

INVESTMENT CASTING MARKET OVERVIEW NORTH AMERICA

INVESTMENT CASTING INSTITUTE
SPRING MANAGEMENT MEETING

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■ 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**



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



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



■ **Aerospace**

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



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



■ **Automotive**

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



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



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

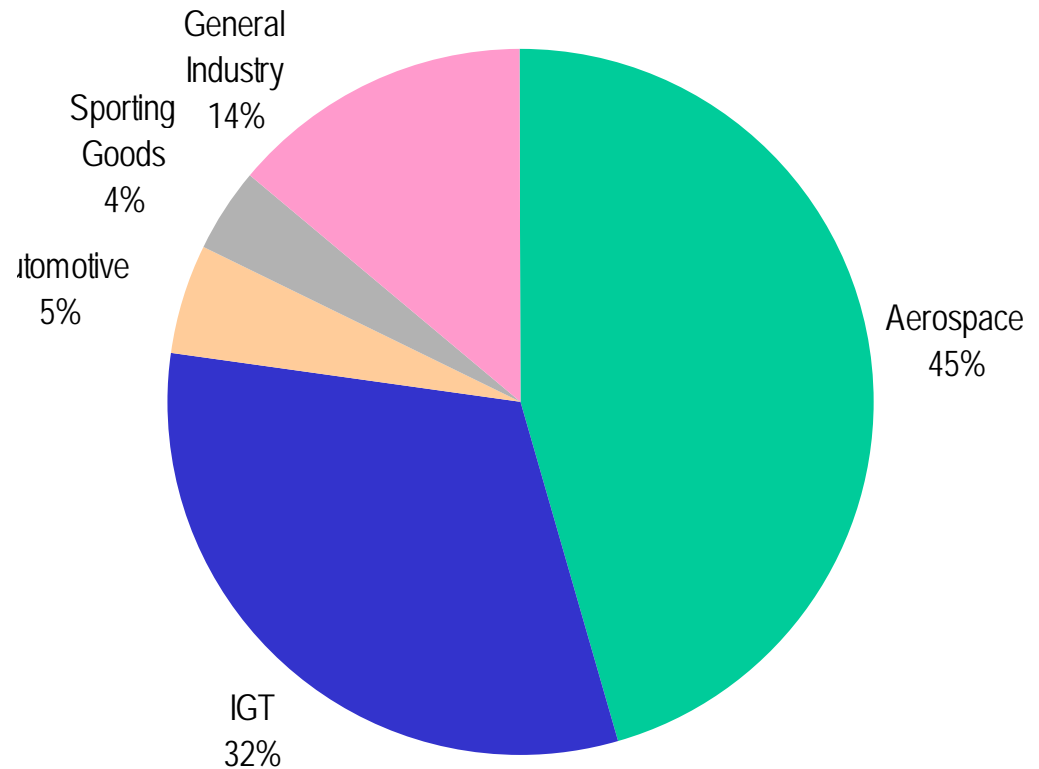
North American Investment Casting 2002 Sales (\$ Million - USD)



Chart 1

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

Chart 1



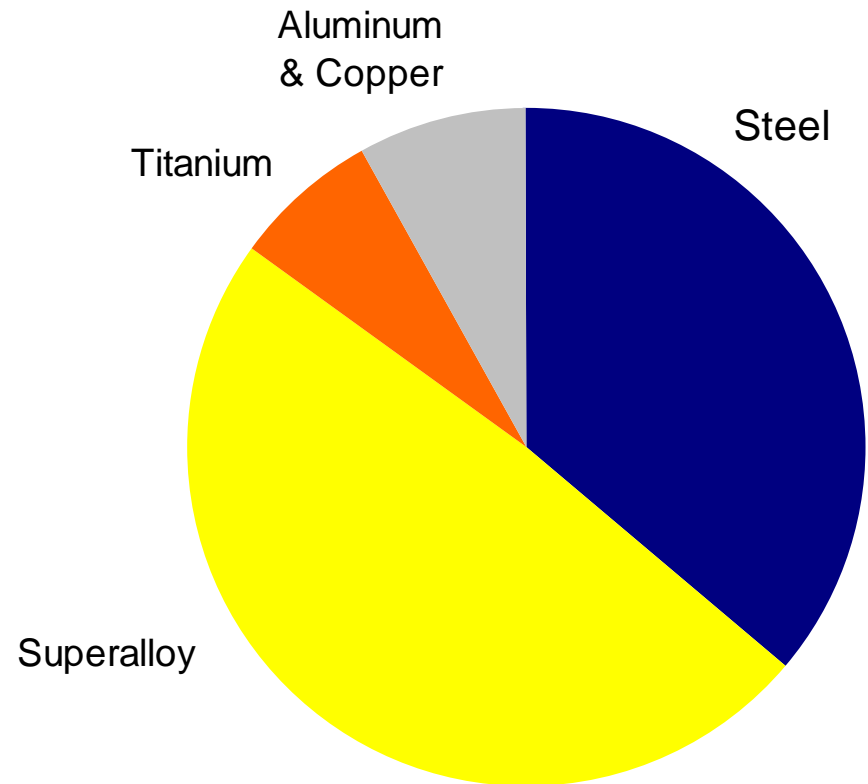
North American Investment Casting Market by Alloy Type



Chart 2

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

Chart 2

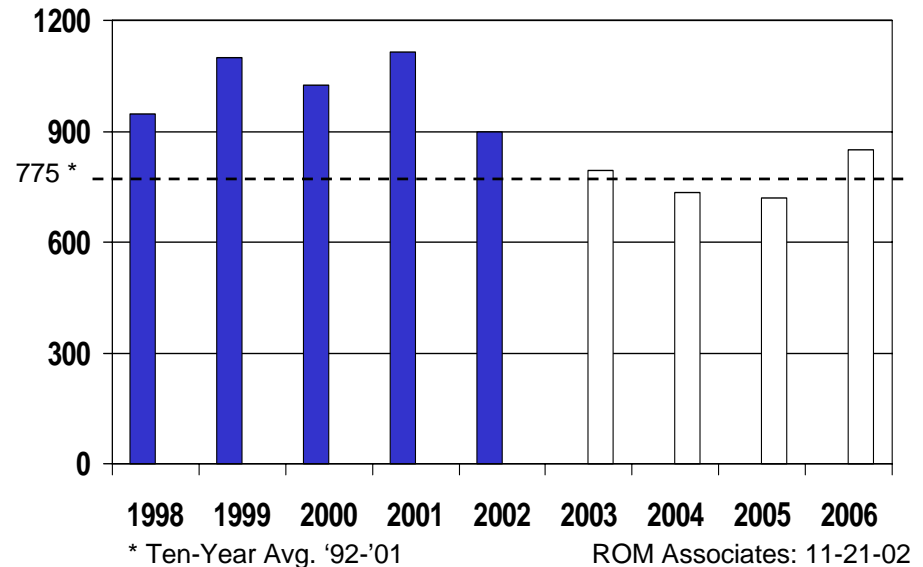


**2002 Casting Dollars
\$3.460M**



- **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





Aerospace - Military

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

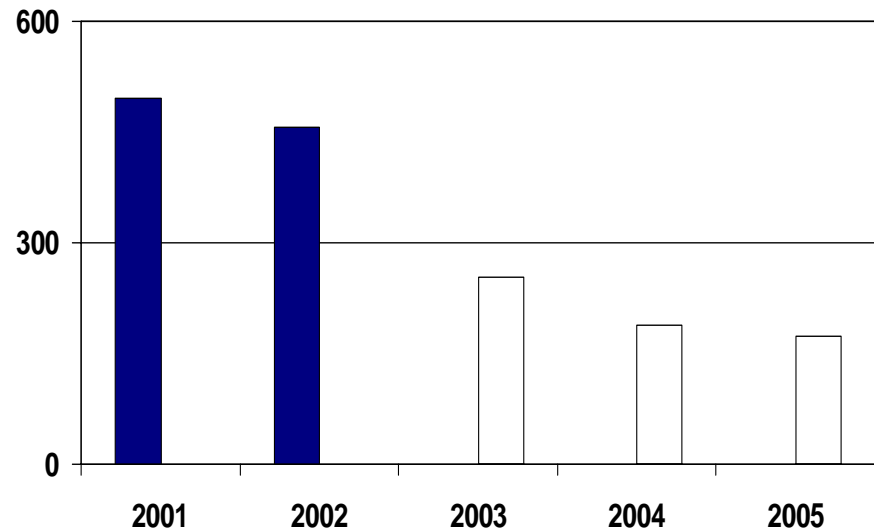
- **Specific Missile and other Ordnance programs being pulled - in**
 - **Lightweight Armament**
 - **Cruise Missiles**
 - **RPV's**

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



- **Industrial 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





- **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**



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



- **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)



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



- **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**



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

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