AGENDA ANNEX 7e Switzerland

Agenda Item 15.11 h)

About F5B Scoring

About F5B scoring

An analysis of a national Championship (Switzerland 2015) and the World Championship 2014.

Marco Cantoni

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Normalization of scores

Example Swiss Championship 2015

		ranking	3 of 4	round1	round2	round3	round4
Raw points	Marco	3	3292	1094	1099	1095	1098
	Patrick	1	3326	1089	1108	1119	1099
	Thomas	2	3306	1079	1099	1099	1108
1000 rel. scores	Marco	2	2982.9	1000.0	991.9	978.6	991.0
	Patrick	1	2995.4	995.4	1000.0	1000.0	991.9
	Thomas	3	2978.2	986.3	991.9	982.1	1000.0
1000 & external	Marco	4	2961.4	978.5	991.9	978.6	991.0
	Patrick	2	2991.9	974.1	1000.0	1000.0	991.9
	Thomas	3	2974.0	965.1	991.9	982.1	1000.0
	Piermario	1	3000	1000.0	1000	995.5	1000

The performance (raw points in first table, legs, time, landing) of Marco and Thomas are the same for all ranking lists

Normalised scores change the ranking because “Patrick” performed not so well in the first round !

Normalised scores with the participation of a foreign pilot (1000&external) have an impact on the ranking of the Swiss pilots!

Present situation:

5.5.4.3 Scoring

a) For each flight the total score is compiled by adding the partial score A and B for each competitor;

b) The individual result of each round is normalised to the points of the best competitor of that round.

P_{round} = 1000 x individual points / points of the best competitor

The normalized points shall be recorded to the first decimal number.

c) In order to decide the winner when there is a tie, the best discarded flight shall be taken into account.

normalisation

Original idea of normalization:

To adjust scores so that they are independent of external factors (weather fro example)

Problem: the normalization is based on a value (best score of round) which is statistically not representative. The pilots performance and the points awarded depend on (statistically) “exceptional” values.

Examples of normalized scores

- F3B, F3J, F5J flying in groups: scores normalized to best score **in group**
- F3A, F3C scores normalized per round and/or flight line
- F3A Tarasov-Bauer-Long …

Examples without normalized scores

- F3D, F5D: flight time of each round summed up
  no normalization even if event spreads over several days
- Easy and transparent scoring (pocket calculator)
  straight forward

Professional sports with normalisation

- F1, MotoGP (points for ranking not time)
- Soccer, Hockey (points for wins not goals)

- Sports dominated by tactics not individual performance

Professional sports without normalisation
(although normalization would make sense)

- Golf (strokes are added up over several days)
- Ski (slalom, giant slalom) run times summed up for different courses (first and second run)
- Figure skating: points
- Gymnastics: points
- WRC (Rally Car) time summed up over several stages (different surfaces and lengths etc.)

Scoring is transparent, any spectator can follow the scores directly. No computer required…

F5B actual scoring scheme
(“raw” before normalization)

Example

- Distant task:
  Typically 50 legs = 500points
  smallest increment 10 points

  500

- Duration task: ideally 600 sec
  Penalty for motor running and early (late) landing
  Smallest unit 1 sec

  + 600

- Landing: 3 circles: max 30 points
  steps: 10 points

  + 30

= 1130

Raw scoring scheme is simple, transparent and needs no normalization

- Abandon “unfair” and complicated normalization

Normalization only makes sense when pilots fly in groups
In statistics normalization based on extreme values should be avoided
Normalisation works best on large populations (number of participants) and large number of events (rounds): in smaller competition normalization can have severe impacts on the ranking !

At WC2014 the final ranking after 8 flights shows hardly any change if raw scores are taken into account: no need to complicate the calculation of the final ranking.
Transparency !

Rounds can last several hours and conditions vary.
“Equality” is achieved with increasing number of rounds and “revers ranking” starting order (pilots with similar score fly close together)

2
balance
distance and duration task

a) Definition: This contest is a **multi-task** event for RC Electric Powered Motor Gliders including two tasks:

1) Distance

2) Duration and Landing

These two tasks are executed without interruption in one flight. A minimum of two and a maximum of 8 flights must be flown. If more than three flights are flown, the lowest score of each competitor will be discarded.

- Actual scoring scheme overemphasises the distance task
- Impossible to “catch-up” with a great duration performance
- Landing score not fine enough to make any difference (90% of all landings are 30 points)

WC 2014

- The scores of 46 pilots in 8 rounds have been analysed for the different tasks
- The equivalent of 1 round (out of 8) has been discarded
- The average values and the variation (standard deviation) were calculated.
- The standard deviation shows how much the scores of 70% of the competitors vary around the average value. This is the range in which individual training and excellence can make a difference.

WC 2014
330 individual scores

Distance

- Average 46.3
- Standard deviation (variation) 2.3

460 Points

+/- 23 points

Duration

- Average 596.2
- Standard deviation (variation) 3.0

596 Points

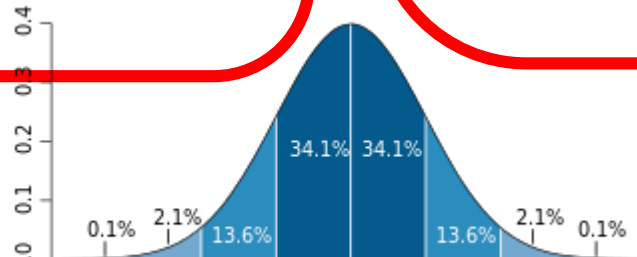
+/- 3 points

Landing

- Average 28.6
- Standard deviation (variation) 2.8

29.1 Points

+/- 2.8 points



WC 2014
330 individual scores

76% of scores:
5 points (or less) from 600
93% 10 points (or less)

90% Scores:
30 points

Distance

- Average 46.3
- Standard deviation (variation) 2.3

460 Points

+/- 23 points

Duration

- Average 596.2
- Standard deviation (variation) 3.0

596 Points

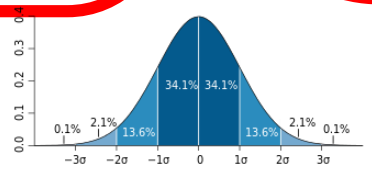
+/- 3 points

Landing

- Average 28.6
- Standard deviation (variation) 2.8

29.1 Points

+/- 2.8 points



Variation << smallest landing score steps (10)

Modified scoring scheme

- Adjust points awarded to equalise the Standard Deviation of the different tasks (adjust so that the variation of scores becomes similar)
- So that the multi-task character is reinstalled
- Distance (“speed”) performance will become less dominant
- Duration and landing performance shall allow to partially catch up with distance performance

1) Distance task:

- 5 points per leg
- 50 legs = 250 points

2) Duration Scoring:

600 points – penalties + landing points

Penalty points
1 point for 1 sec. difference to target time (600sec.)
1 point for 0.5 sec. motor running time during duration
1 point for 3Wmin. over the 1750 Wmin. Limit

landing: points max 50
Minus 5 points per 2m distance from center of landing circle

F5J: 50 points minus 5 points per 1 m
F3B: 100 points minus 5 points per 1 m

WC 2014

with modified scoring scheme (distance, duration and landing)

Distance

- Average 46.3
- Standard deviation (variation) 2.3

230 Points

+/- 12.5 points

Duration

- Average 594.2
- Standard deviation (variation) 4.4

596 Points

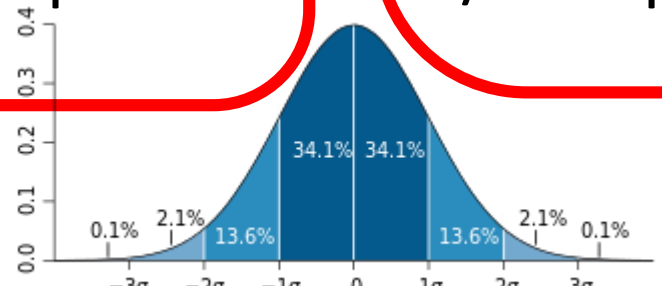
+/- 4.4 points

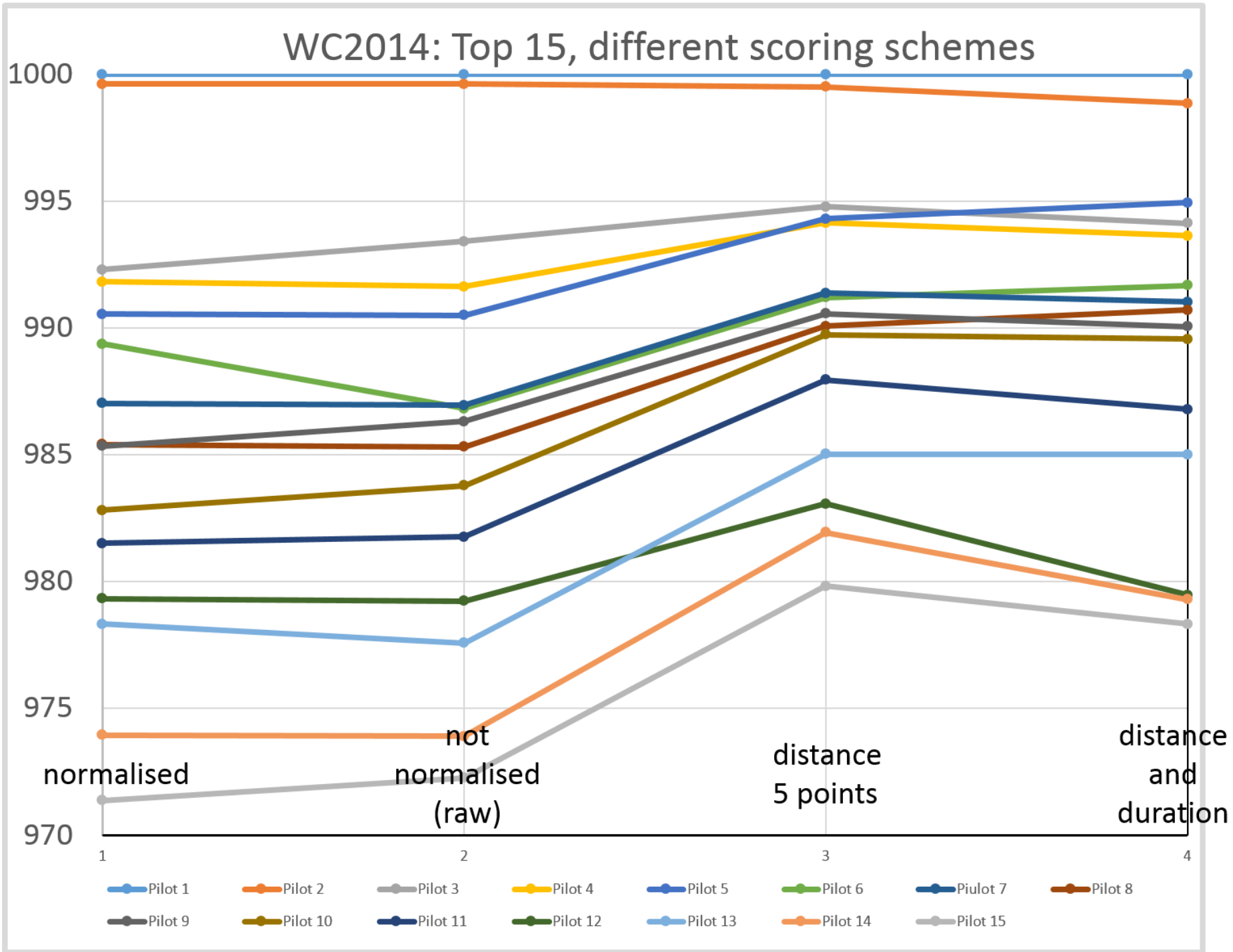
Landing

- Average 47.6
- Standard deviation (variation) 4.6

47.6 Points

+/- 4.6 points




WC2014: Top 15, different scoring schemes
1000
995
990
985
980
975
970
normalised
not normalised (raw)
distance 5 points
distance and duration
1
2
3
4
Pilot 1
Pilot 2
Pilot 3
Pilot 4
Pilot 5
Pilot 6
Piulot 7
Pilot 8
Pilot 9
Pilot 10
Pilot 11
Pilot 12
Pilot 13
Pilot 14
Pilot 15

Top 15 of WC2014

- There are 2 normalization “victims”
- Pilot 1 is the best in all ways
- Going to 5 points does not kill the importance of the distance task but it generates “chances” together with motor running times and landing points
- Impact of landing points on ranking cannot be calculated in this table as relevant values are missing (90% of all scores are 30 points). Statistically a variation of +/- 5 points can be expected.

F5B is a “speed” event
Yes, but…

- The fastest planes on this planet need to do the most precise landings in aviation:
  Jets landing on a aircraft carrier….
  (well, they don’t glide much and search for thermals….)
- If a flight task does not allow to make any difference…
  why fly 10min. and spot land after the score is known…?

Marco Cantoni

- Member of the electric flight commission of the Swiss Model Flyers Association
- Member of the Swiss National Team in F5B since 2002
- PhD in Experimental Physics