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The economic depression from 1929 ruined his ideas and the company collapsed, and the second time he launched in 1938 his own firm, McDonnell Aircraft Corporation, near St. Louis, Missouri, the USA. Douglas continued to develop a new aircraft, including the DC-6 (1946), the DC-7 (1953) and the DC-8 in 1958 to compete with the Boeing 707. Douglas was strained by the cost of the DC-8 and DC-9, and the companies began to sound each other out about a merger. Inquiries began in 1963; Douglas offered bid invitations from December 1966 and accepted that of McDonnell. The two firms were officially merged on 28 April 1967 as the McDonnell Douglas Corporation (MDC). The DC-10 began production in 1968 with the first deliveries in 1971. In 1977 the DC-9 "Super 80" (later named the MD-80) series was launched, as a very successful product. The next aircraft to be launched was the MD-11, as a modern trijet, but discontinued in 2001 as it competed with the Boeing 777. The MD-90 was a stretched version of the MD-80. The MD-95 was the last McDonnell Douglas designed commercial jet produced as a modern regional aircraft and was launched in 1988. Following the merger in the Boeing Company, the McDonnell Douglas MD-95 was renamed the Boeing 717. In recent years the Boeing Company has faced an increasingly competitive Airbus, which offers some commonality between models (reducing maintenance and training costs) and the latest fly-by-wire technology. The 747 has suffered by competing with Boeing's 777 model. More advanced, stretched versions of the 737 were beginning to compete against the 757, so in 2004, Boeing cancelled production of the 757. Also that year, Boeing announced that the 717, the last aircraft to be designed by McDonnell Douglas, would cease production in 2006. The 767 was in danger of cancellation also. Recently, Boeing launched four new variants of existing designs: the longest range of any commercial aircraft 777, two types extended range aircrafts 737 and higher efficiency and longer range 747-8 one. Boeing is now focused on the newly-launched 787 Dreamliner as a platform of total fleet rejuvenation, which has benefited from strong sales success. It is wholly unexpected construction. The most modern set of ultramodern materials was used here. Up to 50% according to mass they consist of composite materials, among which there are Carbon Fibre Reinforced Polymer (CFRP) and also Glass Fibre Reinforced Polymer (GFRP). For example the jet engine is developed also with the front fan case and fan blades made of composite materials. The rest materials are in 20% aluminium alloys, in 15% titanium alloys, in 10 % steel and in 5% other materials. Such materials selection force very modern and unconventional technologies.

The history of great European aircraft industry is much shorter. From the 1970s Airbus has increased its family of aircraft to the point where they can now offer an aircraft in almost every class Boeing does. Airbus Industrie began as a consortium of European aviation firms to compete with American companies such as Boeing, McDonnell Douglas, and Lockheed. In the 1960s European aircraft manufacturers competed with each other as much as the American giants. In September 1967 the German, French and British governments signed a Memorandum of Understanding to start development of the 300 seats Airbus A300. This was the second major joint aircraft programme in Europe, following the Concorde, for which no ongoing consortium was devised. In December 1968 the French and British partner companies proposed a revised configuration, the 250 seats Airbus A250, renamed the A300B the aircraft would not require new engines, reducing development costs. In 1969 the British government shocked its partners by withdrawing from the project. In 1978 the United Kingdom rejoined the consortium when British Aerospace purchased again a 20% share of the company. Airbus Industrie was formally set up in 1970. The grouping was joined by Spain in 1971. In 1972 the A300 made its maiden flight and the first production model, the A300B2 entered service in 1974. It was the launch of the A320 in 1981 that guaranteed Airbus as a major player in the aircraft market. Airbus S.A.S., formerly known as Airbus Industrie, was incorporated in 2001 under French law as a simplified joint stock company. Airbus S.A.S. is located at sixteen sites in Germany, France, the United Kingdom, and Spain. Final assembly production occurs at Toulouse (France) and Hamburg (Germany). Airbus also has three subsidiaries in the USA, Japan and China. Airbus produces around half of the world's jet airliners, with most of the rest built by rival the Boeing Company, though the precise share varies on an annual basis. There are around 3,850 Airbus aircraft in service, with Airbus winning more than 50% of aircraft orders in recent years. Indeed, Airbus is now competing in markets that Boeing once had a monopoly over, e.g. the A320 has been selected by several operators (the aircraft used by these airlines has traditionally been the 737). After several decades of numerous successes, Boeing lost ground to Airbus and subsequently lost its position as a market leader in 2003. Airbus won a greater share of orders in 2003, 2004 and 2005. In 2006 Boeing won more orders again.

Airbus offers now the A380 model, which is the largest passenger airliner in the world, but its production is more expensive as planned earlier. It causes a significant delay in the realisation of programme and at the same time is a risk for the realisation of contracts. The Airbus A380 is a double-deck, four-engined airliner manufactured by Airbus S.A.S. It first flew on 27 April 2005 from Toulouse, France. Commercial flights are scheduled to begin in late 2007 after lengthy delays. The A380's upper deck extends along the entire length of the fuselage. This allows for a spacious cabin with 50% more floor space than the next largest airliner, the Boeing 747-400, and provides seating for 555 people in standard three-class configuration or up to 853 people in full economy class configuration. The A380-800 has a maximum range of 15,000 km (sufficient to fly from Chicago to Sydney non-stop), and a cruising speed of Mach 0.85 (about 900 km/h at cruise altitude). The project of an airplane with the use of CATIA system foresees numerous fully innovative solution in the field of materials. Composite materials make up 25% of the A380's airframe, by weight. Carbon-fibre reinforced plastic, glass-fibre reinforced plastic and quartz-fibre reinforced plastic are used extensively in wings, fuselage sections, tail surfaces, and doors.

Cover story – continued

The A380 is the first commercial airliner with a central wing box made of carbon fibre reinforced plastic, and it is the first to have a wing cross-section that is smoothly contoured. Other commercial airliners have wings that are partitioned in sections. The flowing, continuous cross-section allows for maximum aerodynamic efficiency. Thermoplastics are used in the leading edges of the slats. The new material GLARE (GLAss-REinforced fibre metal laminate) is used in the upper fuselage and on the stabilizers' leading edges. This aluminium-glass-fibre laminate is lighter and has better corrosion and impact resistance than conventional aluminium alloys used in aviation. Newer weldable aluminium alloys are also used. This enables the widespread use of laser welding manufacturing techniques. The first completed A380 at the "A380 Reveal" event in Toulouse Airbus started the development of a very large airliner in the early 1990s, both to complete its own range of products and to break the dominance that Boeing had enjoyed in this market segment since the early 1970s with its 747. In January 1993, Boeing and several companies in the Airbus consortium started a joint feasibility study of an aircraft known as the Very Large Commercial Transport (VLCT), aiming to form a partnership to share the limited market. In June 1994, Airbus began developing its own very large airliner. The joint VLCT effort ended in July 1996. Boeing suspended the 747X programme in January 1997. On 19 December 2000, the supervisory board of newly restructured Airbus re-christened as the A380. The aircraft's final configuration was frozen in early 2001, and manufacturing of the first A380 wing box component started on 23 January 2002. Boeing, meanwhile, resurrected the 747X programme several times before finally launching the 747-8 Intercontinental in November 2005 (with entry into service is planned for 2009). The first A380 prototype was unveiled at a ceremony in Toulouse on 18 January 2005. Its maiden flight took place at 10:29 a.m. local time on 27 April 2005 at Toulouse Blagnac International Airport. In mid-November 2005, the A380 embarked on a tour of Southeast Asia and Australia for promotional and for long-haul flight testing purposes, visiting Singapore, Brisbane, Sydney, Melbourne and Kuala Lumpur. On 19 November 2005 an A380 flew at the Dubai Air Show. On 10 January 2006, the A380 made its first transatlantic flight to Medellín in Colombia. It arrived in North America on 6 February 2006, when an A380 landed in Iqaluit, Nunavut in Canada. The aircraft then flew to Singapore. On 26 March 2006, the A380 underwent evacuation certification in Hamburg in Germany. Three days later, the A380 received European Aviation Safety Agency (EASA) and United States Federal Aviation Administration (FAA) approval to carry up to 853 passengers. On 4 September 2006, the aircraft flew from Toulouse with 474 Airbus employees on board. As of March 2007, nine A380s had flown. Two A380s flew into two USA destinations on 19 March 2007, allowing both the East and West Coasts of North America. A380 flew some 500 passengers to John F. Kennedy International Airport (JFK), New York, the USA. Simultaneously, A380 aircraft landed at Los Angeles International Airport (LAX). Then it flew from New York to Chicago O'Hare and back to JFK on 20 March 2007, before returning to Frankfurt on 21 March 2007. The aircraft then gone to Hong Kong (24 March 2007), and return to the USA for a visit to Washington on 25 March 2007, and return. On its way back from Frankfurt to Toulouse, it made a stopover in Munich on 28 March 2007. Since the first airport tests with the A380 in Frankfurt in 2005, the A380 has visited over 40 airports. During testing the A380 visited 20 countries: Australia, Canada, China, Colombia, Ethiopia, France, Germany, Iceland, Ireland, Japan, Malaysia, Portugal, Singapore, South Africa, South Korea, Spain, Thailand, the United Arab Emirates, the United Kingdom and the United States of America. By 2011 more than 70 airports around the world will be ready for A380 operations. Firm orders and commitments stand at 166 aircraft for 15 customers. Upon completion of a review of the A380 programme, the Airbus announced a delay for the first delivery for Singapore Airlines to October 2007 and for the United Arab Emirates as the customer with the largest A380 order, to August 2008. For the full production rate of 45 A380 aircrafts per year it will be necessary to wait to 2010.

In such a situation today the Boeing Company is the largest global aircraft manufacturer by revenue. In 2006, Boeing was the world's largest civil aircraft company in terms of orders (with 55% of orders and 54% of deliveries in its market segment), overtaking Airbus for the first time since 2000. It is the largest exporter in the United States of America also. The competition between two main players on the world market of airplane producers lasts and passengers hope that they will be winners because thanks to the competition safety, reliability and travel comfort increase.

The part of papers published in that volume are connected indirectly or directly with issues of contemporary aircraft industry. The Editorial Office think that they will meet with vivid interests of P.T. Readers.

Selected materialographical photo

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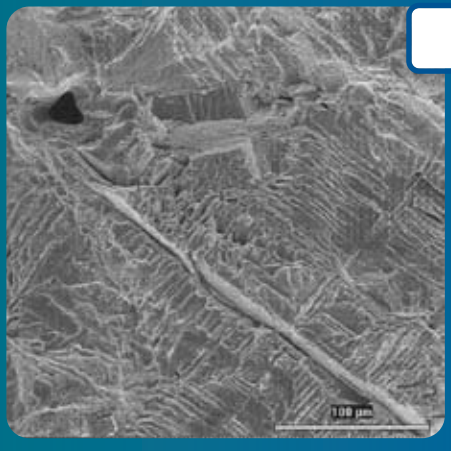

The paper entitled "Nickel super alloy INCONEL 713LC – structural characteristics after heat treatment" presented by P. Jonšta, Z. Jonšta, J. Sojka, L. Čížek and A. Hernas on a **page 7** shows the mode of optimum heat treatment. On the basis of obtained results it is possible to recommend a following regime of heat treatment: heating and dwell at the temperature exceeding 1240°C (min. 1260°C), so that precipitates at the grain boundaries dissolve completely, with subsequent slow cooling down to the temperature of ca. 940-950°C, so that there occurs intensive intra-granular precipitation of intermetallic phase γ'. Super alloy was commercially produced and investigated by using the light microscopy (OLYMPUS IX 71) and local chemical microanalysis and by the scanning electron microscopy (JEOL JSM 50A). Nickel super alloy's products are mainly using for construction parts of jet engines, gas turbines and turbo-blowers.

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