

# 100 Years of Deloro Stellite

November 13, 2007



# Agenda

- Deloro Stellite
- Our History
- Advances in Wear Resistant Alloys & Products
- Hardfacing by PTA and HVOF
- Advances in PTA Equipment



# Deloro Stellite Group

Deloro Stellite is a global provider of innovative solutions to challenging wear problems. Our specialist products and services help extend the life of components in demanding environments where heat, corrosion and abrasion limit their life.



# The Deloro Stellite Difference

We are committed to

- **Excellence**

- Applies to products, services, staff knowledge and training
- Committed to getting the best results, look for new and better way of doing things

- **Dependability**

- Workable, realistic and reliable solutions ensure that our customers are more efficient
- We apply our knowledge to understand our customers' businesses and to deliver solutions that will bring them the best results

- **Innovation:**

- Constantly striving for better products and services for our customers
- Established processes that drive continuous improvement throughout our businesses



# The Deloro Stellite Approach

- Provide advanced wear-resistant materials
  - 100 years expertise in Cobalt and Nickel-based alloys
  - Creating customised solid or coated components
- Complete Wear Consulting Services
  - Engineering support
  - Design assistance
  - Failure analysis
- Nine global production facilities
  - Specialize in a range of manufacturing, casting and coating processes
  - Supported by technological, scientific and R&D services
  - Customers can access our expertise wherever they operate
- Seamlessly integrated services provide customers with a “One-Stop-Shop” for their wear solutions



# The Deloro Stellite Products & Services

## Wear-resistant bespoke components

- Variety of casting processes available within our network of six foundries
  - Sand casting
  - Centrifugal casting
  - Investment casting
  - Resin shell casting
- Machining and finishing of hard alloys to high surface finish specs
- Powder metallurgy products
- Wrought products
- Overlay coatings onto solid components for additional wear resistance
- Full assembly of complete components
- Prototyping and rapid product development



# The Deloro Stellite Products & Services

## Wear-Resistant Coatings

- Jet Kote® HVOF
- Thermal Spray
- Starweld® & Hettiger® Plasma Transferred Arc (PTA)
- Spray & Fuse Coatings
- Manual Torch / Powder Welding
- Tungsten Inert Gas (TIG) Welding
- Oxy-Acetylene Welding
- Submerged Arc Welding
- Metal Inert Gas (MIG) Welding



# The Deloro Stellite Products & Services

## Wear-resistant materials

- High quality Cobalt and Nickel based power, rod, wire & electrodes
- Various diameters and grain size
- One of the leading manufacturers of application equipment
  - Jet-Kote<sup>®</sup> HVOF
  - Starweld<sup>®</sup> & Hettiger<sup>®</sup> Plasma Transferred Arc (PTA)



## 2007 Global Enhancement Initiatives

### **Large increase in manufacturing capacity**

- Nearly doubled the capacity of our Italian operation
- German and Canadian facilities are both expanding by 30-40%
- Planning for further expansion in 2008 and beyond

### **Increased capabilities throughout the Group**

- Larger & more complex Industrial Gas Turbine components in Italy
- New casting operation in China
- New DuraStell™ and High Velocity Oxygenated Fuel coating shops
- Increased investment in R&D to continue strong innovation tradition

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# 2007 Global Enhancement Initiatives

## Factory infrastructure investments

- Process improvement projects to help to further improve quality, reduce bottlenecks, cycle and lead times
- Industry accreditations
  - ISO 13485 in the medical industry in Europe
  - ISO 14000 and 18000 in China
  - Aerospace approval AS9100 in the UK

## Extended footprint with new plants

- Perm, Russia
- Montreal, Canada
- Delhi, India
- Houston, Texas
- Planning phase for expansion in China for bespoke components



# 2007 Global Enhancement Initiatives

## Value added service

- Rapid product development of cast components in Canada
- Final assembly of power generation valves in Germany
- Supply of fully machined IGT parts from Italy
- Local coating services in Montreal and Houston
- Integrated polishing into our operation in Ménars in France



# Major Industries Served

- Power generation
- Aerospace
- Oil & Gas
- Medical
- Automotive
- Steel, Glass, Paper, Food Processing



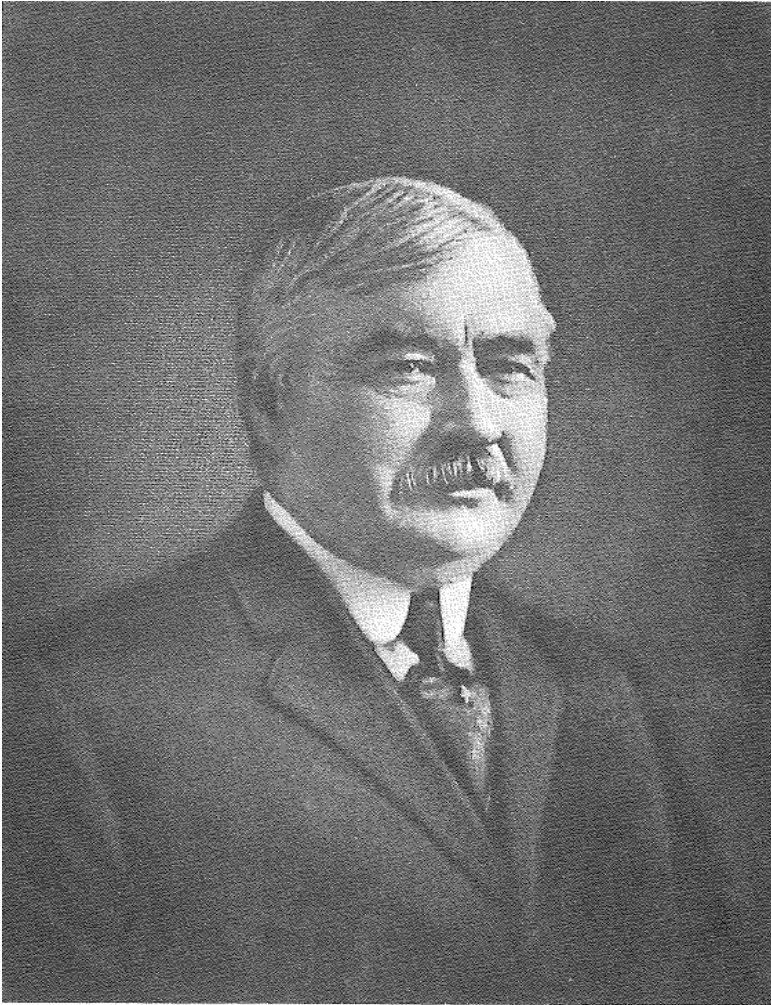
# Global Presence



**The History of Deloro Stellite Inc.  
The first 100 years 1907 - 2007**



## The Inventor



*Elwood Haynes*

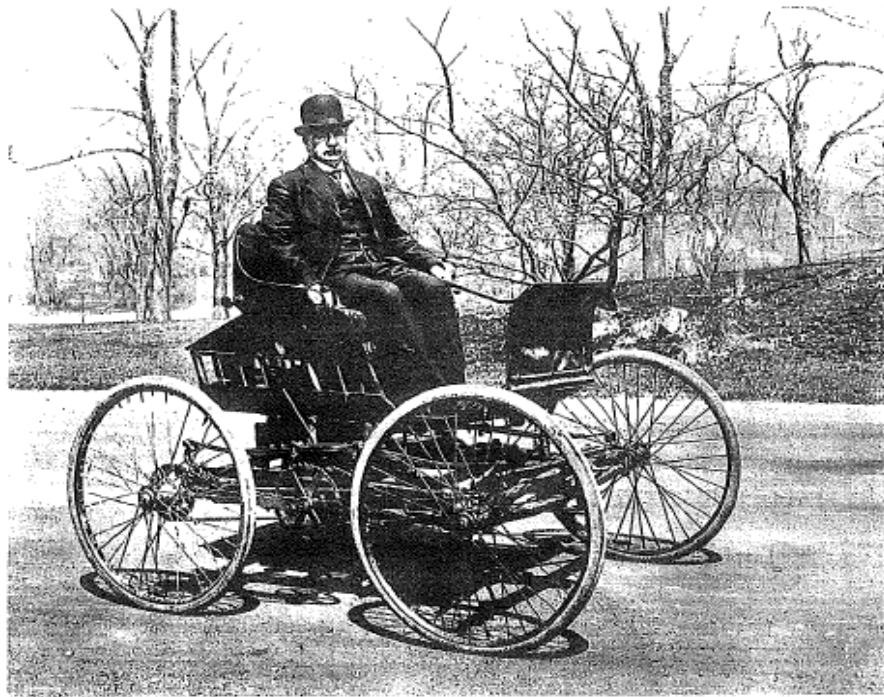
**1857 - 1925**



# Elwood Haynes the Inventor

- 1890's - Credited with development of one of the first gasoline powered automobiles

**Also worked on stainless steel alloys and early experiments on Cobalt metals for cutlery**



Elwood Haynes in his automobile, circa 1900

## **1907 - First Stellite patent applied for and granted**

- **“...a novel metal alloy designed for use in the manufacture of articles requiring a high and durable luster and possessing a degree of hardness adapting it to be substituted for mild tempered steel in the manufacturing of edge tools as table and pocket cutlery, physicians’ and dentists’ instruments, or standards of weight, measure, etc., etc..”**
- **Patent Application No. 873,745 filed April 23, 1907 by Elwood Haynes of Kokomo, Indiana**
  - **Patent was subsequently granted in December 1907**



## Demand meets Supply

- 1910
  - Licensing agreement reached between Elwood Haynes of Kokomo Indiana and Deloro Smelting and Refining Company of Deloro Ontario



*Elwood Haynes*



*M.J. O'Brien*



# Alloy development

- 1912
  - Queen's University metallurgist H.T.Kalmus develops a process for creating cobalt metals at the Deloro metallurgical laboratory.



## The early days

- 1912
  - First commercial Stellite alloys produced by Deloro Smelting and Refining Company



# 1<sup>st</sup> Commercial success – The Wonder Metal

*Stellite*  
NOT STEEL - BUT ITS MASTER

Stellite lathe tools are harder than the hardest of high speed steel tools.

Stellite tools are immune to heat up to a temperature of 1800 F.

Up to that point, the hotter they get the tougher they get, and the better they cut.

These facts are known to manufacturers everywhere, for Stellite has been in successful use in thousands of American manufacturing plants for five years. Stellite speeds up production, does away with vexatious delays, cuts costs and gets the job done.

Stellite tools not only permit speeds and feeds never before considered possible, but they last much longer between grindings.

The manufacturer (large or small) who puts Stellite to work will find an increased production and a decreased cost.

Let us tell you more about this wonder metal.

- Stellite tool metal revolutionized the metalworking industry



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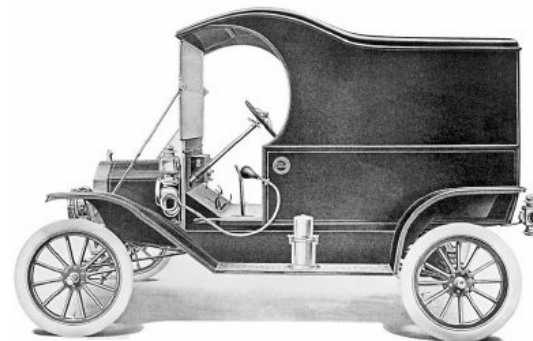


# Industrialization of the alloys

- 1914 – 1918 – First world war drives development of Stellite alloys for machine tool use especially engine manufacturers



Liberty Aircraft



Trucks &  
Autos



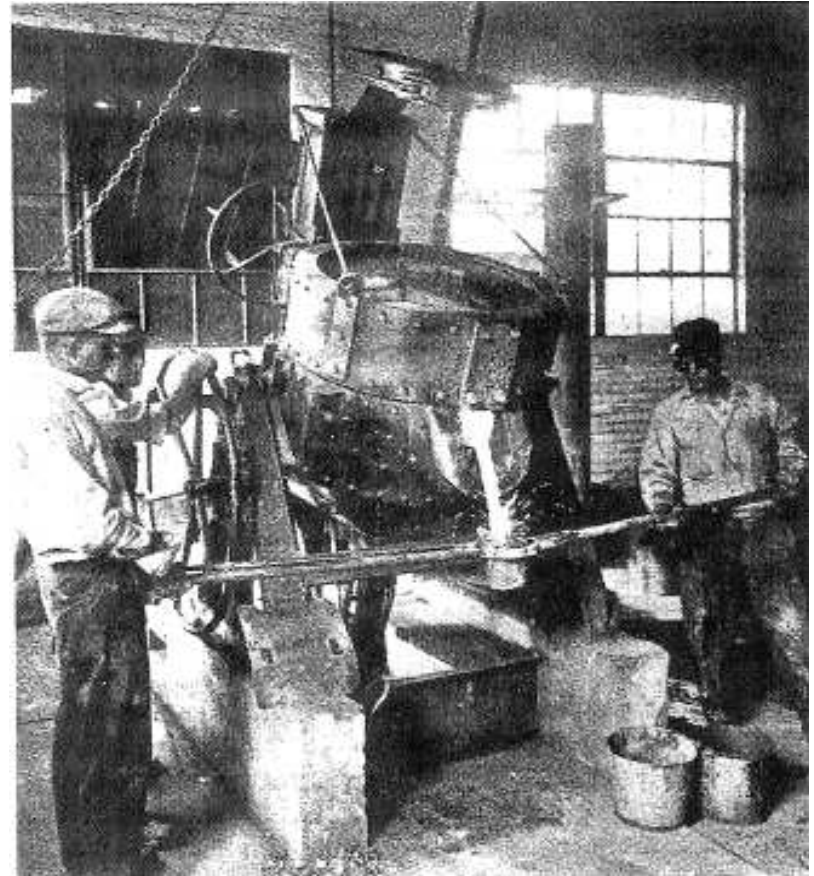
Armaments

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## 1919 – 1930 Stellite expands

- 1<sup>st</sup> European factory opens in England
- Product offering grows to include:
  - Hard-surfacing products
  - Knives
- Hard-surfacing is offered to customers as a service



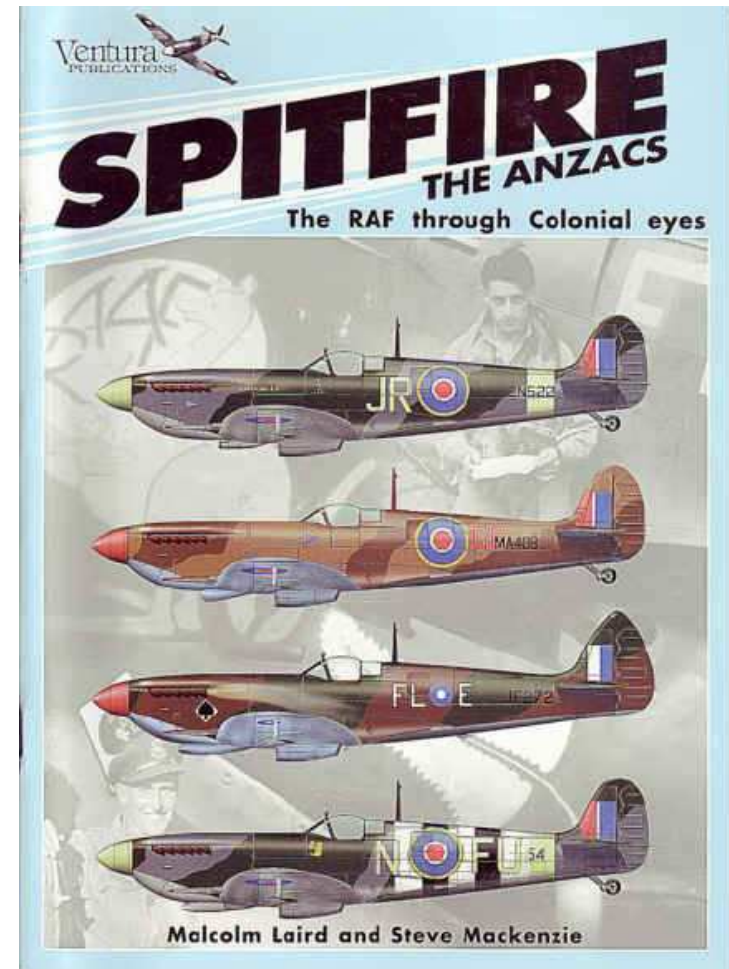
## 1939 – 1941 Deloro plant expansion

- Onset of WW II increases demand for Stellite alloys
- Canadian facilities expand to include investment casting operations



# 1941 Precision castings

- WW II demands grow for aircraft engine components
- Tool metal demand grows for faster machining to support armaments manufacture



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# Post war years 1945 – 1955

- Demand for Stellite wear resistant alloys increases in all major industries to prevent premature failure of metal components

Steel Mills



Aircraft



Pulp & Paper



Cement



Agriculture



## 1956 – 1972

- Continued growth of the use of Stellite drives expansion of manufacturing facilities
- 1956 - Deloro Stellite leaves it's original site in the village of Deloro and re-locates to a state of the art metal producing facility in Belleville, Ontario
- 1968 – due to increased demand this plant size increases by more than 50% that includes a medical division for the production of Stellite prosthesis



## 1956 - 1972

- **1960's – Flux cored Stellite wire production commences in the UK plant now re-located to Swindon**
- **1972 - A third manufacturing plant is added to the company in Koblenz, Germany as a distribution point for welding products and hard-surfacing service center the facility has expanded to manufacture –**
  - Precision Castings and Hard-surfaced assemblies for Power generation



## **1979 – 1986 A marriage made in Stellite heaven**

- **Through a strategic merger Haynes Stellite and Deloro Stellite join forces**
- **This accelerates development in hard-surfacing products that move away from the more traditional welding methods**
- **Advances in hard-surfacing powders spurs the need for equipment that can be automated and used for advanced serial manufacturing**



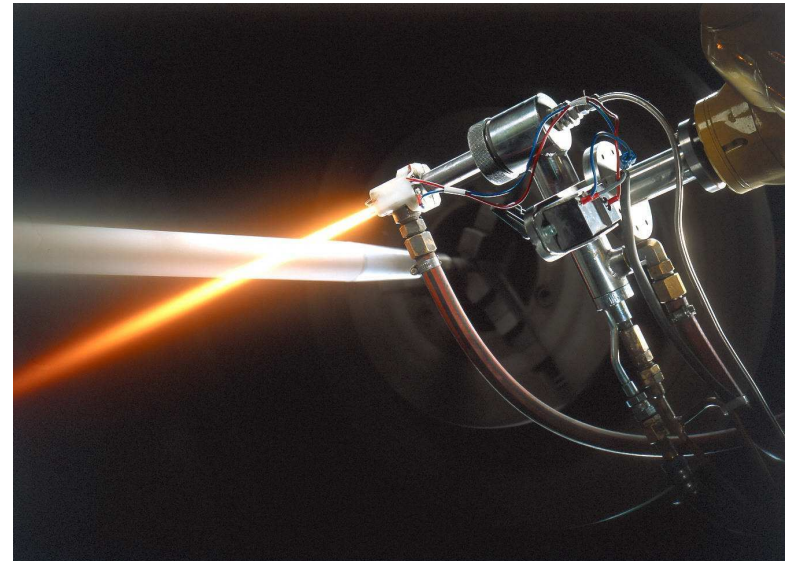
## **1979 – 1986 Continued growth and diversification**

- **Deloro Stellite opens a 4<sup>th</sup> facility in Goshen Indiana**
- **This plant is dedicated to metal powder production for hard-surfacing, plus the manufacture of equipment that will utilize the powders produced**



## 1979 – 1986

- **Deloro Stellite acquires the design of a new thermal spray coating technology and subsequently improves and patents the process**
- **The Jet Kote® systems rapidly become a standard in the Aerospace industry**
- **Composite powder production helps further application development**



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**1979 – 1986**

- **Deloro Stellite improves the design and function of its Plasma Transferred Arc equipment**
- **Advanced design allows applications in the Auto sector to become viable for serial production**



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**1979 – 1986**

- **Improved torch designs are developed for heavy duty applications for valves and feed screws**



## 1983 – Process and product expansion

- **Wrought Stellite production commences in Deloro Stellite facilities to provide rolled and forged components**
- **Products include:**
  - Knives
  - Scrapers
  - Sleeves and Bushings
  - Erosion Shields



## 1985 – Process and product expansion

- Powder Metal component production commences at Deloro Stellite
- High volume production capacity with 100% dense parts
- Products include:
  - Specialty welding alloys
  - Rod end bearings
  - Balls and Seats
  - Saw tips



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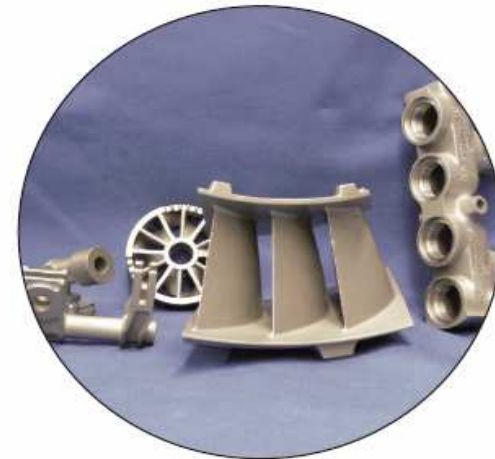
## 1985 – Further international expansion

- **Deloro Stellite opens a 5<sup>th</sup> facility in Shanghai China**
- **Initially opened as a distribution and hard-surfacing centre, the facility has expanded to manufacture –**
  - Powders, Rods, Wires, Castings and Powder Metal components



## 1989 – 1991 Process and product expansion

- Centrifugal and Vacuum casting capability is added to Deloro Stellite
- These additions allow further application development into Power Generation, Aerospace and Food industries



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## 1999 – 2006 worldwide growth and expansion

- **Through strategic acquisitions Deloro Stellite expands its global footprint**
  - **Microfusione Stellite – Milan Italy**
    - Vacuum castings – Aerospace, Power Gen
  - **Microfusione Stellite – Bologna Italy**
    - Investment castings – Valves, Pumps
  - **ATS Stellite – Alès France**
    - Investment castings – Medical prosthesis, Aerospace
  - **Hettiger Stellite – Koblenz Germany**
    - Advanced Plasma Transferred Arc equipment
  - **Sferic Stellite – Ménars France**
    - Advanced machining and polishing



## 2006 – Introduction of local manufacturing services

- Satisfy “specific” customer needs through a world-wide network of market focused, built for purpose services facilities
- Objective of service shops is to augment our product and service offerings
- We have opened two new coatings shops in the past 2 years and will open another two in 2007 - 2008
  - Montreal, Houston, Perm, and India



# 2007 – Continued global expansion

- 9 established facilities
- 4 new start-ups



## 2007 and into the future

- New process, product and equipment development continues with:
  - Alloy Fusion
  - Durastell®
  - P/M superalloy fine diameter wires
- Plus further expansion of manufacturing and service center facilities worldwide



**Deloro Stellite – a long-term partner for the future**

