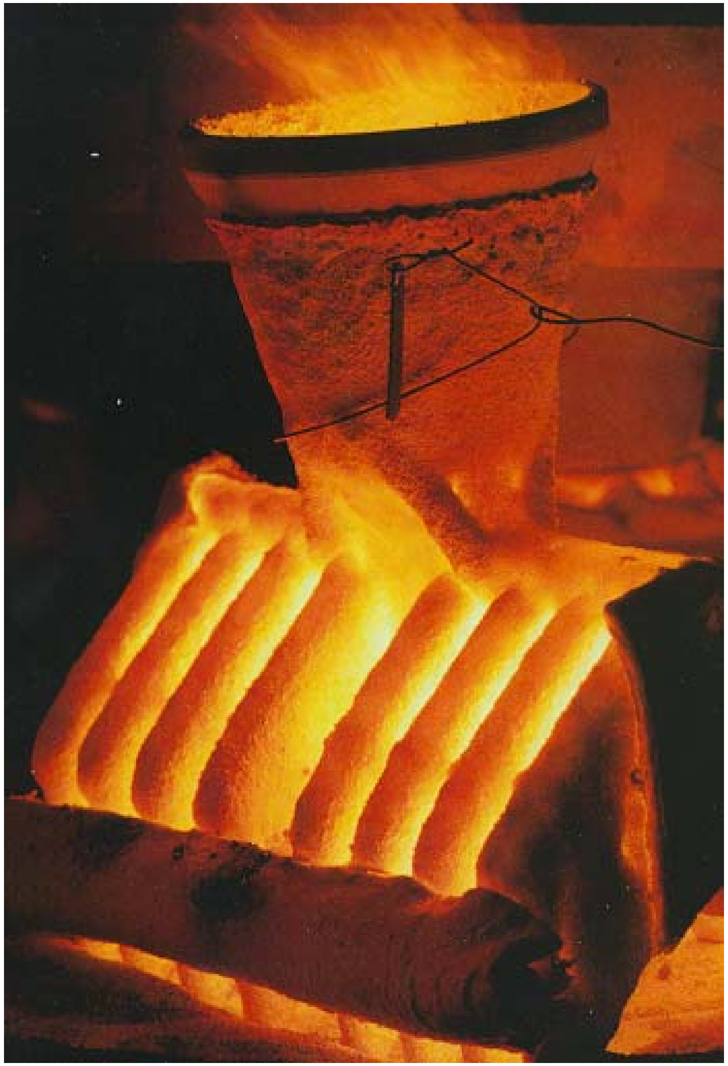


INVESTMENT CASTING MARKET OVERVIEW NORTH AMERICA

INVESTMENT CASTING INSTITUTE
SPRING MANAGEMENT MEETING

Palm Harbor, Florida
March 9-12, 2003

MICHAEL C. PERRY
Executive Director

Investment Casting Trends

- **Segment summary**
  - **Aerospace - No recovery forecasted before 2004**
  - **Power Generation - new IGT builds down sharply & still falling**
  - **Medical - growth continues in implants & surgical instruments**
  - **Automotive - growth in complex applications**

- **Customer expectations**
  - **Demand for annual price reductions - *“productivity improvements”***
  - **Holding of inventory**
  - **Extended payment terms**
  - **Ready-to-assemble components**

Investment Casting Trends - cont’d

- **Global market and sourcing -**
  - **drive for low cost suppliers accelerating**
  - **sourcing activity in China**
- **Industry consolidation continues**
  - **OEMs & subcontractors (casting, forging & machining)**
  - **IC Suppliers**

Market Segments

- **Aerospace**
- **Industrial Gas Turbines**
- **Automotive**
- **Sporting/Recreational**
- **General Industry**

Market Segments

- **Aerospace**
  - **Jet Engine**
    - **Blades & Vanes (Airfoils)**
    - **Integral Wheels & Nozzles**
    - **Hardware and Structures**
  - **Airframe**
    - **Hardware and Structures**
  - **Missile & Rocket Components**
  - **Other Military Ordnance**

Market Segments

- **Industrial Gas Turbines**
  - **Blades & Vanes (Airfoils)**
  - **Hardware and Structures**
  - **Turbine and Combustor Components**

Market Segments

- **Automotive**
  - **Valves**
  - **Turbocharger Components**
  - **Complex Powertrain Parts**
  - **Chassis Applications - Passenger Car and Motorcycle**

Market Segments

- **Sporting/Recreational**
    - **Golf Club Heads**
    - **Other Recreational Equipment**
        - **High Performance Bicycles**
        - **Skate Boards**
        - **Roller Blades**
        - **Personal Water Craft**

Market Segments

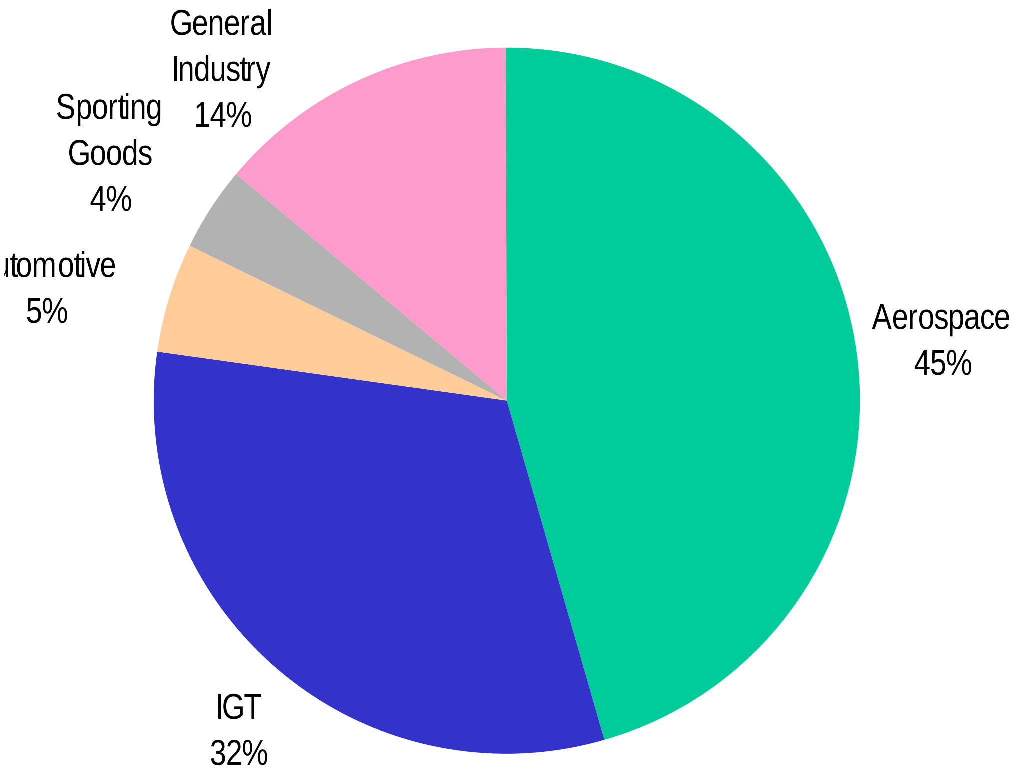
- **General Industry**
  - **Medical**
  - **Industrial Valves& Pumps**
  - **Petrochemical**
  - **Food Processing**
  - **Off-Road Equipment**
  - **Firearms**
  - **Building Equipment**
  - **Hand & Power Tools**

North American Investment Casting 2002 Sales ($ Million - USD)

Chart 1

Aerospace	1,600
IGT	1,100
Automotive	170
Sporting / Recreational	110
General Industry	480
TOTAL:	**$3,460**

Chart 1

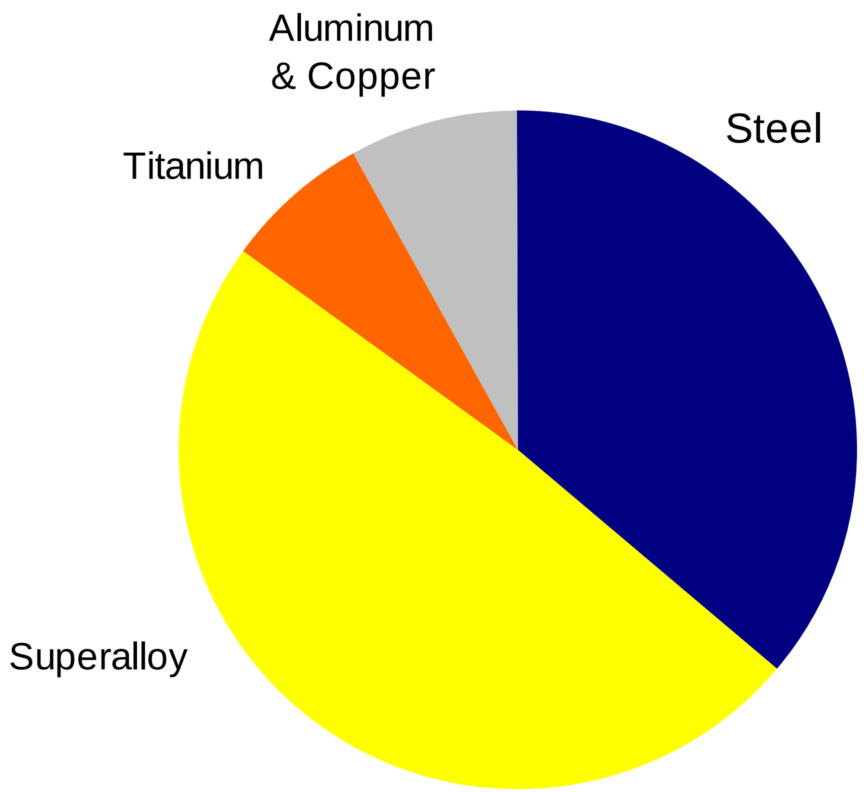


North American Investment Casting Market by Alloy Type

Chart 2

Aluminum & Copper:	8%
Titanium:	7%
Steel:	36%
Superalloy:	49%

Chart 2

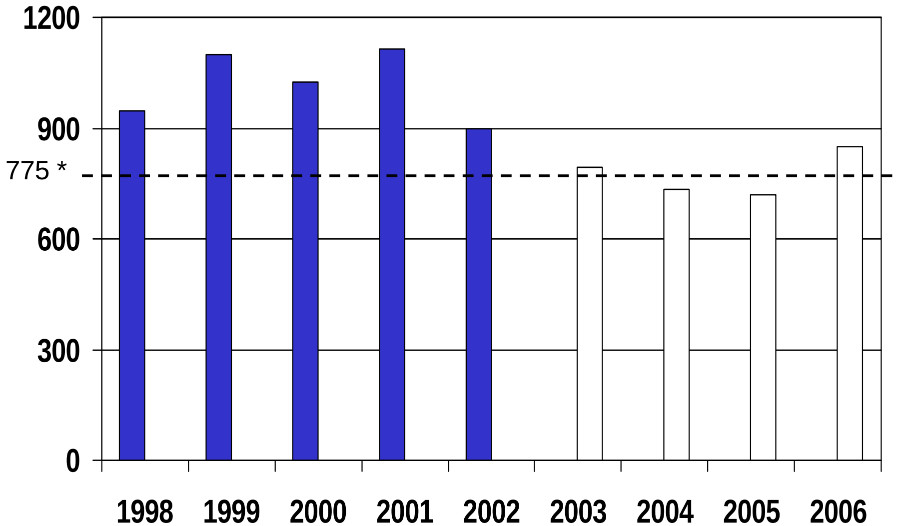


2002 Casting Dollars
$3.460M

Aerospace - Commercial

- Cyclical market - peaked in 2001.
- Casting shipments lead market by 6-9 months.
- Recovery by ‘05?
- Growing fleet will drive engine spare parts, but spares impacted by grounding of fleet to keep load factors up.
- Regional Jets - 25% of total, but may be at peak as fleet replacement is nearly finished.
- Conversion of fabrications & forgings countered by aggressive pricing.

Chart 3
New Aircraft Builds
> 50 Passenger



* Ten-Year Avg. ‘92-’01   ROM Associates: 11-21-02

Aerospace - Military

- **Some increase in engine spare parts for Fighter, Helicopter and Transport aircraft**

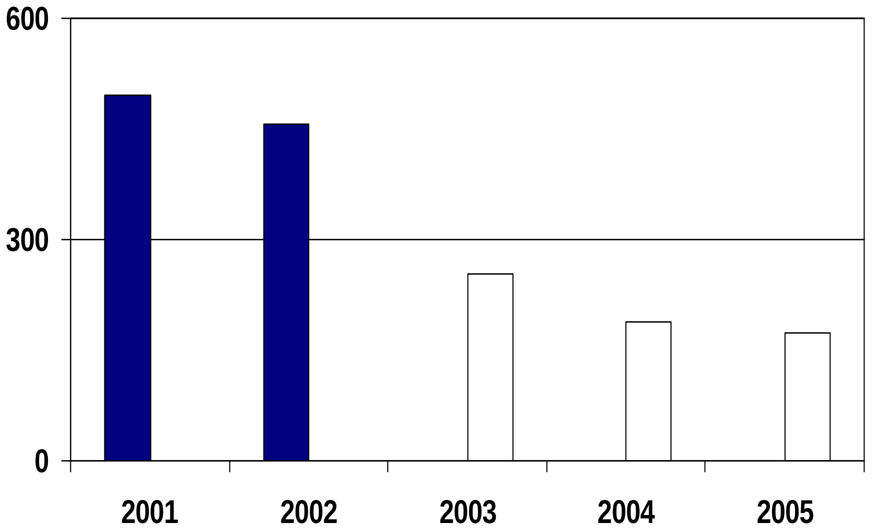
- **Specific Missile and other Ordnance programs being pulled - in**
  - **Lightweight Armament**
  - **Cruise Missiles**
  - **RPV's**

- **Defense budget growth likely to replenish depot inventories and additional support for a war in Iraq**

Industrial Gas Turbines

- Industrial decline has lowered demand.
- Banks unwilling to finance new power generation projects - 'Enron Effect'
- Casting designs becoming more complex & temperature requirements increasing
- Spare parts increasing with installed base.
- Microturbines & Fuel Cells ?

Chart 4
New Land-based Turbine Builds



Automotive

- **Growing market for new casting applications**
- **Driven by new emission standards and fuel efficiency**
- **Trend toward complete assemblies with design & warranty responsibility**
- **Customers require QS 9000 certification & e-commerce capabilities**
- **Increasing interest in Titanium and Titanium Aluminide alloys**
- **Long time required to introduce on new models**

Sporting / Recreational

- **Primarily stainless steel & titanium golf club heads**
- **Business continues to migrate to Asian sources**
- **Cyclical market - currently down**
- **Recent trend toward forged designs**

General Industry

- **Commercial and documented castings**
- **Widely dispersed among many casting suppliers**
- **Significant sourcing activity in Asia, Mexico and Eastern Europe**
- **Economic downturn effect**
- **Need to find Niche market applications**
- **Need to develop new casting applications with Value Added operations**

North American Investment Casting
2003 Estimated Sales ($ Million - USD)

		% Change
Aerospace	**1,500**	**(6)**
IGT	**900**	**(18)**
Automotive	**180**	**6**
Sporting / Recreational	**80**	**(27)**
General Industry	**460**	**(4)**
TOTAL:	**3,120**	**(10)**

Summary

- **Overall North American market is down from record high levels**
- **Specific market segment growth opportunities**
- **Trend toward more complex castings - leveraging the IC process**
- **Customer desire for ready-to-assemble components**
- **Customer demand lower cost, holding of inventory & extended payment terms**
- **Globalization and Industry consolidation continues**

Acknowledgement

The Investment Casting Institute wishes to acknowledge the following Member Companies for their contribution to this report.

- **ESCO Turbine Group**
- **Hitchiner Mfg. Co.**
- **Howmet Corporation**
- **Southern Tool, Inc.**
- **Wisconsin Precision Casting Corp.**