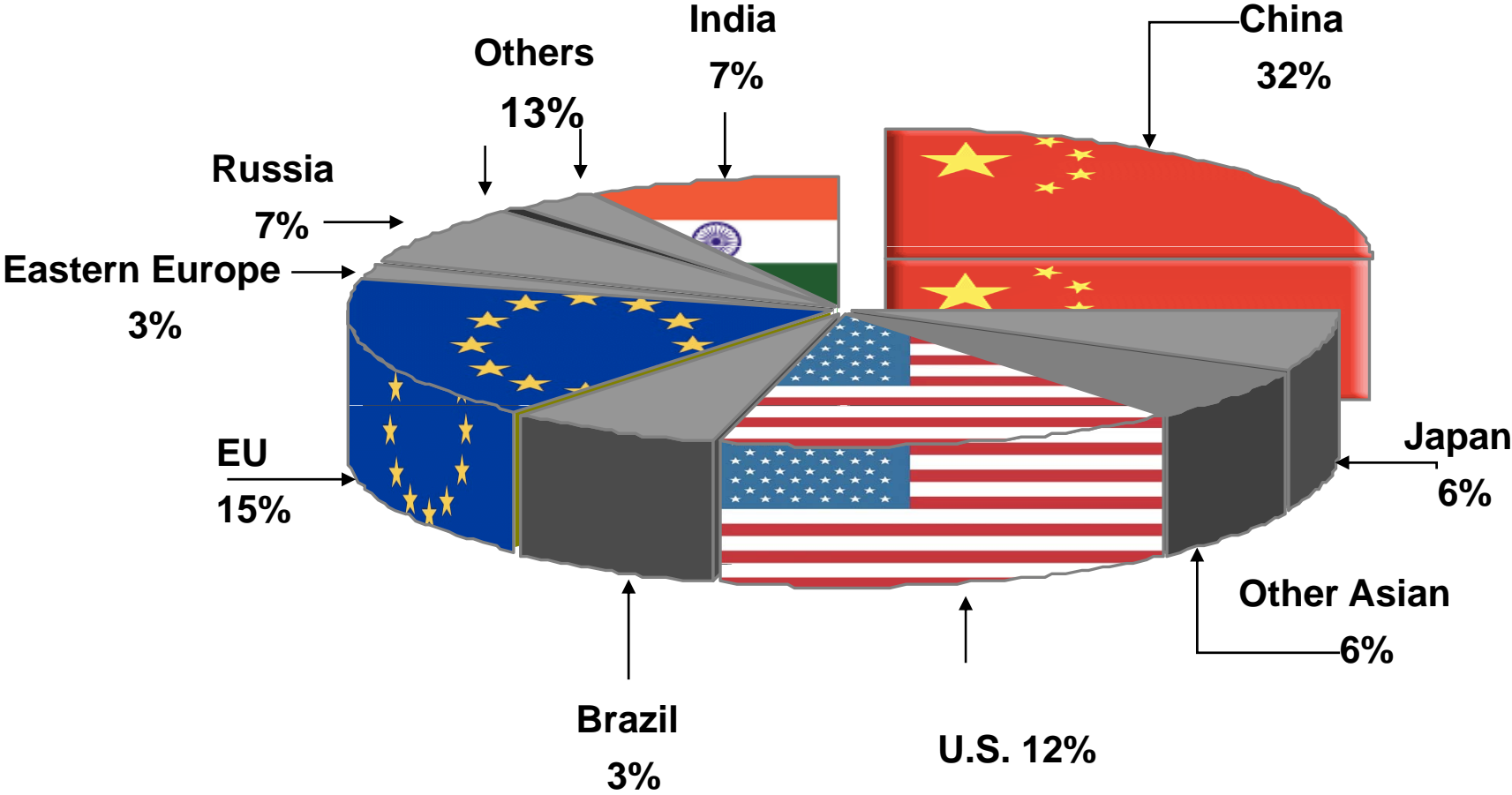
260 lb Al Castings/vehicle in 2008; 280 lb. by 2018
15 lb Mg Castings/vehicle in 2008; 40 lb/vehicle by 2018

Where we are going depends on...

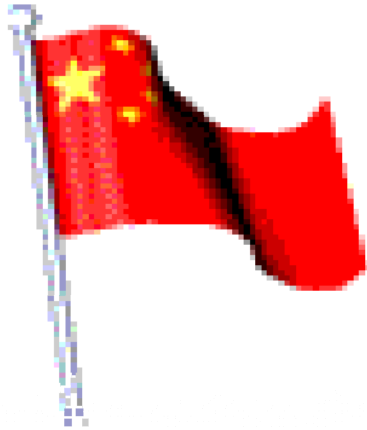
- \$787 Billion U.S. Stimulus Package Passed in 2009
- Climate Change Legislation
- Health Care
- OSHA & EPA Concerns...
Are we part of the solution or part of the problem?
- How we compete globally



Global Production Pie 2008



China



- 25% of output is exported to the U.S.
- Rich in raw materials, but quality is suspect
- CFA says it is working with government to reduce industry to 10,000 casting facilities with same capacity over the next few years
- Auto production of 9.3 million cars in 2008, 16 million by 2012

Casting Shipment (000s tons)

	2006	2007	2009	2010	2015
Gray Iron	13,928	15,460	13,500	13,500	16,100
Ductile Iron	6843	7698	6600	6800	10,800
Aluminum	2300	2740	2300	2400	4000



China Casting Usage Growth from 2008 to 2015 (000s metric tons)

Auto:

- 4,540 to 4,740 tons GI
- 1,760 to 2,460 tons DI
- 2,200 to 3,240 tons AI

Farm & Engine:

- 1,990 to 2,070 tons GI
- 500 to 700 tons DI

Construc. & Mining:

- 930 to 980 tons GI
- 190 to 270 tons DI

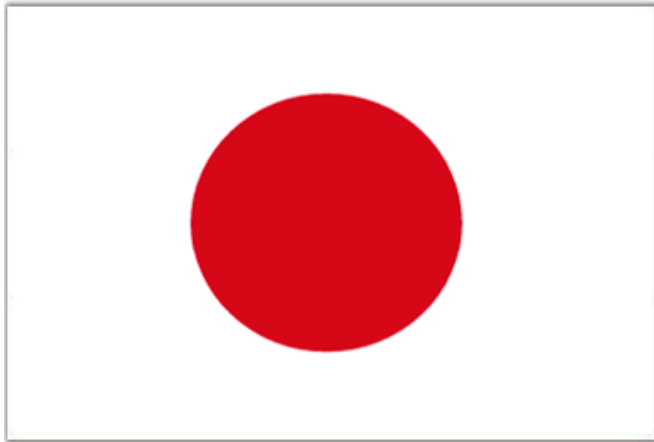
Pipe & Fittings:

- 3,300 to 3,450 tons GI
- 2,900 to 4,070 tons DI

Leisure

- 230 to 320 tons AI

Japan



- Increases in automotive usage and apps to spur aluminum casting demand from 2010-15
- 7.6 million autos to be produced in 2009, significant growth to 2015

Casting Shipment (000s tons)

	2006	2007	2009	2010	2015
Gray Iron	2834	2856	1729	1678	2600
Ductile Iron	2036	2044	1225	1197	2000
Aluminum	1556	1550	933	901	1721

Germany

- Normally a net exporter of castings, exported 400,000 tons of ferrous casting in 2006, imported 250,000 tons
- 33% of gray and 30% of ductile iron production for Western Europe



Casting Shipment (000s tons)

	2007	2009	2010	2015
Gray Iron	2717	1590	1530	1950
Ductile Iron	1855	1070	1038	1895
Aluminum	885	580	580	950

India

- Casting exports to the U.S.—300,000 tons in 2008
- India's car production reached 2.3 million in 2008, is forecast to double in next 5 years.
- In 2009, Asia's 4th largest auto exporter.



Casting Shipment (000s tons)

	2006	2007	2009	2010	2015
Gray Iron	4870	5332	4300	4200	5000
Ductile Iron	762	802	650	640	1000
Aluminum	571	608	550	530	800

Brazil

- Problem with currency has made Brazil uncompetitive internationally last few years
- Brazilian government supports mfg and metalcasting through promotion outside Brazil
- 3 million autos produced in 2007



Casting Shipment (000s tons)

	2005	2006	2007	2009	2015
Gray Iron	1780	1760	1780	1500	1700
Ductile Iron	650	750	780	460	790
Aluminum	210	198	200	120	210

Mexico



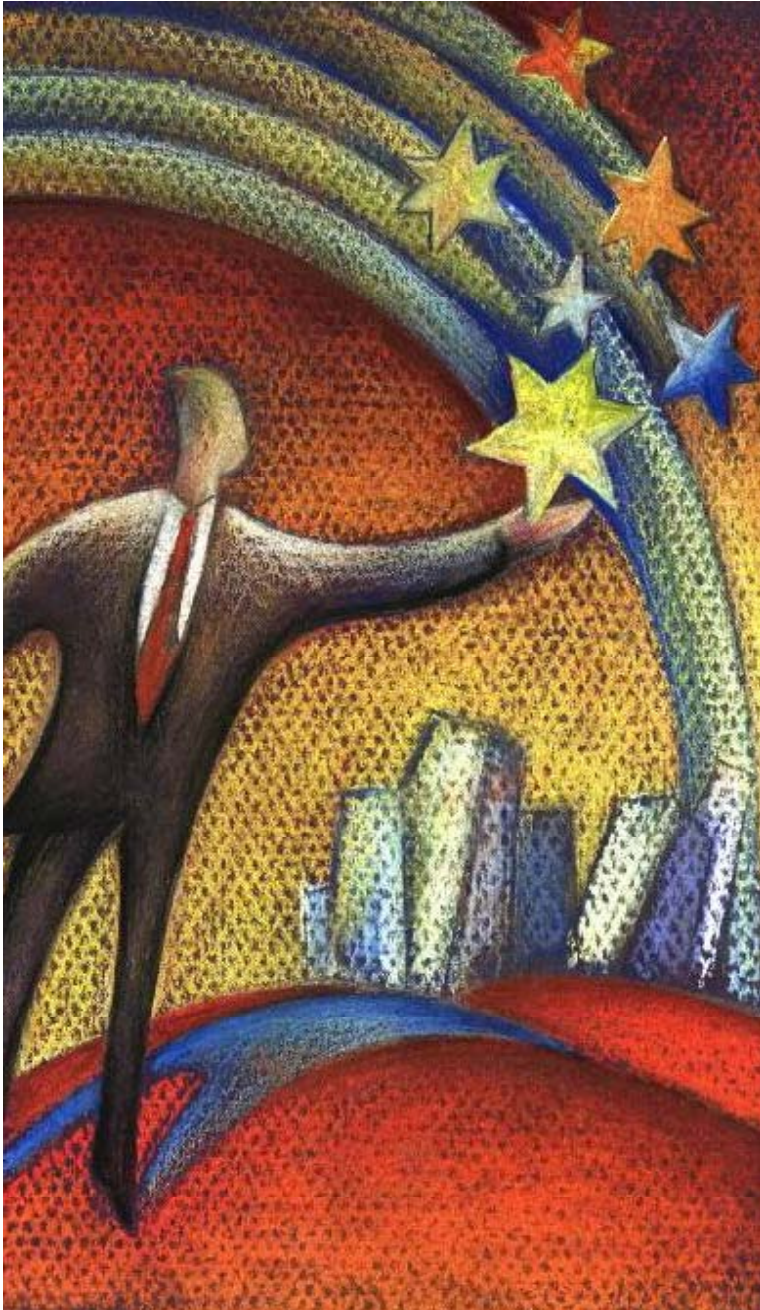
- Casting imports to the U.S.=300,000 tons in 2008
- Growth in Ductile Spurred by New Facilities
- Status of New Facilities: Technocast, Novacast?
- Status of Large Players: Nematik, Cifunsa?

Casting Shipment (000s tons)

	2005	2006	2007	2009	2015
Gray Iron	600	550	700	440	600
Ductile Iron	270	300	350	220	400
Aluminum	550	700	800	540	900



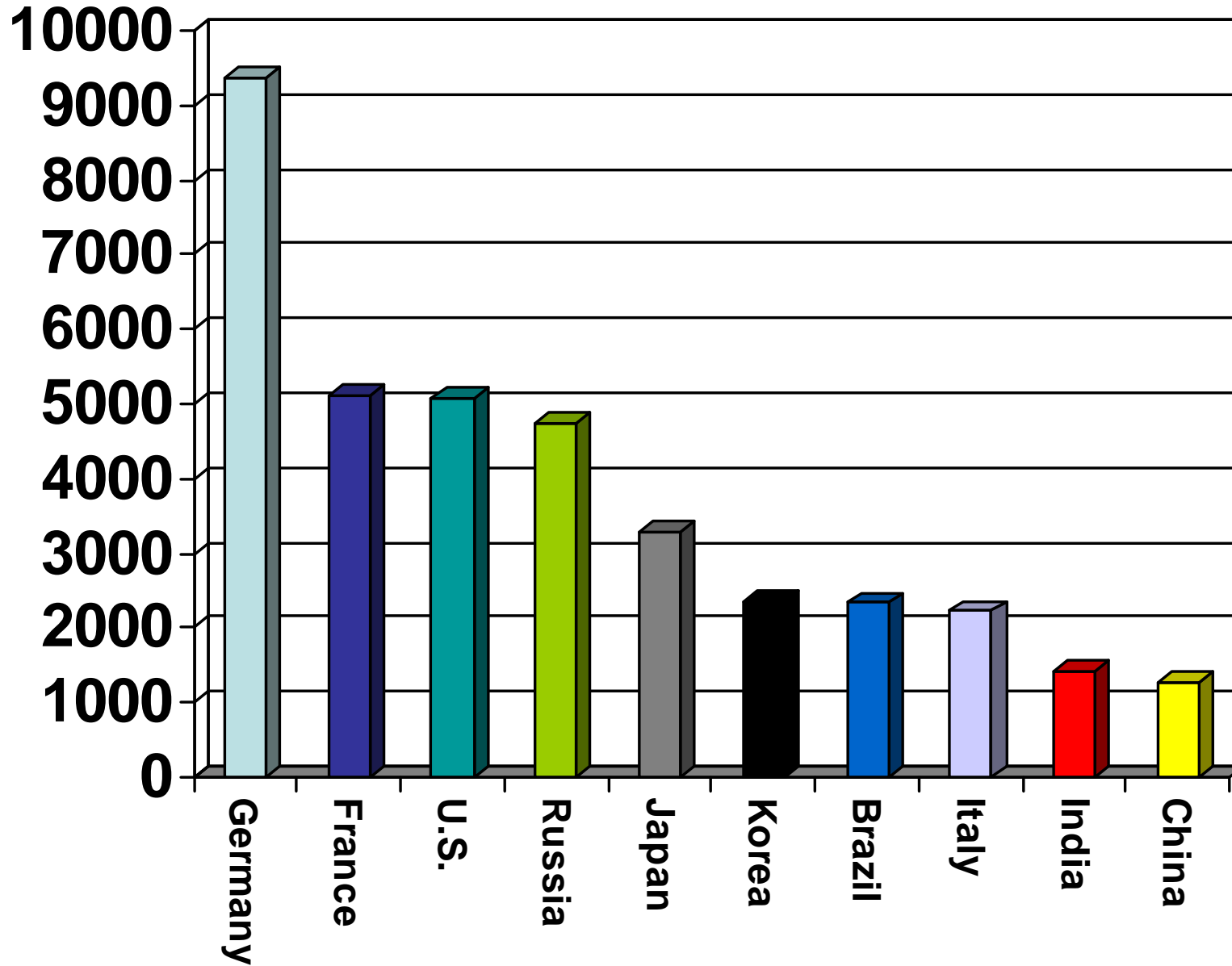
How Does
the U.S.
Compete
in the Global
Market?



Challenges & Opportunities

- Becoming Younger
- Further Productivity Improvements Through Further Technology Adoption
- Growth in Casting Application
- Marketing & PR to:
 - Next Generation
 - Government/Regulators
 - Customers.

Global Production Per Plant



Technology Advancements

- Simulation modeling that optimizes the casting design for you
- Vacuum and pressure assisted casting process for different mold materials and alloys
- Automated pouring designed for job shops—ferrous and nonferrous
- Ablation process for sand casting aluminum
- RP: machining of sand molds; systems for tooling-less sand and investment casting
- Affordable automated casting grinding systems



We are going to...Conversions to Casting



BMW X3 Instrument Panel: One Piece, 12.5 lb Magnesium Die Casting Converted from a Steel Stamping at 50% weight



Rangeland Planter Boot Casting Redesigned from Steel Fab to ADI Casting



**It is about...
Opportunity**

- **U.S. Metalcasting Always Will Be Needed**
- **Global Growth Industry**
- **Growth for New (younger) Leadership**
- **Our Customers Need Technical Support**
- **Ancillary Mfg: Suppliers, Design, Buyers, Lean Mfg...Knowledge is Key**
- **Technology Implementation is Key**
- **PR/Marketing Savvy is Key**
- **Endless List of New Customers, Cast Products**