B-4-3

資料番号＿＿＿＿＿＿

生型研究部会資料

・　・H19/1/18　名古屋開催・・

資料提供
太洋マシナリー㈱
米北　洋一

U.S.Metalcasting:

Competing in a Global Economy

(USA 鋳物事情)

昨年 11 月、弊社営業部員が GK 社(シカゴの技術提携先：General Kinematic Co.,)の Sales Meeting に参加したときの資料です。

U.S. Metalcasting: Competing in a Global Economy

Al Spada
Editor-in-Chief, *MODERN CASTING*
Editor/Publisher, *Engineered Casting Solutions*
AFS Director of Marketing, PR & Communications

Topics

- U.S. Industry Profile
- U.S. Casting Forecast
  - Macro
- U.S. Casting Forecast
  - Metal by Metal
  - End-Use Industries
- Sizing Up the Foreign Competition

Profile of the U.S. Metalcasting Industry

- **2190 Operating Casting Facilities**
  - **700+ Ferrous Foundries**
  - **1400+ Nonferrous Foundries**
  - **Employs More Than 200,000 People**
  - **80% of Foundries Are Small Businesses (less than 100 employees)**
  - **Global Leader in Casting Application; 2nd in Production**

U.S. Metalcasting Plants

In 1955, there were **6150** foundries.

In 2007, there are **2190** foundries.

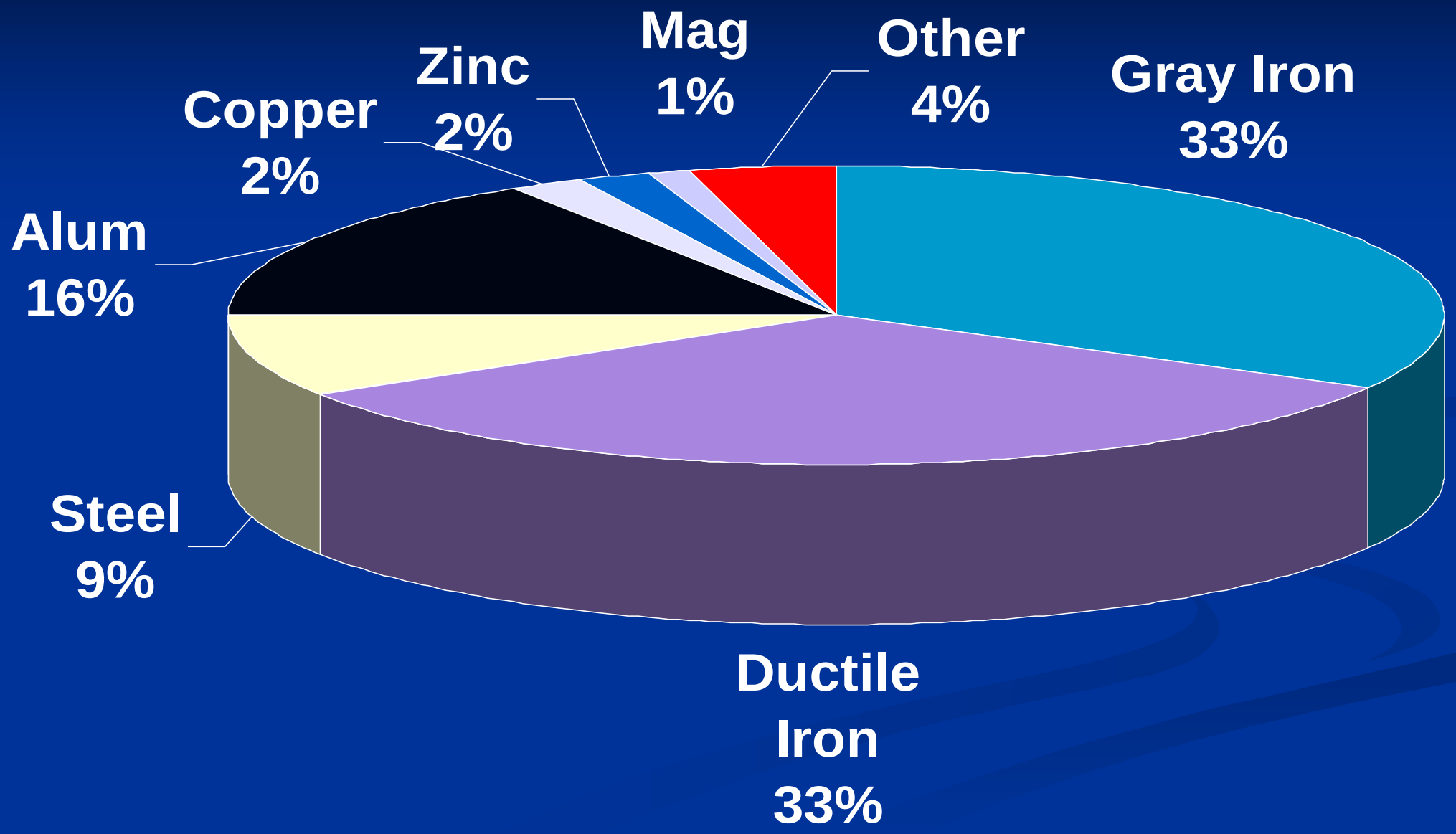
U.S. Casting Industry Profile

- **2005: $33.3 Billion in Shipments; 14.4 Million Tons Shipped**
- **2006: $34.9 Billion; 14.6 Million Tons**
- **2007: $36.3 Billion; 14.57 Million Tons**
- **Operating at 87% of Capacity**

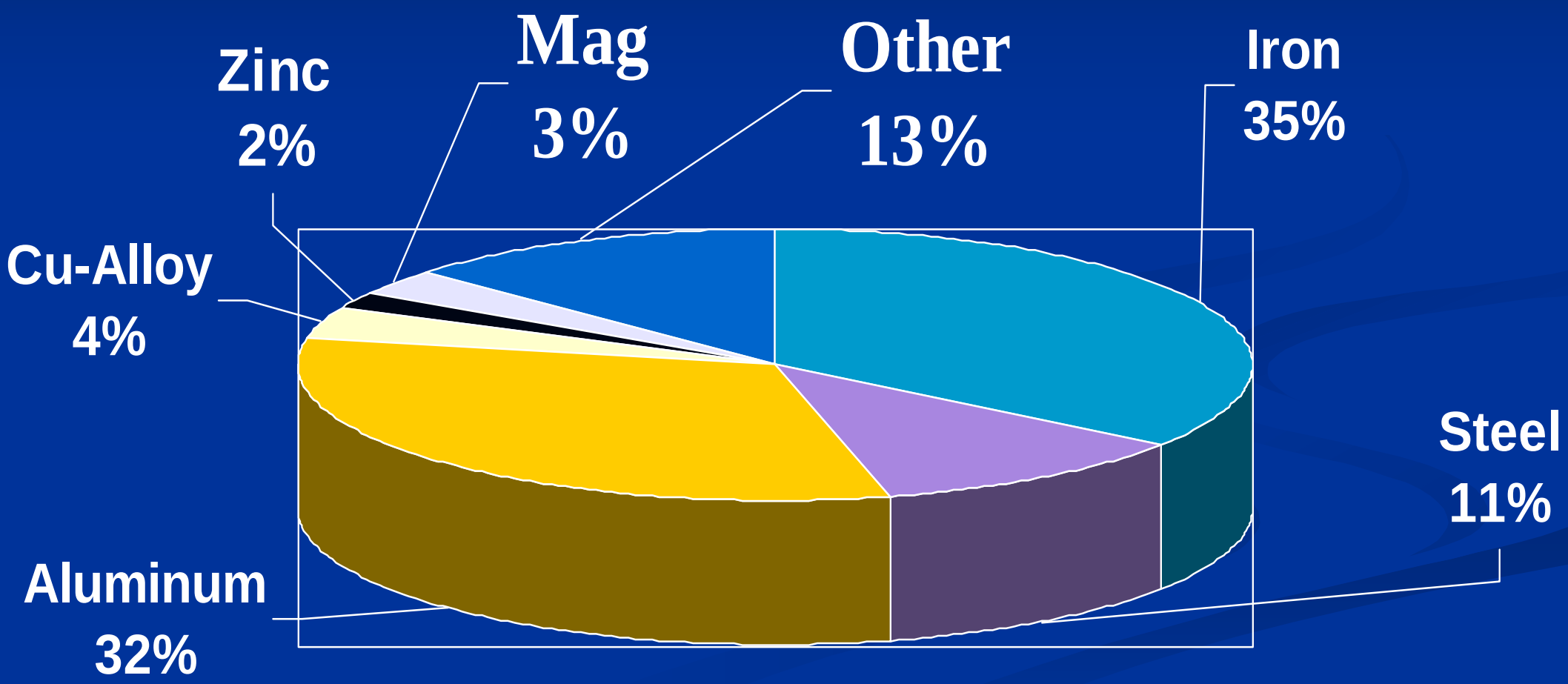
2007 Capacity & Utilization

Metal	Capacity (Tons)	Utilization (%)
Iron	11,200,000	87
Steel	1,510,000	90
Aluminum	2,840,000	84
Copper Base	380,000	88
Magnesium	180,000	88
Zinc/Lead	390,000	87
Other Nonferrous	70,000	86
Investment	230,000	86
TOTAL	16,930,000	87

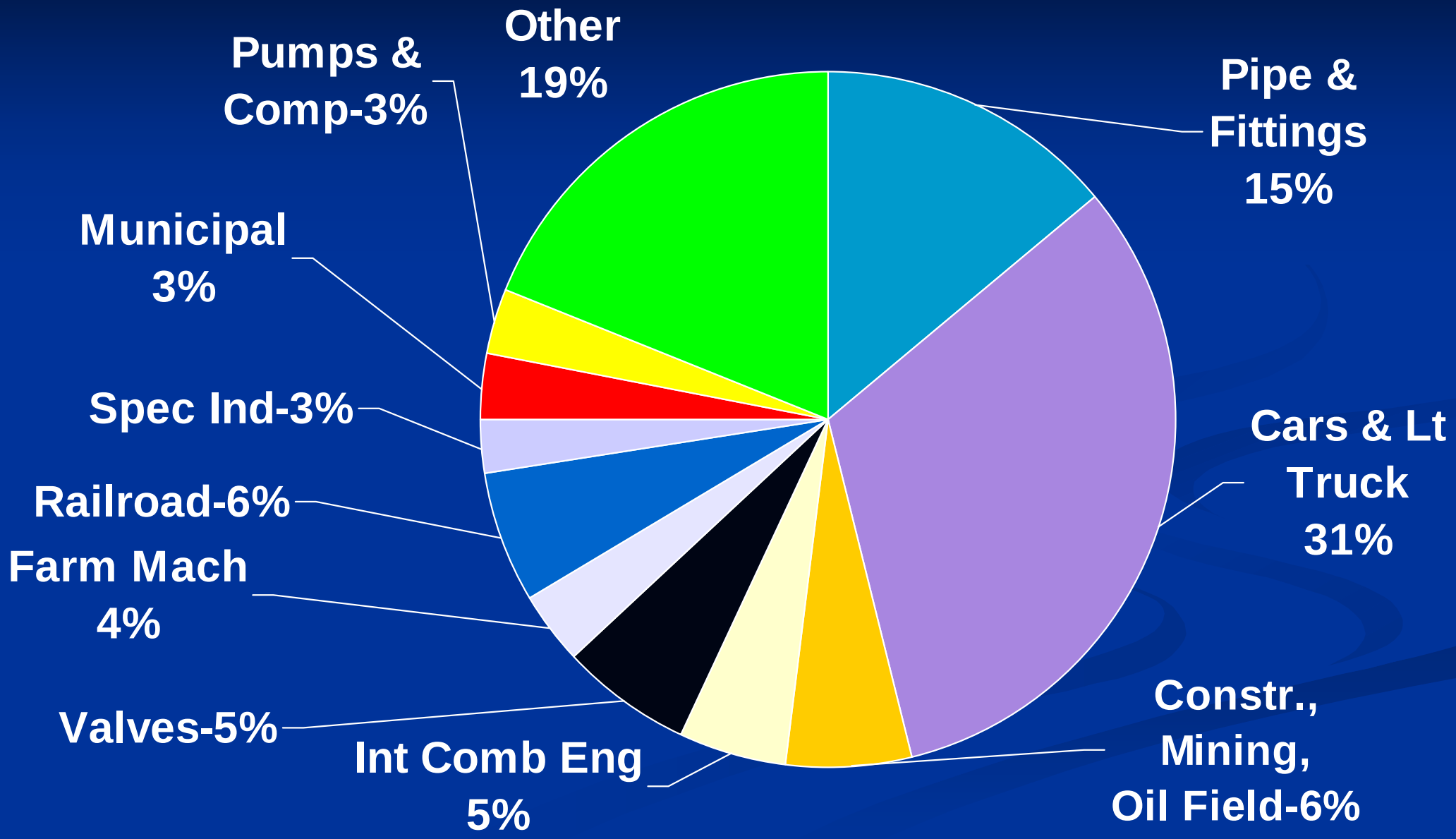
2006 Shipment Mix: Tons



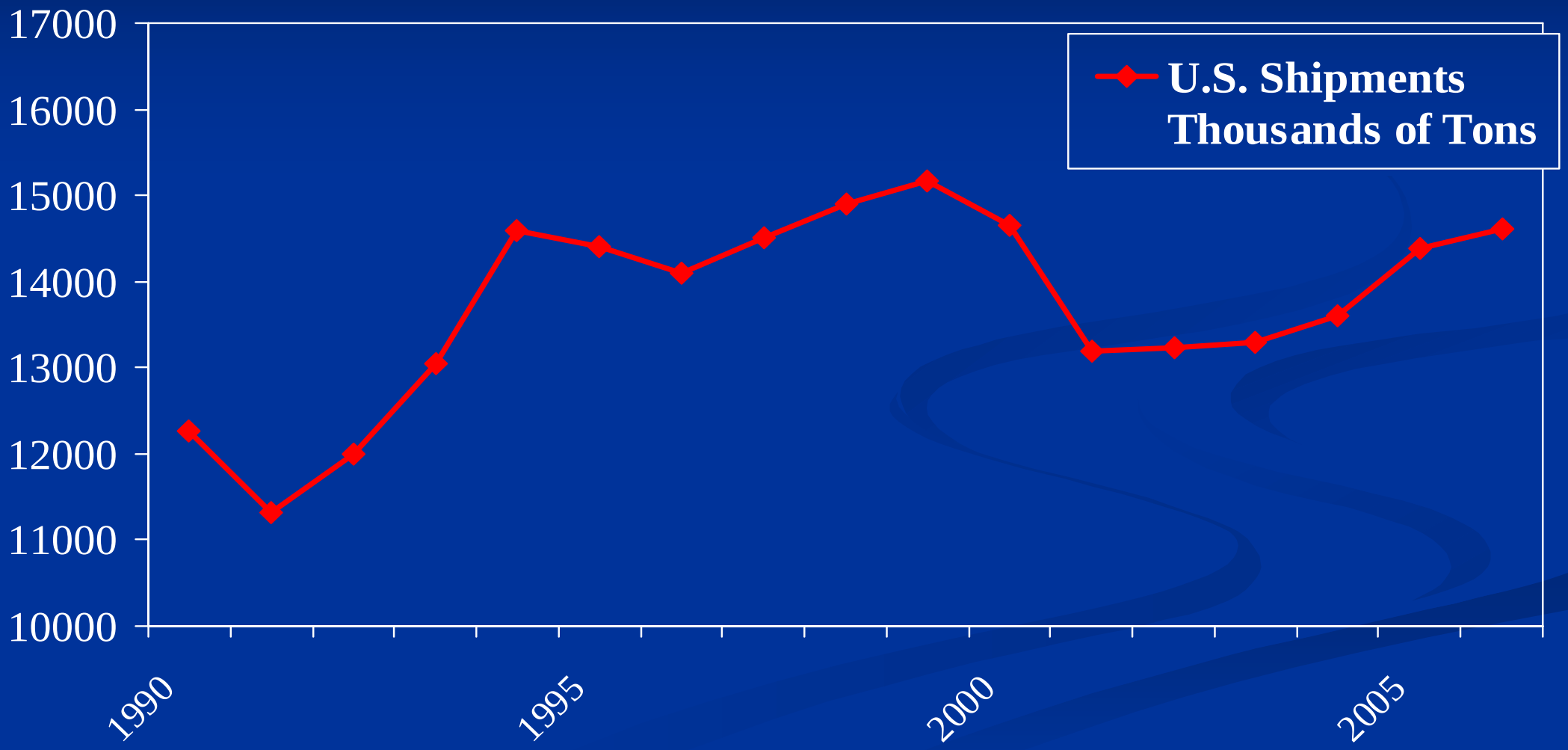
2006 Shipment Mix: Sales



Casting End-Use Markets

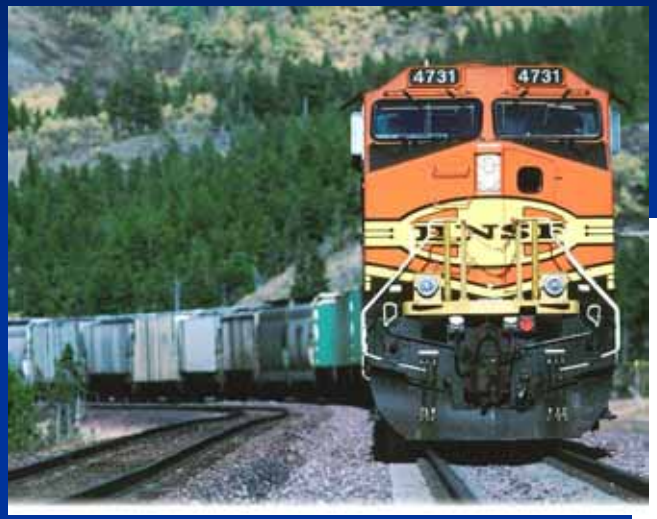


Cast Shipments 1990-2006



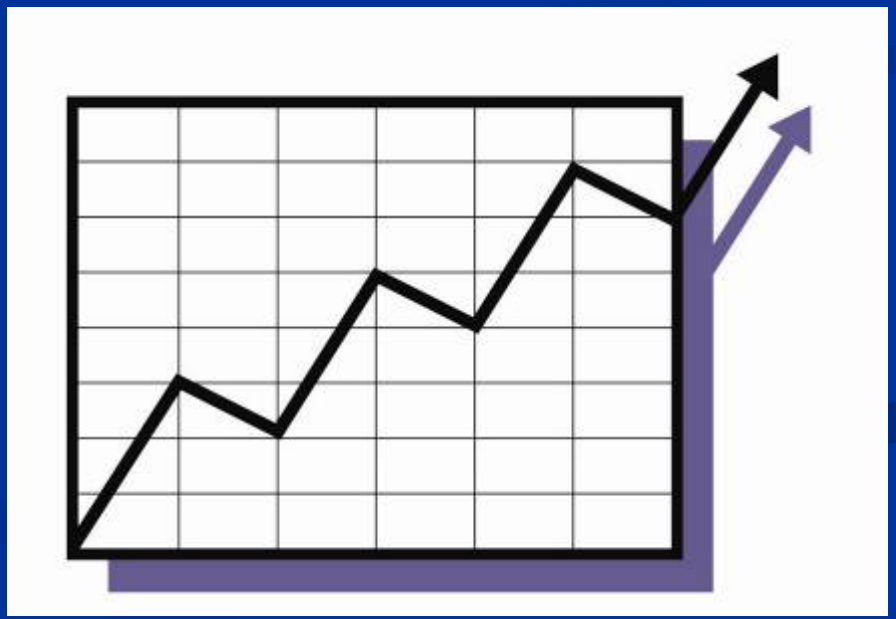
Forecast By Metal & Market

Casting Demand is Strong in Most Markets, Most Metals



PROJECTED SHIPMENTS

- **$37.7 Billion in Sales in 2008**
- **14.61 Million Tons of Shipments in 2008**
- **Lower tonnage than previously forecast, due to increased aluminum in auto and heavy truck**
- **Growth of 22% in sales; 9% in shipments from 2003-2008**



WHY?

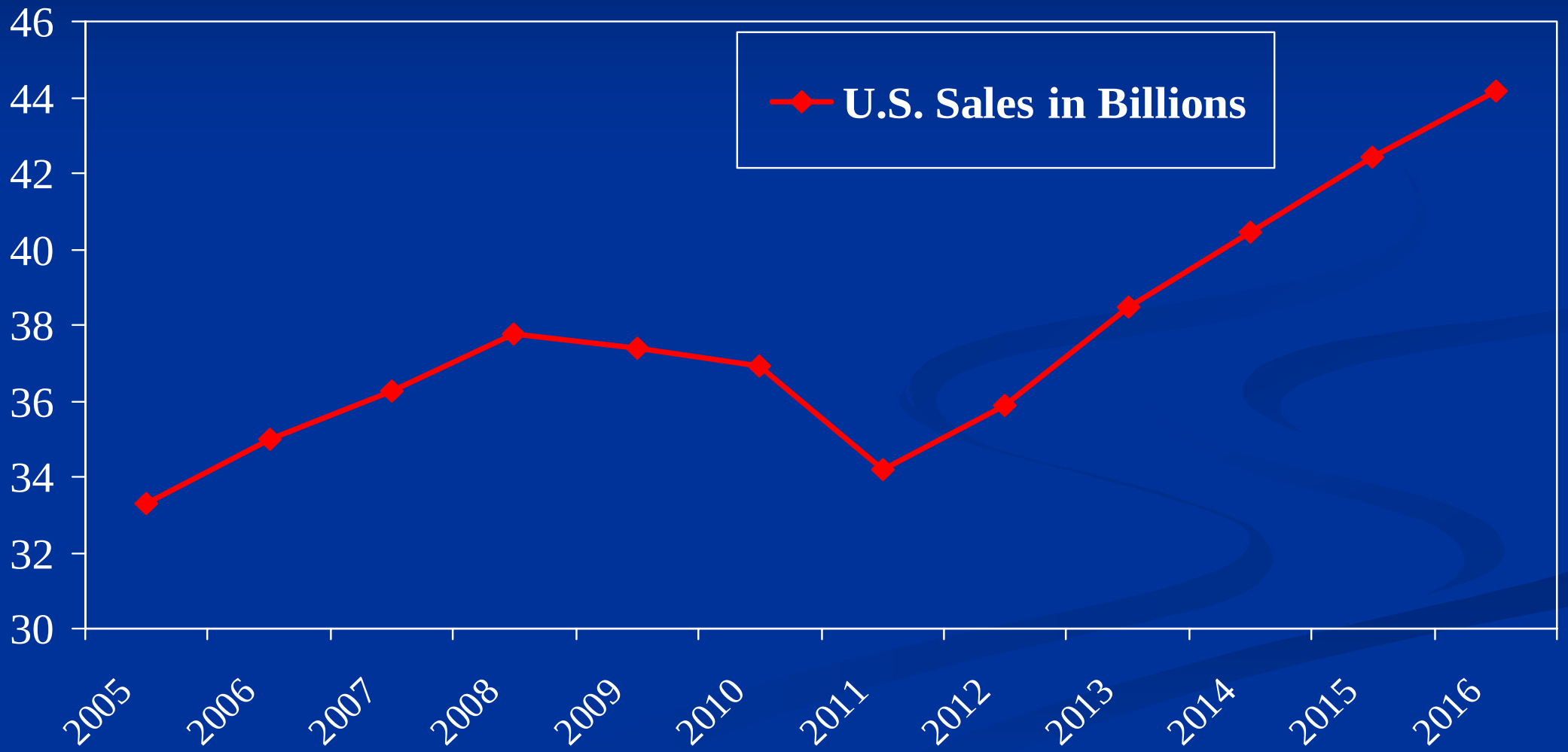
"One fundamental that drives our economy in a predictable manner is consumption. Baby boomers are entering peak earning and spending years from 2004-2009."

Casting shipment forecasts based on forecasts for:

- GDP
- Housing Starts
- Auto, Railcar and Truck Production
- Construction Activity

Shipment Forecast Through 2016

Sales Forecast Through 2016



What Happens in 2011?

- Cyclical economic recession is expected every 10 years, affecting auto, railcar, heavy truck, construction, etc.
- Happened in 2001, 1991, 1981, 1971, etc.
- Forecasted by economic experts for 2011
- Similar Shipment tonnage as 2001
- Sales to be at $34.2 Billion

Gray & Ductile Iron Trends

- **2006 Shipments:** 4.774 million tons gray iron (-15% from ‘00); 4.772 million tons ductile iron (+9.5% from ’00)
- **2007 Forecast:** gray down less than 1% in shipments ($5.3 billion); ductile up less than 1% ($6.7 billion)
- **2016 Forecast**: gray down 7.7% in shipments; ductile up 4.6% in shipments

Gray Iron Heat Exchanger

Break Away Hinge

Iron Trends

Gray Iron

- Pumps & Compressors (0.6%); Construction Equipment (0.2%)
- Household Appliances (-5.8%), Soil Pipe (-4.1%); Sanitary/Radiator (-4%)
- 270 lb of gray iron/vehicle in 2005 to 140 by 2012 (down from 650 lb in ‘81).

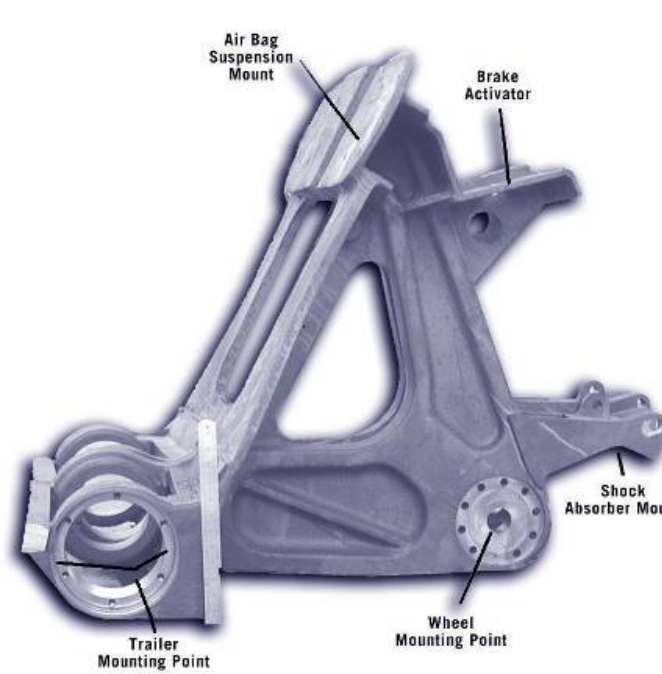
Ductile Iron

- Construction 1.9%); Special Ind. Machine (1.6%); Gears/Power Transmission (1.6%); Light Vehicles (-1%)
- 190 lb of ductile iron per vehicle in 2003 to 150 lb. by 2016

Ductile Iron Drive Wheel Converted From Fab

Iron Trends: ADI & CGI

- ADI: finding new inroads replacing forgings.
- ADI: 18% growth from 2004-08.
- ADI: Reached 4% of ductile iron shipments (excl. pipe) in 2005, and is forecast to grow to 8.1% by 2008
- CGI: 2007 Forecast-126,000 tons; 2009-146,000 tons; 2016-174,000 tons
- CGI: Markets in motor vehicles and internal combustion engines (engine blocks and heads in diesel engines, bedplates, gear covers)



ADI Truck Suspension Bracket

CGI Brake Drum

Steel Trends

- **2006 Shipments:** 1.49 million tons (+9% from ‘00)
- **2007 Forecast:** -9%
- Annual Growth/Decline through 2016: -2% overall;
  - Pumps (0.8%)
  - trucks/military (-7%);
  - Railroad (-3.2%) with 62,000 freight cars (reduction from 2006, reduction expected for 2008)
  - Oil Field (-2%)

Locomotive Axle Housing

Diving Helmet

Aluminum Facts

- **2006 Shipments:** 2.3 million tons
- **2007 Forecast:** +2% ($11.2 Billion)
- 10 Yr Trend: 1.6% annual growth
- Annual Growth/Decline By 2016
  - Motor Vehicles (1.9%)
  - Marine (1.9%)
  - Refrg/AC (1.8%)
  - Instruments (1.4%)
  - Computer/Office (-4%)

Vehicle Hull Section

The Switch to Aluminum

Part	2005	2007	2009
Engine Block	50%	60%	75%
Cylinder Head	93%	96%	98%
Intake Manifold	33%	24%	10%
Transmission Case	98%	97%	97%
Wheels	75%	70%	70%
Suspension	30%	45%	50%

130 lb Al Castings/vehicle in 1992; 260 lb. in 2007; 280 lb by 2016

Copper Base Trends

- **2006 Shipments:** 328,000 tons
- **2007 Forecast:** +2%.
- **10-Year Trend:** -0.6% annual decline through 2016.
- **Annual Growth/Decline by 2016**
  - Plumbing/Sanitary (-2.3%)
  - Industrial Valve (-2.5%)
  - Marine (+1.9%)

Oscar: Permanent Mold Cast Copper

Magnesium Trends

- 2007 Forecast: 170,000 tons.
- Shipments increased more than 50% last five years
- 10-Year Trend: +4% annual growth.
- To grow from 13 lb/vehicle in ‘05 to 26 lb/vehicle by 2016
- New Mg Motor Vehicle Apps: Seat Frames, Instrument Panels, Steering Column Supports, Wheels, Transmission Cases, Engine Valve Covers

Shift Assembly

Mg Intermediate Case

Superalloys Trends

(NI, Co, Ti; non investment casting)

- 2007 Shipments: 59,000 tons
- Long-Term Growth: 2% annual through 2016
- Major Markets (annual growth through 2016): Valves (+1.8%), aircraft & aerospace (7%), pumps (2.5%)

Zinc & Lead Base Die Casting Trends

- **2007 Forecast:** slight decline to 330,000 tons.
- **10-Year Trend:** -4% annual decline.
- Zinc casting use in motor vehicles is forecast to go from 60 lb/vehicle in 1970 to 8 lb by 2014.

Investment Casting Trends

(incl. steel, aluminum, copper-base, titanium and other super alloys)

- 2007 Shipments: 198,000 tons
- Long-term annual growth through 2016: 1%
- Major Markets (annual growth): Valves & fittings (+0.9%); pumps (+2.1%); engines and turbines (+2.4%); engine blades (+1.6%)

Potential U.S. Supply Shortages

Gray Iron

- Vertically Parted
  - 1,739,000 tons supply in 2007
  - 1,673,000 tons demand in 2007
  - 1,706,000 tons demand in 2008
- Horizontally Parted Matchplate
  - 1,100,000 tons supply 2007
  - 954,000 tons demand in 2007
  - 972,000 tons demand in 2008

Ductile Iron

- Vertically Parted
  - 1,681,000 tons supply 2007
  - 1,565,000 tons demand in 2007
  - 1,580,000 tons demand in 2007
- Horizontally Parted Matchplate
  - 600,000 tons supply 2007
    530,000 tons demand 2007
  - 548,000 tons demand in 2008

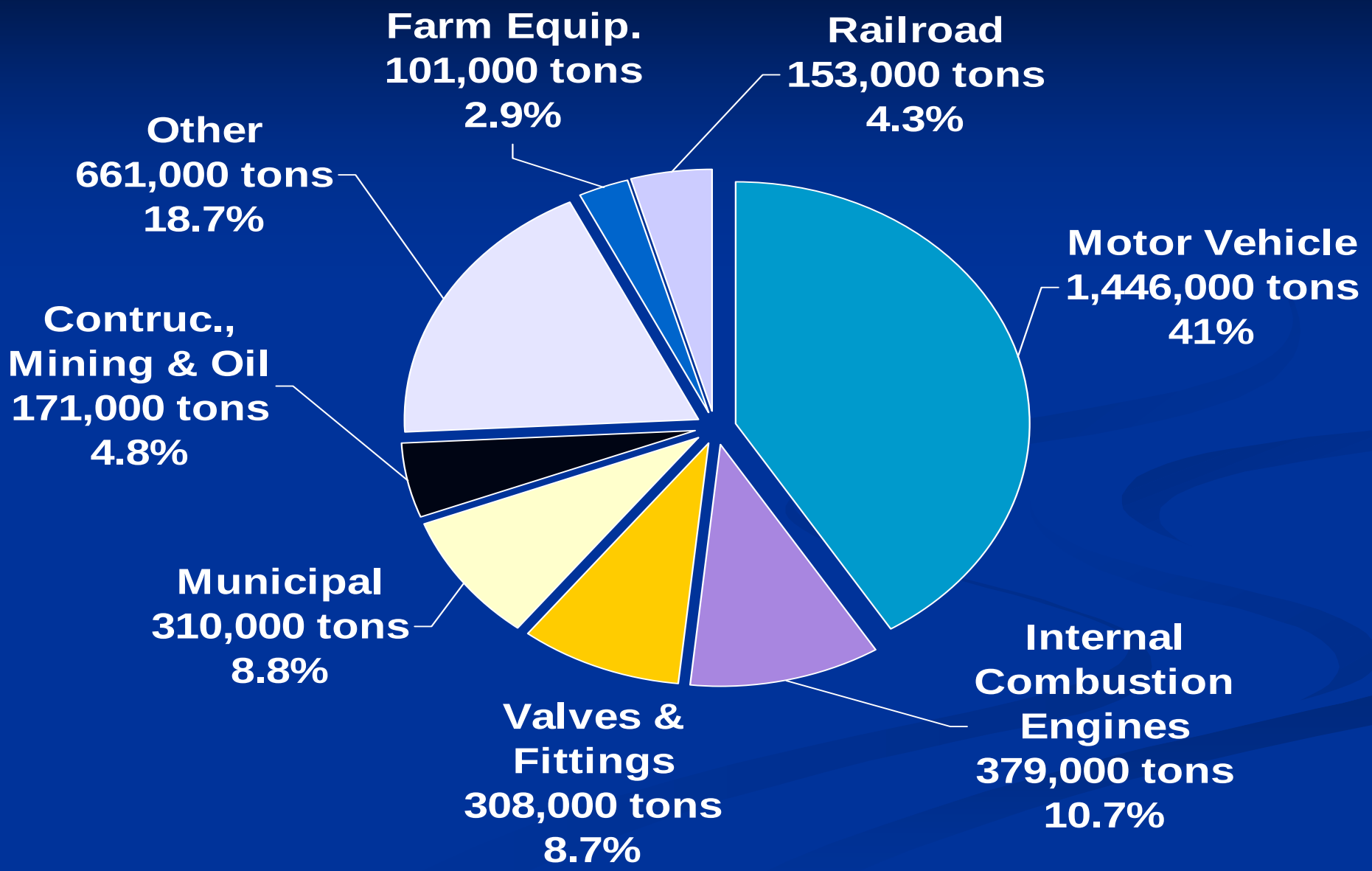
Forecast of Imports: 2007

3,529,000 tons of castings

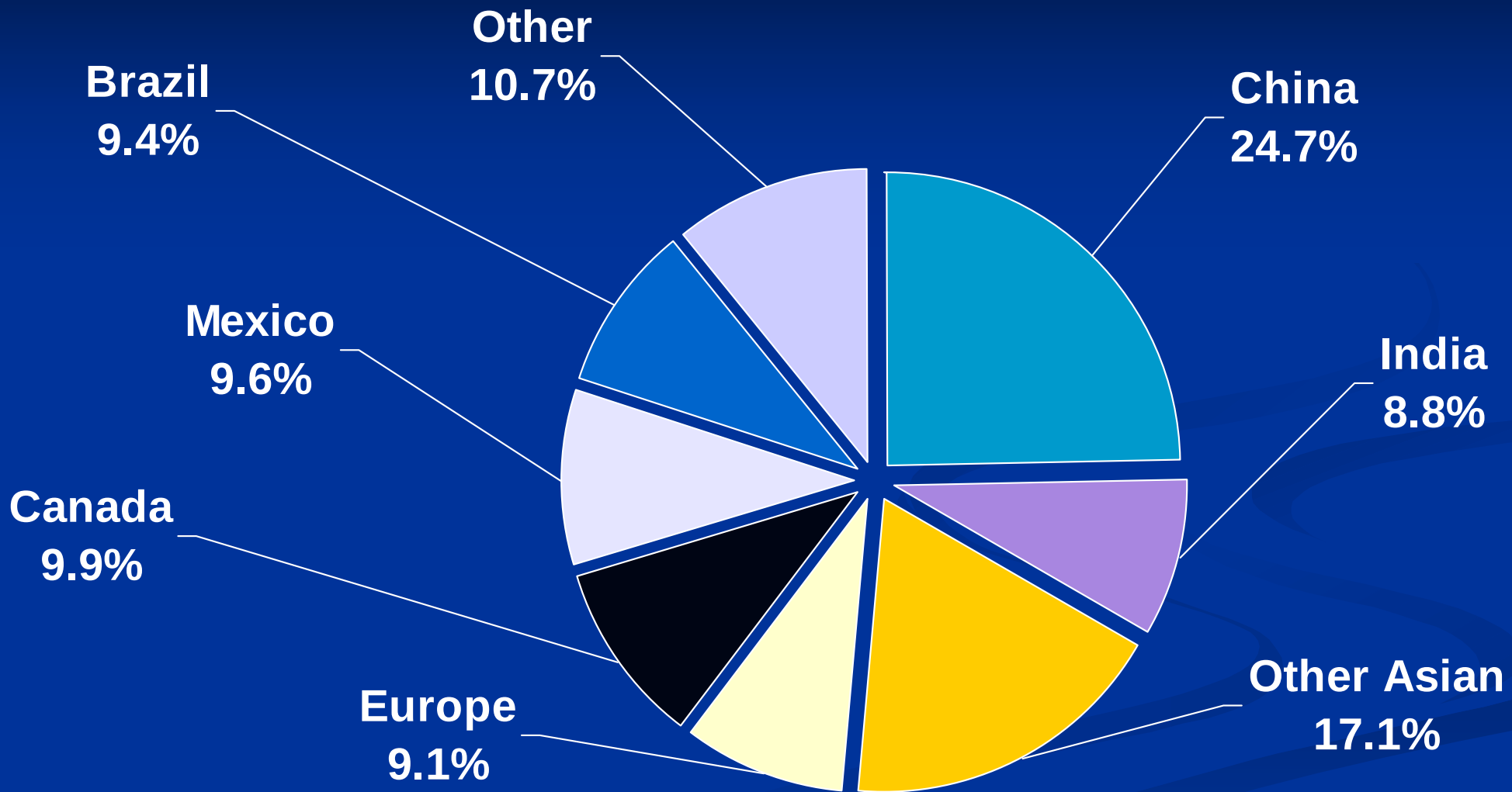
22% of demand (from 7% in 1998)

- Gray Iron: 1,596,000 tons (28% of demand)
- Ductile Iron: 580,000 tons (12% of demand)
- Carbon and Low Alloy Steel: 265,000 tons (21% of demand)
- Aluminum Die Castings: 365,000 tons (24% of demand)
- Aluminum Permanent Mold/Sand: 487,000 tons (38% of demand)
- Copper-Base: 69,000 tons (19% of demand)

Forecast of Imports By Market: 2007



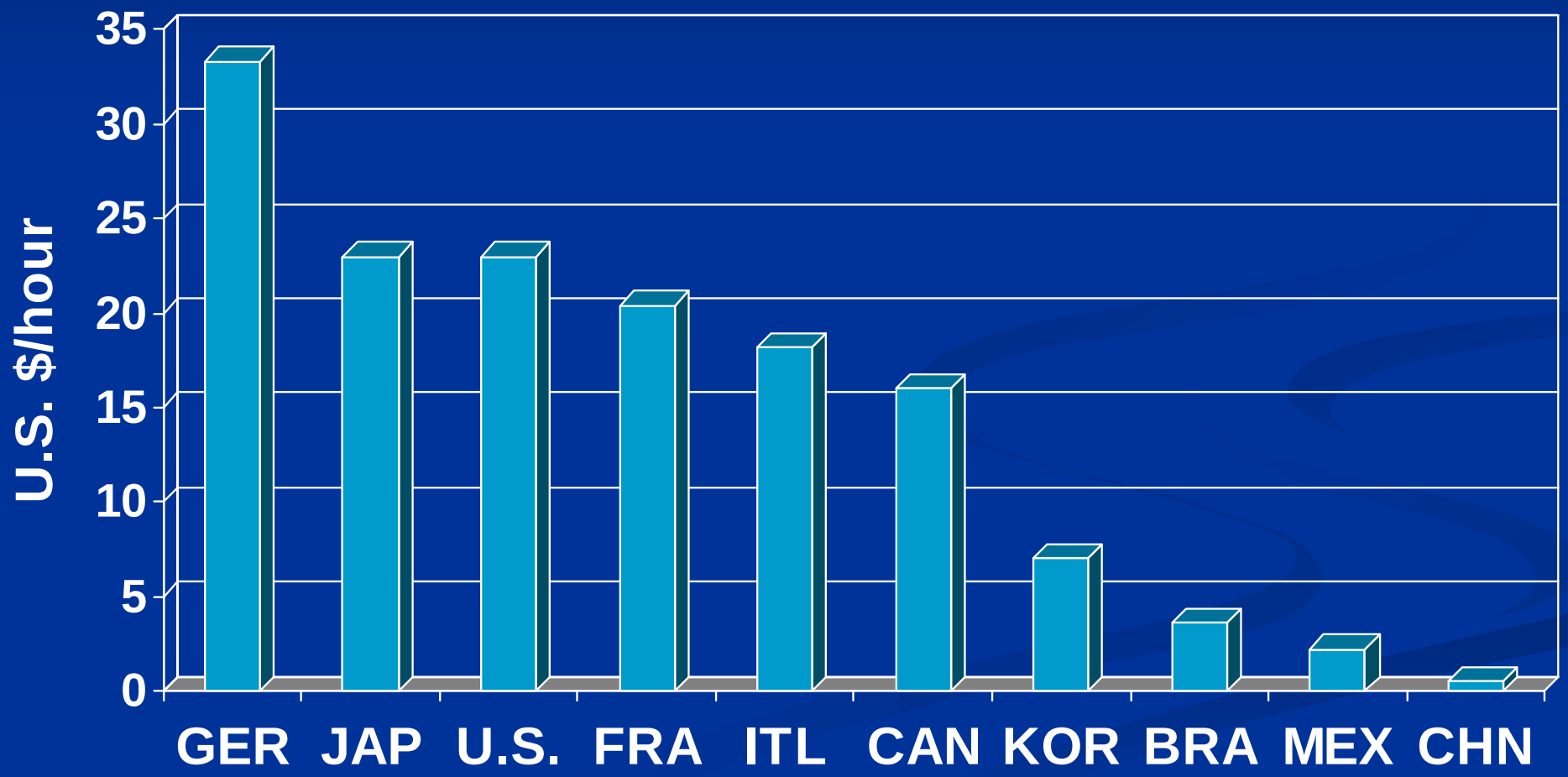
Imports of Castings into the U.S.: 2007



Global Markets

- China
- Brazil
- Turkey
- Russia
- Japan
- Germany
- India
- Mexico

Comparison of Foundry Labor/Benefit Rates 2007



China

- Exported 3.2 million tons total, 870,000 tons to U.S.
- Capacity Utilization: 67% gray iron and 75% for ductile iron and aluminum

Casting Shipment (000s tons)

METAL	2003	2004	2006	2008		
Ductile Iron	3,300	5,603	6,100	6,700		
Gray Iron	10,800	11,267	12,050	12,750		
Aluminum	1584	2475	2772	3,100		

Chinese Casting Usage Forecast for 2008 (Major Markets)

- Auto: 3,760,000 tons GI, 1,540,000 tons DI, 1,620,000 tons Al
- Locomotive: 275,000 tons GI
- Farm & Engine: 1,640,000 tons GI, 440,000 tons DI
- Machine Tool: 975,000 tons GI
- Valves & Spec. Mach.: 280,000 tons GI, 160,000 tons DI
- Construc. & Mining: 780,000 tons GI, 170,000 tons DI
  Electrical/Power Equip: 270,000 tons GI
- Ingot Mold: 930,000 tons GI
- Pipe & Fittings: 2,740,000 tons GI, 2,525,000 tons DI

Japan

- Capacity Utilization: 86% on ductile iron, 67% on gray iron; 93% on aluminum
- 10 million vehicles produced in 2004
- $30/hr total fringe loaded average labor rate

Casting Shipment (000s tons)

METAL	1999	2001	2003	2005	2007	2008
Gray Iron	2490	2396	2456	2600	2500	2450
Ductile Iron	1987	1807	1931	2060	2160	2180
Aluminum	1092	1200	1263	1461	1592	1681

Russia

- Produced 26 million tons of castings in 1991
- Capacity Utilization: 67% for ductile iron, 59% for gray iron, 92% for aluminum
- Inflation hovers between 15-20%; Real GDP from 9 in 2000 to 2 in 2005
- An unknown: Suppliers love the possibilities

Casting Shipment (000s tons)

METAL	2003	2004	2005	2006	2007	2008
Gray Iron	4200	4200	4200	4100	4000	4000
Ductile Iron	320	340	370	400	420	440
Aluminum	420	500	520	550	570	600

Germany

- Capacity Utilization: 92% for ductile iron, 83% for gray iron, 90% for aluminum
- 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)

METAL	2002	2003	2004	2005	2007	2008
Gray Iron	2303	2253	2421	2300	2234	2226
Ductile Iron	1277	1342	1428	1440	1500	1520
Aluminum	661	670	716	718	740	768

India

- Exports to the U.S.=310,000 tons in 2007
- India's car production is forecast to double in 8 years (from 760,000 auto/lt truck in 2001 to 1,100,000 in 2004).
- Capacity Utilization: 84% for gray iron, 80% for ductile iron and 81% for aluminum

Casting Shipment (000s tons)

METAL	2004	2006	2008
Gray Iron	3180	3225	3350
Ductile Iron	442	480	520
Aluminum	300	350	410

Brazil

- Casting imports to the U.S.=330,000 tons in 2007
- Current issues with currency has made Brazil uncompetitive
- Brazil and Mexico are battling for the U.S. diesel engine block and head market. Prices can be classified as “dumping”.

Casting Shipment (000s tons)

METAL	1999	2001	2003	2004	2006	2008
Gray Iron	971	950	1200	1730	1850	1800
Ductile Iron	361	350	400	597	620	650
Aluminum	98	100	140	160	180	200

Brazil

- 46% of gray and ductile iron are auto; 65% of aluminum
- Total Capacity: 2.2 Million tons
- Capacity Utilization: ductile at 90%; gray at 86%; aluminum at 90%
- Casting Plant Cost Structure: 24% metal, 8% energy, 12% binders, 30% personnel, 26% balance
- Utilities—water at $0.20 cu m; electric $0.04-0.06 per KWH
- Brazil produced 2.2 million vehicles in 2004

Turkey

- Capacity Utilization: 83% for ductile, 77% for gray iron, 78% for aluminum
- Steel casting production estimated at 130,000 tons (up 20% from 2003)

Casting Shipment (000s tons)

METAL	1999	2001	2003	2004	2006	2008
Gray Iron	620	615	592	475	640	720
Ductile Iron	136	132	187	308	320	350
Aluminum			51	52	62	78

Mexico

- Casting imports to the U.S.=340,000 tons in 2007
- Capacity Utilization: 73% on ductile iron, 86% on gray iron; 79% on aluminum
- Labor rates are estimated at $2/hr for major metalcasting facilities.
- Domestic vehicle production is 1.5 million in 2004
- Real GDP has grown from -0.4 in 2001 to an estimated 4.2 in 2006

Past, Present Casting Shipment (000s tons)

METAL	1999	2001	2003	2004	2006	2008
Gray Iron	631	650	750	1100	1150	1200
Ductile Iron	44	75	200	270	310	350
Aluminum	454	540	550	540	600	700

U.S. Casting Exports: 2007

- Gray Iron (non pipe/municipal): 583,000 tons
- Ductile Iron: 316,000 tons
- Carbon Low Alloy Steel: 133,000 tons
- Aluminum Die: 212,000 tons
- Fluctuates Based on the Value of the Dollar
- Opportunities for Growth

SWOT Analysis of U.S. Metalcasting

- Strengths
  - Mfg. Engineering skill, raw material availability, close proximity to customer base, communication skills, technology development, time to market
- Weaknesses
  - Labor rates, work ethic/drive, government regulations, size, new technology adoption, fixation on production not profit
- Opportunities
  - Conversions to castings, exports, strategic alliances and joint ventures, value-added services (machining, design services, etc.), educate customer base
- Threats
  - Foreign competition, plastics, powdered metals, fabrications

Thank you!

Questions???

Al Spada, aspada@afsinc.org