

**TRAINEESHIPS INDUSTRIAL
AND PROFESSIONAL PRACTICE
AS EFFECTIVE MECHANISM OF MARKETING
OF THE SCIENTIFIC AND RESEARCH INSTITUTE**



TRAINEESHIPS INDUSTRIAL AND PROFESSIONAL PRACTICE AS EFFECTIVE MECHANISM OF MARKETING OF THE SCIENTIFIC AND RESEARCH INSTITUTE

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Summary

The following paper presents executed at the Institute of Aviation in Warsaw student internship program and a program of industrial internships for young researchers technical universities of the country and from abroad. Many years of experience staff and a modern database of certified, modern laboratories can convey knowledge, the level of which is highly esteemed in the world. Conducted new projects and specialized training organizations in the design and maintenance of the Institute of Aviation enable trainees to familiarize themselves with modern technologies in the wider area around the aviation. The author presented the work program proposed the possibility of potential trainees in the laboratories of aerodynamics, strength, testing equipment and installation of air, environmental and motor. Posted framework programs, which are carried out by students and trainees. At the end of the shows achievements, and plans for the future. Run this way MARKETING Aviation Institute allows popularize unit in the country and abroad. Measurable benefits include contacts with similar companies in the world, as well as gaining a new perspective valuable employees.

Keywords: apprenticeships, internships, industrial, aviation, marketing

Introduction

The shortest definition of marketing, which also applies to scientific and research institutions, is "to meet the needs, achieving a profit." Well-understood marketing is a sensible strategy and resulting tactics, tailored to the target audience, who buy goods or services, based on knowledge and research, firmly embedded in the realities of the market. It is also a social process in which individuals and groups get what they need by creating, offering, and freely exchanging other goods and services, which have a tangible and intangible value. Acquiring skilled, good and loyal staff is a real problem in today's corporate systems and supranational companies. The phenomenon of globalization is one of the elements of the modern world. There are of course many opponents of corporate systems, but any national argument cannot resist the huge profits brought by supra-national co-operation. Corporations have a deadly impact on traditionally organized companies with national coverage. The development of basic science and the accumulation of knowledge is narrowed and subordinated to profiled corporate goals. Relatively high salaries for new employees them to acquire the most active and educated young people fresh out of college. Institutes dealing with research and development that can offer significantly lower salaries attract young candidates essentially for two reasons, namely strong interests and their own good financial situation (rich family), or the inability to break through in corporate recruitment. Therefore, scientific institutes and research organizations should develop innovative marketing methods allowing them to acquire valuable employees, able to put maximum effort into work seeking to develop the broadly understood science.

Since the end of the 20th century, the Institute of Aviation, as a research organisation, has by means of various programmes tried to encourage domestic and foreign universities to co-operate with it. A number of co-operation agreements have been concluded with universities, polytechnics and aerospace institutes, whose students and young researchers can participate in practices, internships and conferences. An interesting event that promotes the Institute of Aviation in society is a regular event called "Night at the Institute of Aviation."

Every year in October, the laboratories and workshops are open and visitors can learn about the research work carried out at the Institute. Visitors who number about thirty thousand, including many school children and young people, are potential future employees. A conference organized annually by the Institute of Aviation entitled "Marketing of scientific and research institutions" allows other institutes from Poland and abroad to exchange their experiences and work carried out in order to popularise their business in the global market.

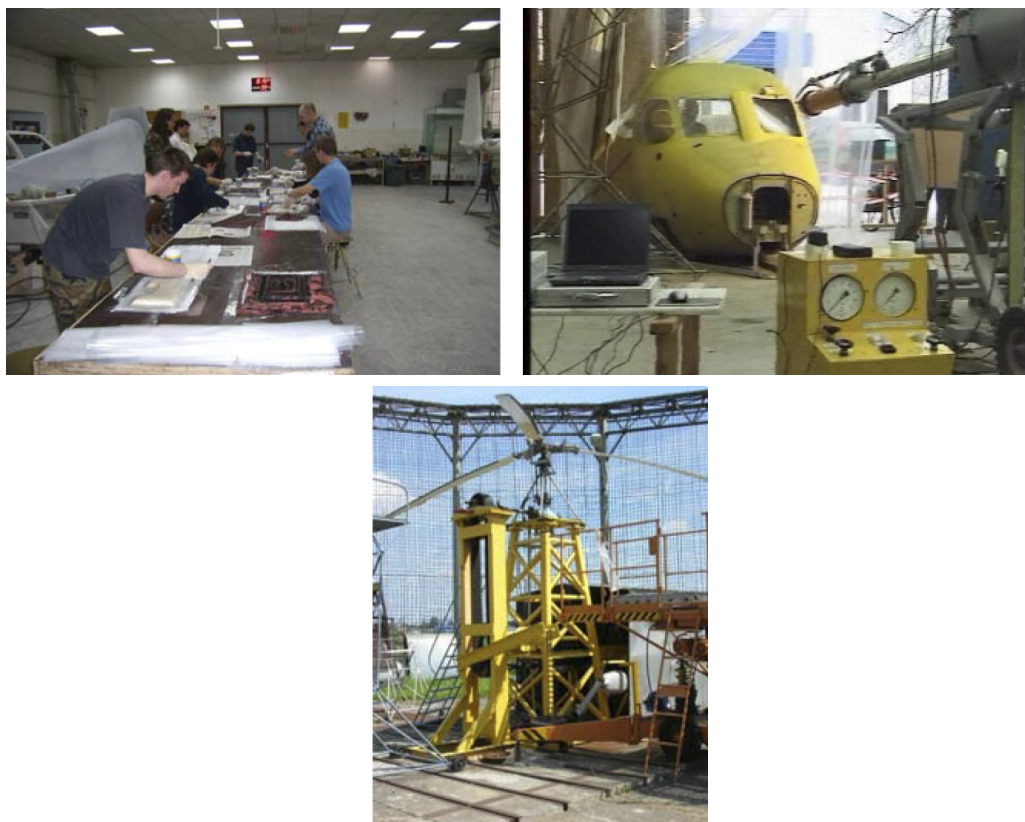
The aim of this paper is also to familiarize readers with the problems of education of young people and students towards research techniques and aviation technology. The author also presents proposals for young research employees of other institutes who want to improve their own skills, which may contribute to their promotion and career development. The author wants to share the experience gained from a programme of research and education conducted at the Institute of Aviation for a number of years. The proposed and implemented programmes help popularise the Institute of Aviation and also attract good employees, orders from customers and, ultimately, enable the Institute to make a profit.

Laboratory base of the institute of aviation

Programme of internships and apprenticeships

The program of industrial internships and apprenticeships has been designed so as to be able to familiarize trainees and apprentices with the whole process of work on selected solutions of aircraft structures. Work is also offered including procedures related to the performance of tests in accredited laboratories, design organization and maintenance organization. In addition, for those selected a proprietary programme has been created where the student can go all the way from an idea through concept, design, prototype and qualification tests. It is of course possible only in certain specific cases. The main obstacle is the limited duration of internships, which may last up to six months. Sometimes going through the full cycle is not physically possible.

Picture 1. Some of the workshops and laboratories of the Institute of Aviation



Source: the photographic archive of the Institute of Aviation.

The programme of internships and apprenticeships at the Institute of Aviation has already attracted students and employees of scientific institutes and technical higher schools from Poland as well as Ukraine, the United States, France, Spain. The cross-section of specialties covers a wide range: aerodynamics, structural strength, environmental testing, aviation undercarriages, composite structures and other aviation-related areas. In one of the departments of the Institute of Aviation — New Technologies Centre, engineers and experts with rich construction and research experience familiarize trainees and students with the

latest developments in the global aerospace industry. In the early years of the programme an overall framework was developed, which is constantly modified according to the individual needs of trainees and students, and also because of the time capacity of offices and laboratories of the Institute of Aviation. Some of the laboratories and workshops, where the internships and practices are conducted are shown in the enclosed photographs.

Goals set before interns and apprentices

The programme, established over recent years, includes familiarizing trainees with the profile of the Institute against the background of the global aviation industry. The trainees are familiarized with the research and development work carried out by academics. Engineers and designers familiarize trainees with the technical data of the prototype flying objects designed at the Institute of Aviation. They include: aircraft, helicopters, hovercraft, gyroplanes, unmanned aircraft and rockets. In recent years, a space technologies programme has been developed. It involves designing rocket engines powered by hydrogen peroxide of high purity. A technology allowing the manufacturing of a high-energy fuel has been developed at the Institute of Aviation. Trainees have the opportunity to learn about the stages of designing a flying object and to get practically acquainted with the methods of research concerning aircraft components in accredited laboratories.

Sample internship and work practice programme.

- Presentation of the Institute of Aviation — a lecture on the history, current activities and the future.
- Familiarisation with the type of work performed in the departments of the Institute of Aviation.
- Aerodynamics Department — aerodynamic tunnels, research and calculations.
- Landing Gear Laboratory — fatigue tests — static and dynamic, tests of aircraft landing gear.

- Propulsion Laboratory — jet and piston engines — selected engine issues, engine testing.
- Avionics Laboratory — aircraft, helicopters, hovercraft.
- Avionics and Digital Systems Laboratory — avionics devices, environmental tests.
- Prototypes Laboratory — building models and prototypes.
- Co-ordinated co-operation with students connected with their term and graduation papers, interests regarding future work, etc.
- Practical classes in composite structures — e.g. the "Ranger" hovercraft, pilotless helicopter, composite aircraft, autogiro, renovation of historical planes.
- Testing of traction and aviation engines.
- Auxiliary participation in computational work — strength of constructions, flows.
- Participation in research and development work of the Institute teams using computer software applied in the network of the Institute of Aviation.
- Engineering services, minor mechanical constructions.

Formal requirements and obligations of interns and apprentices

Interns or students wishing to undergo a period of work practice at the Institute of Aviation must meet certain conditions which protect them and the Institute against adverse consequences in the event of disputes, complaints and fortuitous events.

Documents which every intern must deliver to the Institute of Aviation prior to the commencement of practice:

1. Agreement between the school or institution where the intern is employed and the Institute of Aviation.
2. Accident insurance policy.
3. Health certificate.
4. Referral from the school — practice log.

After meeting the formal requirements and acceptance for an internship or apprenticeship, a detailed programme is drawn up. Below is an example of such a programme.

Prior to commencing independent work, heads of laboratories — tutors, carry out instructions consisting of:

- **Introduction** — OHS training, fire regulations, familiarisation with the workshops and laboratories of the Institute of Aviation.
- **General production technology:**
 - marketing, exhibitions, presentations, conferences;
 - order acceptance, contract signing;
 - technical and technological working documentation;
 - procurement, commercial products;
 - materials management: materials, chemical, subassemblies and finished products warehouses;
 - toolmaker's shop.
- **Mechanical workshops:**
 - iron-working;
 - machining;
 - welding shop.
- **Composites workshops:**
 - lamination, glass, carbon composites;
 - preparation of swages, moulds;
 - lamination of subassemblies;
 - filling and preparation for painting.
- **Assembly shop:**
 - assembly of mechanical subassemblies;
 - assembly of electric subassemblies.
- **Product testing:**
 - dynamic tests stand;
 - field tests of products.

In return for the opportunities for raising qualifications provided by the Institute of Aviation the trainee and apprentice is obliged to comply with the regulations in force at the plant and to carry out work that

brings tangible benefits to both parties. The intern is obliged to draw up a report after the internship, which is approved by the tutor. In addition, training should be completed by a joint publication with the tutors, a patent or utility model submitted at the Institute of Aviation in accordance with all legal obligations. Trainees have access to computer-assisted design systems (CAD), computational fluid dynamics (CFD) and computational structural mechanics (CSM). These tools can be used as basic instruments for aerodynamic optimization, calculation of loads and the stability of the aircraft.

These requirements meet the good marketing practice of mutual relations between the intern and the Institute of Aviation, are mutually beneficial and create a profit, both material and intellectual.

Equipment fitted in the laboratories and workshops of the institute of aviation

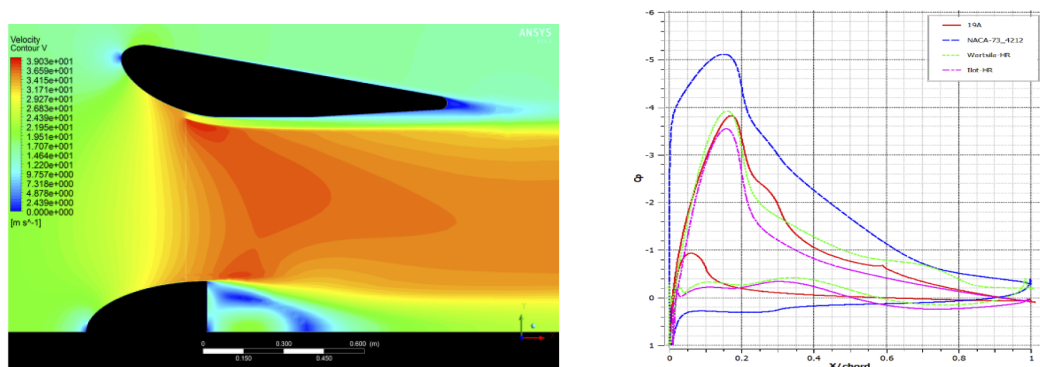
The Institute of Aviation is in a position to offer interns and students of higher schools and Institutes access to its numerous centres and laboratories:

1. Composite Technologies Centre — Composites laboratory, apprentices familiarise themselves with glass, carbon and aramid fibre composites production technologies. Wet, under-pressure and preimpregnates technologies are presented. Students and interns participate in the building of prototype flying objects such as hovercraft, aircraft, autogiro and helicopter.
2. New Technologies Centre — repair shop for airplanes, gyroplanes and helicopters — we offer an opportunity for trainees and apprentices to learn simple technologies used in repairs of historic aircraft, which have been decommissioned and are now valuable museum exhibits.
3. Experimental hovercraft research facility — some trainees may become familiar with ongoing research conducted within the Institute, as well as on water reservoirs.
4. Dynamic testing stand — trainees are familiarised with the methodology of destruction testing of the windshields of rail vehicles.

5. Helicopter rotors testing facility.
6. Aerodynamic tunnels.
7. Strength tests laboratory.
8. Environmental tests laboratory.
9. Landing gear testing laboratory.

All works are carried out under the supervision and with participation of full-time employees of the Institute of Aviation. The results of the works are firms included in the reports of the Departments and laboratories. If the results of the works do not infringe the rights of contracting authorities and secrecy of the projects carried out by the Institute, they may be made available in a limited form to interns and trainees for use in their own term, graduation papers or reports for their employers. One of the effects of the industrial internship was described in publication. Working together ended with new profiles designed for tunnelling rings of propellers and fans. The results are presented in Figure 2.

Picture 2. Results of computer simulation and characteristics
of a new profile developed at the Institute of Aviation



Source: *Profil pierścienia kołowego do zastosowań w napędach lotniczych*: A.c. Nr. W. 122937. Urząd Patentowy Rzeczypospolitej Polski. Szafran, K., Shcherbonos, O., Ejmowski, D. 24.03.2014; published 31.03.2014.

Internships and apprenticeships in figures

In order to illustrate the scale of the resulting marketing operation, below is a brief compilation of statistics of the last years of internships

and practices for the future engineering staff. The activities of the Institute of Aviation are focused on aviation. Internships in numbers are as follows:

- 2004 — 47 students,
- 2005 — 86 students and 14 pupils of Aviation Secondary Technical School,
- 2006 — 121 students and 21 pupils of Aviation Secondary Technical School,
- 2007 — 143 students and 12 pupils of Aviation Secondary Technical School,
- 2008 — 161 students and 9 pupils of Aviation Secondary Technical School,
- 2009 — 149 students and 11 pupils of Aviation Secondary Technical School,
- 2010 — 164 students 2 France, 2 Great Britain,
- 2011 — 184 students 2 France, 1 Spain,
- 2012 — 198 students 2 France, 1 India,
- 2013 — 205 students 6 France, 1 Spain, 2 interns,
- 2014 — 174 students 7 USA, 2 France, 1 intern from Ukraine,
- 2015 — 193 students 4 USA, 4 France, 2 interns.

The above figures are presented in a graph (Fig.2) showing changes in the number of interns and apprentices accepted due to the limited staff amenities and the number of qualified tutors.

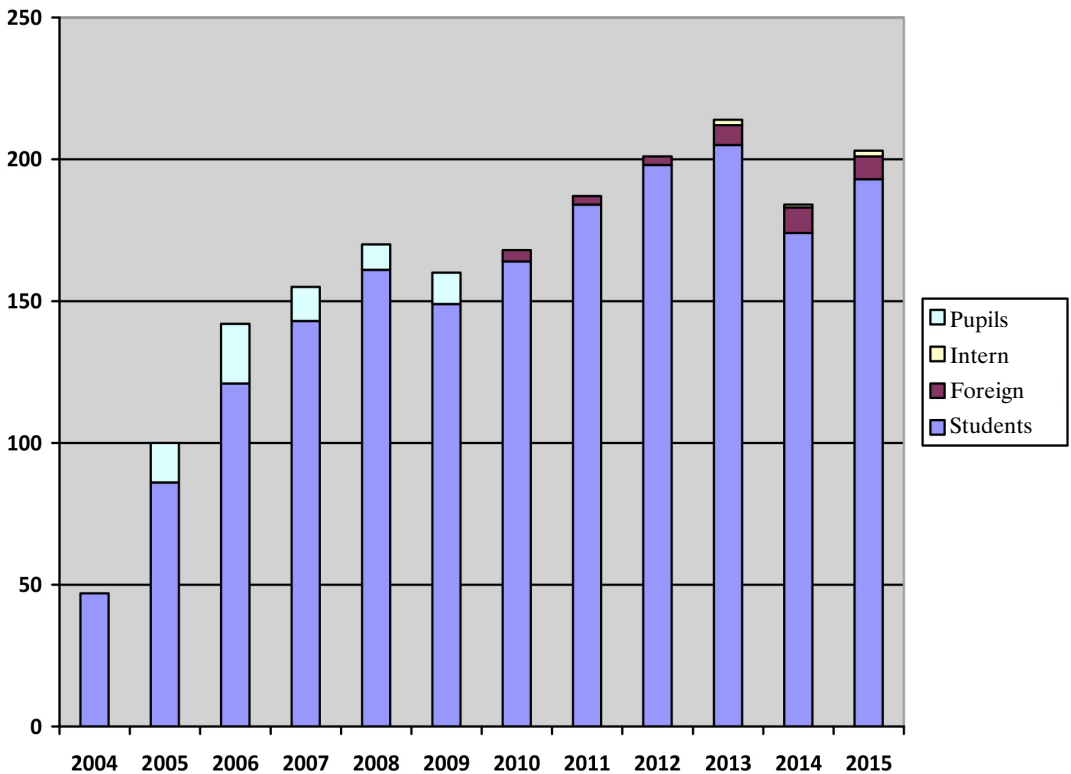
In terms of numbers the Warsaw University of Technology is in dominant position. Students from its Aviation Engineering Faculty form a majority of interns. Other faculties, such as Material Engineering, Manufacturing technology and others, are also represented by many students.

Below is a list of schools whose students participated in internships at the Institute of Aviation in the years 2004–2015.

1. Warsaw University of Technology;
2. Rzeszów University of Technology;
3. Szczecin University of Technology;
4. Agh University of Science and Technology;

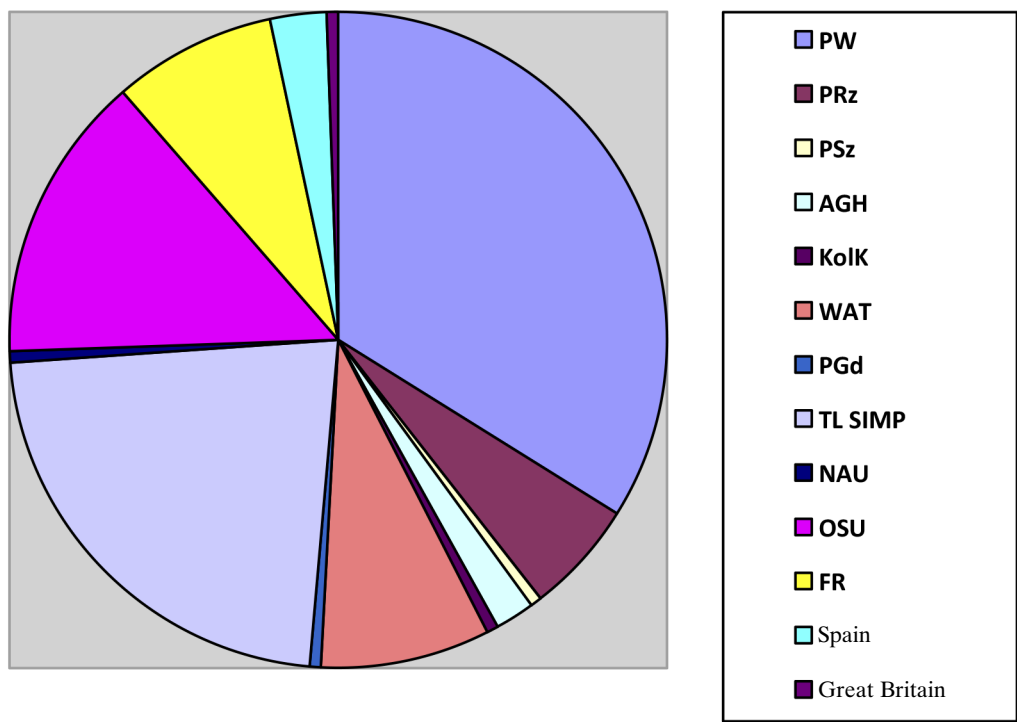
5. Kolegium Karkonoskie;
6. Military University of Technology;
7. Gdańsk University of Technology;
8. European Aviation Technical College;
9. Aviation Technical College;
10. National Aviation University;
11. Ohio State University;
12. France;
13. Spain;
14. Great Britain.

Picture 3. Number of students, pupils and interns
at the Institute of Aviation in the years 2004–2015



Source: own materials.

Picture 4. Estimated presentation of the share of Polish universities
in student practices at the Institute of Aviation in the years 2003–2009



Source: own materials.

We hope that in the coming years the Institute of Aviation will conduct a marketing campaign and accept students from other schools, especially those studying aviation-related subjects for work practice and industry internships.

Conclusions

The Institute of Aviation gains tangible benefits thanks to conducting industrial internships and apprenticeships. Such marketing activities contribute to the acquisition of valuable employees, as exemplified by

some managers of centres and laboratories. The pre-selection carried out during internships allows young people to assess whether they would like to engage in this kind of activities at work. Apprenticeships are also a kind of sieve and are much better at characterizing new potential employees than interviews. In the longer term a practice makes it possible to get to know each other and establish relationships between the future manager and employee. The positive effects of such comprehensive practices are also attested by the statements trainees make in the reports summarizing the practice, as well as letters sent after completing the programme.

Another tangible effect are joint publications, patents and utility models and personal contacts resulting in joint projects.

A marketing campaign conducted in the form of internships and apprenticeships is effective, generates no costs, and in some cases brings profits.

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