



## A History of Innovation

1914

World War I erupts. The United States, which had been importing nearly all of its fine chemicals from Germany, is faced with impending shortages of organic chemicals for pharmaceutical and laboratory use.

1915

Disturbed by U.S. vulnerability due to lack of fine chemical resources, Carl Pfanstiehl sets up a lab in the basement of his Highland Park, Illinois home. He experiments with methods for isolation and purification of rare sugars and amino acids from naturally occurring compounds.

1918

As World War I ends, the United States seeks to boost domestic capacity for producing fine chemicals by creating a funding program for viable start-up ventures.

1919

With the help of U.S. government seed money, Carl Pfanstiehl founds the Special Chemicals Corporation, located in the stable behind his home. He begins providing high purity carbohydrates, amino acids and enzymes to analytical laboratories and hospitals.

1930

Pfanstiehl, a brilliant scientist but poor businessman, begins having financial difficulties. Babson Brothers, Inc., a Chicago-area manufacturer/distributor of dairy industry supplies, steps in, assisting Pfanstiehl with financial and management support. The Special Chemicals Company is renamed Pfanstiehl Chemical Corporation and relocates to Waukegan, Illinois.

1942

Carl Pfanstiehl dies. Pfanstiehl Chemical becomes a wholly-owned subsidiary of Babson, operating three separate divisions: fine chemicals, metallurgical products, and dairy sanitation products.

1947

Arthur G. Holstein, chemist and holder of five biochemical processing patents joins Pfanstiehl, managing the fine chemical division.

1950

Pfanstiehl begins producing Seqlene™ sequestering agents for industrial use.

1954

Babson sells fine chemical division to Arthur Holstein and carbohydrate chemist Dr. Waldersee Hendrey who then name their company Pfanstiehl Laboratories, Inc. Pfanstiehl begins producing fine chemicals in larger volumes and begins supplying biochemicals in bulk to catalog resellers.

Product focus shifts towards carbohydrates and related organic chemicals.

1959

Company significantly expands capacity and capabilities by moving to its current address in Waukegan. The original building occupied on Glen Rock Avenue continues to house Pfanstiehl

fine chemical production.

1962

Upon the untimely death of Dr. Hendrey, Arthur Holstein acquires all Pfanstiehl voting shares under terms of their business agreement. Pfanstiehl begins producing sodium lactate solutions and Glucosamine hydrochloride, marking entry into production of pharmaceutical compounds and intermediates.

1963

George Holstein, one of Arthur's sons, joins Pfanstiehl as Vice President. George, a chemist, had been managing a Fructose pilot plant in Hawaii. Pfanstiehl registers with the FDA.

1970

Ed Holstein, also Arthur's son, joins Pfanstiehl as Vice President and Treasurer.

1972

→ Arthur Holstein semi-retires. By this time Pfanstiehl is producing carbohydrates and related organic chemicals exclusively, with the exception of two synthetically produced amino acids: Creatine and Creatinine.

1973

Pfanstiehl establishes its first Type II Drug Master File with the U.S. Food and Drug Administration for a pharmaceutical client.

1977

Pfanstiehl partners with a major pharmaceutical company to develop a process for producing egg yolk phospholipid (egg lecithin) for use in a parenteral nutrition formulation.

1979

Dedicated egg yolk phospholipid (EYP) facility constructed.

1980

Several expansions of facilities and purchases of real estate enlarge Pfanstiehl properties

1992

Dedicated sodium lactate solutions manufacturing facility constructed.

1994

International operations expanded with the addition of Pfanstiehl (Europe) Ltd. sales and marketing office located near Manchester, England.

1996

Production of Seqlene™ phased out to increase focus on pharmaceutical bulk actives and intermediates, food additives, cosmetic ingredients, and dietary supplements.

1997

Dedicated, fully automated Creatine manufacturing facility is commissioned, increasing Creatine production capacity to 4million kilograms per year.

1998

Egg Yolk Phospholipid facility is expanded and significantly upgraded in response to increased demand for this product.

New explosion-proof facility is completed, opening the door to expansion for future contract manufacturing projects.

1999

New multi-purpose commercial scale High Potency Substance (HPS) manufacturing facility constructed. Optimized for product isolation/containment and centralized process control, the facility expands Pfanstiehl's capabilities for processing toxic and cytotoxic APIs and intermediates.

2000

High-capacity, sequential batch wastewater treatment facility is commissioned. The facility is engineered to exceed stringent EPA pharmaceutical discharge/effluent limitations.

Pfanstiehl becomes a wholly-owned subsidiary of the Ferro Corporation, a major international producer of performance materials for industry, including coatings, fine chemicals and polymer additives. Acquisition by Ferro steps up expansion of technical and capital infrastructure.

2001

High Potency Substance (HPS) manufacturing facility and practices certified by SafeBridge Consultants, Inc.

Ferro Pfanstiehl supports growth in potent API contract manufacturing business with addition of several new technical positions.

2003

Synthesis Isolator added to High Potency Substance (HPS) manufacturing facility to accommodate additional early phase Oncology Drug Candidate Development Programs

Ferro Pfanstiehl HPS manufacturing facility re-certified by Safebridge Consultants

**2003/2004 Planned Changes:**

Construction of new / expanded Analytical Testing Laboratory and Methods Development and Validation Laboratories

Construction of new Kilo-Lab & Pilot Plant facilities, to support Custom Synthesis and HPS Manufacturing Services (Phase I)