TMS031 STATISTISK FÖRSÖKSPLANERING HT05
PROJECT 1

A Helicopter Experiment

Customers of CHC (Cellulose Helicopter Company) have been complaining about the limited flight time of CHC helicopters. A team of CHC design engineers, manufacturing engineers, pilots, field reps and managers, is formed to study how the standard CHC helicopter design might be modified to prolong the flight time without deterioration in stability and flying capacity. The standard design is shown in Figure 1. A large number of helicopter design factors that might affect the flight time are proposed by the CHC team during a brainstorming session. The list is finally limited to eight factors, that are to be studied through a factorial experiment. The eight factors and their respective level suggested by the team are listed in Table 1. Those levels that are not completely defined (e.g. paper quality A and B) are up to you to define.

Factor	(–)	(+)
Paper quality	A	B
Body width	35 mm	50 mm
Body length	80 mm	130 mm
Wing length	80 mm	130 mm
Paper clip(s)	1	3
Folded wing-tips	No	Yes
Taped body	No	Yes
Taped wings	No	Yes

Table 1: Factors and levels.

Your task is to plan, run, analyse and document one or more factorial experiments with the aim to improve the CHC helicopter construction to prolong the flight time. Unfortunately, CHC has a short budget and you do not have resources for more than a total of 25 experimental runs. When fractional factorial experimental designs are used, they must have as high resolution as possible.

The result together with conclusions and recommendations are to be given in a short report directed towards the design manager at CHC. All steps in the experiment should be motivated and explained in words, such that other groups are able to reproduce your experiments and verify your results by following your report. When fractional factorial experimental designs are used, the documentation should contain the following items: (i) how you generated the design (defining relations), (ii) the design and (iii) the price you have had to pay in terms of aliased effects (confounding pattern). The report can be written in either English or Swedish. The deadline for the report is on **24 November** at four o'clock. The reports are to be handed in in the bookshelves at the secretary office of Mathematical Statistics, 4th floor at Mathematics Centre.

Johan Svensson October 27, 2006

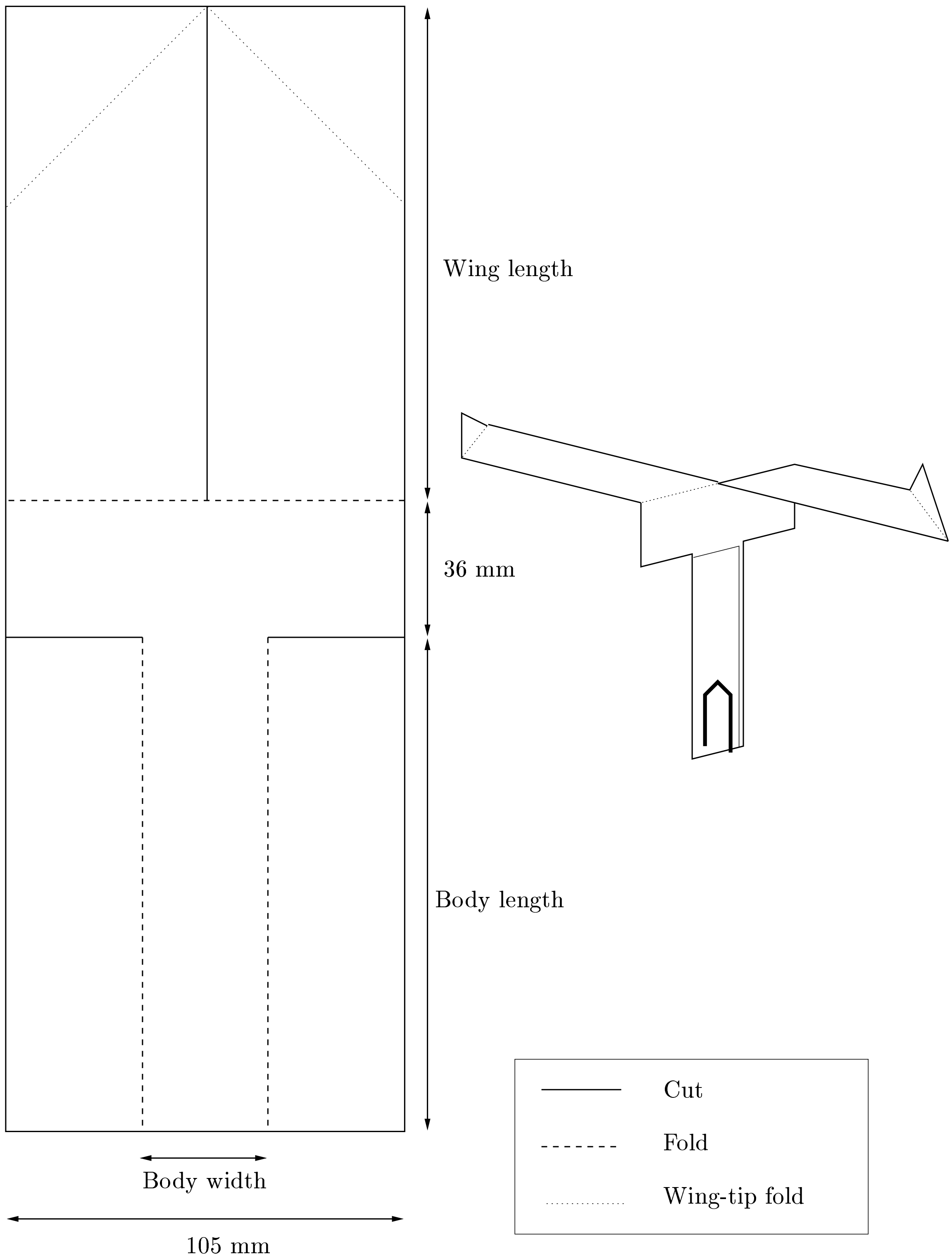

Figure 1: Design of CHC helicopters.