**WARSAW UNIVERSITY OF TECHNOLOGY**
**THE FACULTY OF POWER AND AERONAUTICAL ENGINEERING**
**THE INSTITUTE OF AERONAUTICS AND APPLIED MECHANICS**
**AIRCRAFT DESIGN DEPARTMENT**

**Tomasz Goetzendorf-Grabowski**

# GENERAL REQUIREMENTS CONCERNING PROJECTS

Project guide for:
Introduction to Aerospace
Aircraft Design
and others

WARSZAWA 2015

# Introduction

These „General requirements concerning projects" are supposed to help students prepare their work in the right form. Experience gained while leading such projects shows that students' imaginations rarely match the requirements concerning project's form. Guidelines concerning student's work are shown below in order to define methods of calculations documentation, graph drawing, etc. as precisely as possible. Moreover, pattern of the front page is described, so that is includes information necessary to identify the project and it's author.

These requirements are obligatory for all projects carried out in the Aircraft Design Department and are also compatible with those for projects carried out in other departments.

# General requirements

1. All projects should be prepared carefully, both in terms of form and substance. Exterior look will be taken into account when determining the grade: calculations aesthetics, precision, carefulness of preparing the project.
2. Every project should be prepared in form of a report composed of A4 pages, written on one side, permanently bound or glued by their left edges. The report must begin with a front page containing (Fig. 0.3):
   - Student's name and surname,
   - Project group's symbol (e.g. "Thursday-A", if the teacher determined such a symbol),
   - Name and surname of the teacher leading the project group,
   - Next project number,
   - project's title,
   - hand in date
   - field for a grade.
3. It is advised to do repetitive calculations in tables, which templates are given in specific project's descriptions. Calculations, that are not repetitive should be well documented – e.g. estimations of aircraft parts weight, estimations of harmful drag, etc. (formula and/or its source, used data and the result should be shown). All symbols describing physical quantities should be defined, when they appear for the first time, or defined in the beginning of the project (Fig. 0.1). If it matters, units used for formulas should also be given, especially when dealing with not SI units.
4. Graphs used as data or illustrating calculations results can be drawn with a program made for graphs drawing (e.g. Grapher, Excel, OpenOffice, Grace, etc.) or by hand on lined paper or tracing paper. Graph axes should be clearly scaled and described, including physical quantity, units. Data imported from published sources, from internet must be clearly cited, with precise source of information (author, title, year of publishing, place of publishing, pages, etc.)
5. Pictures can be drawn with a program able to do it or by hand. Pictures drawn by hand can be drawn with ink or pencil, on tracing paper. Pictures should be drawn according to technical drawing rules (Fig 0.2), with a scale given in numbers or linear scale.

6. Project authors are encouraged to use globally available program tools for microcomputers IBM PC (e.g. Microsoft Excel). The work has to be done single-handedly by the student, which means, that using the same data or macroinstruction sets for program tools by multiple students is unacceptable. Violating these rules will be treated as an offence against Rules of study in WUT and can be a base for crossing the student out of the subject list.
7. All calculation tables, pictures and graphs, and also pages should be numbered. Pictures and graphs smaller then A4 should be inserted into the proper page. Tables and graphs, that need to be turned by 90 degrees due to their size should be put in a way, that puts the upper part of the table or graph on the same side, as the bound edge. Pictures bigger than A4 should be folded and added to the binder – they don't have to be bound with project description.
8. Projects will be kept in a carton binder, signed properly (fig. 0.3):
   - Student's name and surname,
   - Project group's symbol (e.g. "Thursday-A", if the teacher determined such a symbol),
   - Name and surname of the teacher leading the project group,
   - Name and type of the aircraft, that is the subject of the analysis,
   - Title: "Warsaw University of Technology, Aircraft Design Department"
   - Title: „Aircrafts' Performance – projects",
   - Symbol of academic year preceded by word: „Warsaw".

   Subsequent projects ought to be handed in for checking in a binder together with all previous projects. It means, that single projects (except for the first one) won't be checked and marked.
9. Projects ought to be completed in time, according to the schedule given by the teacher in the beginning of the term. Every week of delay will cause decreasing the mark by 0,5.

## Main symbols

| | |
|---|---|
| $c_a$ | mean aerodynamic chord |
| g | normal gravity acceleration [9.80665 $m/s^2$] |
| m | aircraft mass [kg] |
| S | wing area [$m^2$] |
| $\Lambda$ | aspect ratio [-], |
| $\lambda$ | taper ratio [-], |
| $\nu$ | air kinematic viscosity [$m^2/s$] |
| $\nu_0$ | air kinematic viscosity at sea level[$1.53*10^{-5}$ $m^2/s$] |
| $\rho$ | air density [$kg/m^3$] |
| $\rho_0$ | air density at sea level [1.225 $kg/m^3$] |

Fig. 0.1

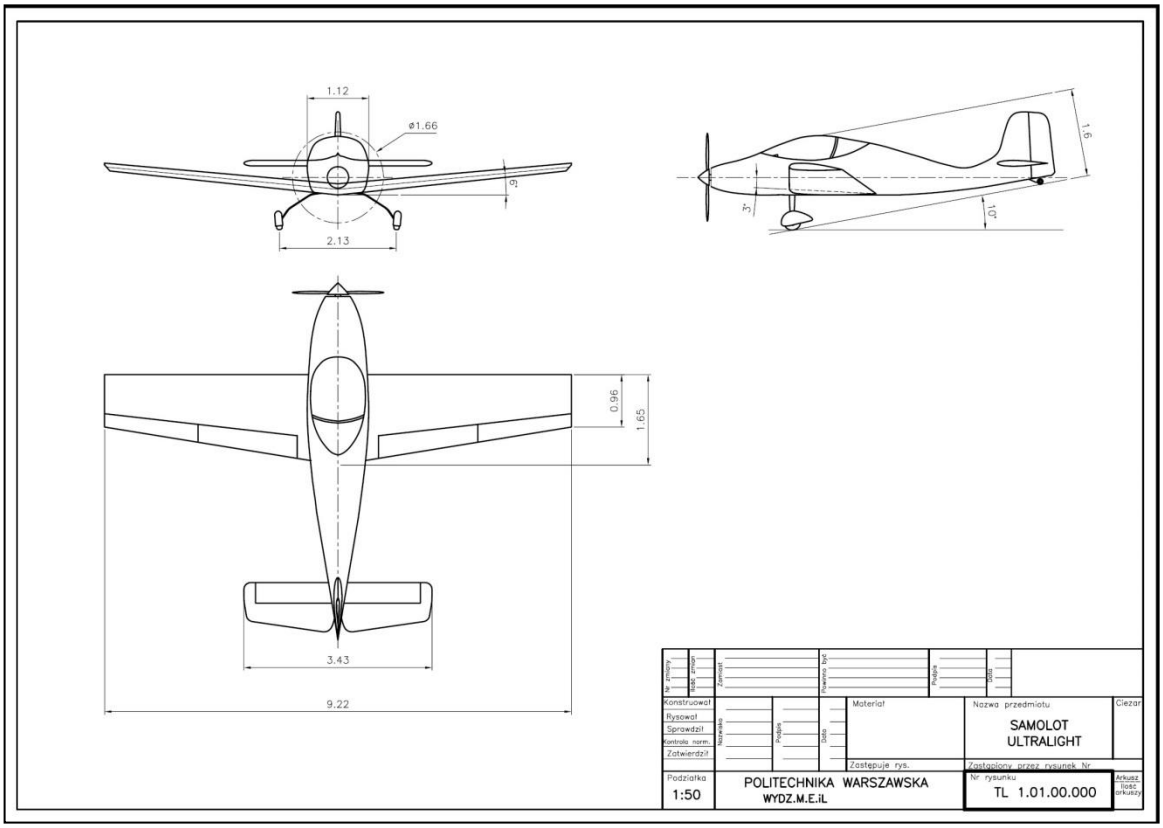


Fig. 0.2

John Smith
Group: A - czwartek 8:15-9:00
Teacher: Dr. T. Grabowski

# Project 3
# Mass analysis

Deadline: 14 January 2016 Mark .....

Fig. 0.3

John Smith
Group: A - Thursday 8:15-9:00
Twin engine transport turboprop
Teacher: Dr. M.Figat

Warsaw University of Technology
Faculty of Power and Aeronautical Engineering
Aircraft Design Department

# Aircraft Design Projects

WARSZAWA 2015/16

Fig. 0.4