Airborne Composites designs and manufactures composite parts for the Aerospace, Oil & Gas, Marine and other industries since 1995. They are involved in notable high-tech projects, from the Galileo Satellites, to the Gulfstream aircraft for Fokker and the ALMA astronomical telescope. The Leonardo Times sat down to talk to Sandor Woldendorp, Business Development Manager, Space division at Airborne to get an insight in the question: “How do they do it?”.

LT: Can you tell us something about yourself and your position at Airborne?

SW: I am Sandor Woldendorp, Business Development Manager of the Space division at Airborne. I am responsible for the sales and business development of composite spacecraft structures. I started at Airborne seven and a half years ago as a stress engineer and grew towards project management. Since four years, I do sales & business development.

My study was at TU Delft at aerospace engineering. My thesis work was performed in the aerodynamics department and that was also my first job. I started working at NLR in the aerodynamics department. After 3 years, I moved to the engineering company Silver Aerospace, where I was part of the design team for a flap for the A380. After that I worked for Airbus in Germany for 9 months. In 2004, I joined Airborne and got the opportunity to build my career here.

LT: Airborne was founded by two Delft aerospace engineers. Could you throw some light on the background of Airborne?

SW: I am not one of the founders, but I know the story of our company. In 1995, the two founders had just finished their studies at the aerospace department in Delft and founded the company, focusing on aerospace and offshore markets. Since then, Airborne has grown abundantly in the number of employees (200+ personnel today), as well as in the range of activities. We now have production divisions at three sites: Ypenburg, Ummiden and Girona, Spain. The growth was fueled by several processes. Firstly, the customers wanted to have a feel for the products: making prototypes was incorporated in the activities. After about ten years, a number of customers required serial production of parts. We had to move to The Hague facility to make that possible. At that point in time, metals were used for product manufacturing as well. Around 2005, we decided to focus on composite technology, as we experienced that that was where we had an added value to the markets. The company name was changed to Airborne Composites to ex-
press the focus that we chose. We do not do any metal designs anymore, but of course, most of the products still have a metal interface like bolted connections or bush fittings. The metals that we use depend on the specific products. In space, we use titanium and aluminium inserts. In marine applications steel is used, which has to be surface treated. All kinds of metals are still used, the choice depending on the application. However, our expertise is in composites.

L T: To what extent are the founders involved in Airborne these days?

SW: The first four employees including the founders are still in the Board of Directors today. They do a lot of strategic decision-making. A recent decision that was made is to focus more on the following markets: Aeronautics, Space, Marine and Oil & Gas. This year we will make the transition in which Aeronautics and Space will be placed in a separate business unit: Airborne Aerospace. The same goes for Airborne Marine. This way, our clients will get more focus than they already had. The internal resources as well as the external communication, like our website, will also be structured in accordance with our market focus.

LT: Is this a marketing focus or does this change something internally in the company as well?

SW: Both actually. Oil & Gas is an example of this approach. It was launched two years ago as a separate business unit in a separate location in Ijmuiden. There, our capabilities and expertise for the Oil & Gas market are concentrated in one place.

LT: Apart from Aerospace, Marine, Oil & Gas, you have a specials department. Could you elaborate about what goes in “Specials” called Airborne X?

SW: For instance, we make large antenna dishes for astronomy and high-end parts for ASML (chip lithography machines). For energy-related markets, we make big flywheels for storage of kinetic energy. If we see potential in a specific market, we choose to give that a greater focus and develop it into a separate unit. In Dutch, we call it a “Kraamkamer” – a nursery or incubator – for new business. The process was the same for the Marine unit, which was at first a new activity within Airborne Composites. In a few years, the Marine unit was vital enough to become a separate business unit. When products sprout in the “Specials” department and have significant growth potential, they might evolve into a separate business unit, if they represent a market in which we can play an important role.

LT: What are the challenges you face in the development, production and automation?

SW: When looking at automation, the challenges concern quality assurance and qualification. The processes that we handle by hand today could be handled automatically by robot tomorrow. What
needs to be proven is that the robots deliver the same or better quality. For example, fibre lay-down can be accomplished by humans as well as by robots, but there are limitations to the capabilities of robots. On the other hand, robots make less mistakes than humans. Note that there are some processes that cannot be done by hand, for example fibre steering or advanced fibre placement, which can only be achieved mechanically. I cannot point out generic challenges to automation; each process has its own challenges.

**LT:** What kinds of problems are faced in general, when you start discussing the manufacture of a certain product with clients?

**SW:** For aerospace, an important aspect is that the product must be qualified for flight. Qualification is an intensive program in cooperation with our clients. The first step is designing samples, after which a first article or prototype is made and tested in a laboratory. For spacecraft parts, the tests are performed in a simulated space environment. The testing sets challenges on our budget and resources. It is a long path to operational life on a spacecraft for new products and technologies.

**LT:** What are the criteria for a bid/no-bid decision?

**SW:** With every request from a customer approaching Airborne, a bid/no-bid decision is made. The selection is made on a number of criteria. First of all, the insight on whether a project is commercially attractive is acquired. As for any commercial company, the question: “Will we make a profit?” needs to be answered. Secondly, there is an ethical component. Of course, we would not make weapons of mass destruction but also in general weapons, is not our business. Airborne is essentially a high tech company. There are many consumer products made from composite materials, from tennis rackets to polyester boats that is not our business. Products developed by Airborne are “high spec”.

Airborne likes to bring added value to the table, a real advantage for our clients, where our technologies enable our clients to obtain a unique position in their market. If there are a number of other companies that can accomplish the same task in the same way, a “no bid” decision can be made.

**LT:** What are the major arguments you have to put to clients to switch to composites in place of metals?

**SW:** Well, usually our clients do not have to be convinced anymore. In the past we used to ‘preach’ why a client should choose composites over other materials. Fortunately, that is not the case anymore. Our clients usually know that they can reach better performance levels with composites: lower mass, higher stiffness, strength, less fatigue, no corrosion or a combination of these. If a client wants more information for making trade-off, we can provide that information as well. What we do have to do is convincing the client about economic viability. Is it worth to pay the price for the benefits composites offer? Next to that, we have to prove that we can maintain the quality of the product in a series production. The serial production obviously reduces the price. Automation of the manufacturing process helps in that case.

**LT:** Could you provide some information about automation at the in-house Technology Centre?

**SW:** A number of processes have been robotized in-house. The trick for Airborne is that we do not make or buy a robot for a single process. It is common in Aerospace for Tier-1 supplier to go to a Robot manufacturing company to automate a specific process. The robot is designed to do exactly that and only that. We think that especially in Space and sometimes also in Aeronautics, the number of recurring products is too low to have one dedicated robot, which can cost a few million euros. In these cases, the cost of such a robot is not justified. Our concept is to have one flexible robot platform on which can place different heads, the so-called end-effectors, at the end of the robot arm. In this way, theoretically speaking, we can have the robot do one process on...
Monday, the other process on Tuesday, Wednesday etc. In addition, this flexible robot does not cost millions; it costs an order of magnitude less than that. This way we do not have high investments to automate a process for aerospace manufacturing. That is our cost-efficient solution for automation.

The development and programming of the head/actuator unit is done at the Airborne Technology Centre.

**LT:** This distinguishes you from your competitors.

**SW:** Yes, we are not only developing or only engineering or only a manufacturing company but we have all these capabilities in-house. We can do the development, engineering, production, and qualification of composite products. This is not unique, but few companies can claim this in the high-end composites market, especially SME’s (small and medium enterprises).

**LT:** What are some projects that Airborne has been part of in the Aerospace Industry?

**SW:** We are proud of our involvement in the development and building of composite antennas for the ALMA astronomical telescope. We are involved in the Galileo Satellites, where we made all the solar panel substrates. In Aeronautics, we do serial production of parts for Gulfstream aircraft for Fokker. Also recently, Fokker, manufacturing parts for Dassault SMS - a business jet - has selected us for production of empennage parts.

With our facility in Girona, we are working for years with Airbus and Eurocopter in qualification processes for programs like the A350.

**LT:** How do you see the future for composites in Aircraft Industry?

**SW:** Most of the aircraft can be made of composites in the near future. What you already see is that the Dreamliner has a full composite Fuselage. In the 1980’s, I recall that Beechcraft had already made a full composite business jet named the Beechcraft Starship. It was the first full composite jet with the wing as well as the fuselage made of composite. The new Airbus A350 will have a lot of composite. The engines will be made of metal but most of the load-carrying structure will be composite. In this way, it reduces the mass, which is beneficial for fuel efficiency. Some of the metallic parts like load introduction ribs and brackets, are complexly shaped and highly loaded. Those are the parts where we want to play a major role in the ‘transition’ to composites.

**LT:** Are the high costs of Composites a disadvantage?

**SW:** Price of the composite part itself may be higher than of a metal part but if you include the cost for assembly, inspection and maintenance, it is beneficial in the long run. For instance, take the cost for inspection for fatigue: a composite structure may be initially more expensive to purchase, but at the end of its life, it may have cost less than a metal structure. A stringer in thermoplastics might be more expensive, but then you do not need all these rivets, you can weld it. The term used here is TCO: total cost of ownership. In general, the composite cost is initially more expensive than the metal part, but the clients are looking at the total lifecycle costs.

**LT:** What does relationship with the TU Delft entail?

**SW:** We have a good relationship with the TU Delft. Airborne was founded by two aerospace engineering graduates. After that, a lot of our employees came from the TU Delft, fresh graduates and people with experience. A big part of our management staff are Aerospace Engineers who have worked for other companies.

“If there is no safe material today, it should have a safe alternative tomorrow, that’s the philosophy.”

Figure 4. Airborne personnel in front of ALMA telescope
bringing in a lot of experience to Air-
borne. We get a lot of support especially
in the Technology Centre where students
do their internships and thesis work with
us. There are a number of examples where
we have seen that students are good in
their work and have been offered a job.
In this way, we continue the relationship
with the university. We cooperate with
the university in other ways as well. For
instance, the university has a test lab that
we use on a regular basis to do some of
our testing, a whole range of mechanical
testing, including NDI.

LT: Is Airborne involved in some projects
together with the TU Delft?

SW: We developed a Marine propeller for
the Navy, where we used the expertise
of the TU Delft, specifically the Hechting-
sinstituut, who are bonding experts. This
was for an adhesive bonding of a com-
posite part on a metal interface, which
of course should survive in severe condi-
tions at sea. We have some other devel-
opment proj-

The trick is not to tell the trick.

LT: How do you look at being an Eco-
friendly company?

SW: One element of Airborne’s mission
statement is “we care about our planet
and our people”. Caring about our peo-
ple means that Airborne will provide an
interesting and safe environment with
challenges and opportunities for her
employees. Caring about our planet is
expressed in recycling the waste mate-
rials externally and following the rules
and guidelines regarding harmful mate-
rials and chemicals according to REACH
(Registration, Evaluation, Authorization
and Restriction of Chemical substances),
which is the European Community Regu-
lation on chemicals and their safe use. “If
there is no safe material today, it should
have a safe alternative tomorrow, that’s
the philosophy”. At the moment, Air-
borne is involved in the development of
a new generation of solar panels in col-
laboration with Dutch Space. Selection of
harmless materials and processes, with
long-term availability, has its challenges.
New materials and smart processes are
being researched and the focus is on cost
efficiency and performance increase-
ment with also sustainability in mind.
That includes the raw materials and how
these are produced, so taking in account
of what our company is buying and us-
ing.

On the other hand, it sometimes is sim-
ple to be eco-friendly. Our offices for in-
estance all have motion sensors. When no
movement is detected for a number of
minutes, the lights are shut off automati-
cally. This saves a lot of energy.

LT: What is your Marketing approach as
a High-tech company?

SW: Marketing, in terms of Airborne’s
brand personality comes down to Exper-
tise, Entrepreneurship and Visionary. Our
website is currently undergoing an up-
date that will express the company’s phi-
losophy, products and goals. Next to that,
the company takes a pro-active approach
to reach potential clients. Our researchers
at the Technology Centre develop a lot of
interesting stuff, they give lectures, write
papers and do presentations on influen-
tial technical conferences. The engineers
attend SAMPE (Society for the Advance-
cement of Material and Process Engineer-
ing) and JEC. It is a challenge to share
knowledge on new technology with cli-
ents, competitors and other researchers,
in a way that the proprietary information
is not disclosed. The trick is not to tell the
trick. Going to the right business events is
another factor in marketing. Airshows in
Paris, Berlin and Farnborough, job events
like the “Banenmarkt” in Delft, business
to business meetings, etc. Then there is
also the very direct approach, visiting our
customers and potential customers. Me-
dia exposure is important as well, there-
fore this articles in the Leonardo Times is
highly appreciated!

Later this year, Airborne will take part of
the NASA exhibition – A Human Adven-
ture in Utrecht.