„My Way“ Construction

Translated with www.DeepL.com/Translator.
In drawings, divide metric millimeter units by 25.4 to get decimal inch equivalents
Divide Grams by 28.35 to get oz.

“My Way” is an attempt to compensate the effect of propeller gyro forces on the flying F2B model by structural measures and to use the effect of these forces to increase line pull. During the entire three years project I was able to count on the competent help of our F2B friend Wolfgang Nieuwkamp for the calculation of the disturbing forces and the design of the compensation measures. Without his indispensable support it would not have been possible to build several perfectly functioning models.
Until today (October 2018) I have built three different pusher models according to the basics described below. All models fly with a constant speed e-drive. “My Way” and its three predecessors fly agile, stable, accurate and symmetrical. They show no tendency to "e-hunting". With very exact construction with selected woods and adherence to the target weight of less than 1'850 grams as well as with the setting of the operating data according to suggested values “My Way” is a suitable F2B competition model. Its construction requires experience and skill from the construction of conventional wooden model aircraft.

Pusher Design Basics
In Control Line flight, the considerable gyro forces of the propeller affect the flying model in two ways:

1.) In horizontal flight, an F2B model rotates around its vertical axis once in 5 seconds. The resulting gyro force of the rotating propeller results in a disturbing force around the transverse axis which, depending on the direction of rotation of the propeller, pushes the nose of the aircraft upwards (with a conventional "Tractor" drive) or downwards (with a left rotating "Pusher" prop. In order to compensate for this disturbing force, it makes sense to align the traction axis of the motor in the vertical direction in the opposite direction on an F2B model:

- Traction axis for conventional drive with Tractor Propeller: 2° downwards.
- Traction axis for left-hand drive with pusher propeller: 2° upwards.

Combined with a small angle of attack of the stabilizer, stable level flight is then possible, provided the centre of gravity is within reasonable limits.:

- Stabilizer angle of attack for conventional drive with Tractor propeller: 1° upwards.
- Stabilizer angle of attack with pusher propeller: 1° downwards.

A welcome effect of the gyro force caused by the left-running "Pusher" drive is the immediate build-up of line pull at the beginning of the take-off run. Especially when flying without a helper on a hard surface circle this is safety relevant.

2.) When flying an outside looping, an F2B model rotates 90° around its lateral axis in approx. 0.8 seconds. The resulting gyro force results in a disturbing force around the vertical axis which, depending on the direction of rotation of the propeller, pushes the nose of the airplane inwards (with a conventional "Tractor" drive) or outwards (with a left-running "Pusher" drive).

- In the case of a "pusher" drive, this effect results in the nose of the aircraft in the upper outer loop of the standing figure eight, in the outer corners of the square figure eight and in the two upper corners of the hourglass striving outwards, thus increasing the line pull.
- To prevent, in inside looping/corners, an unwanted movement of the aircraft nose to the inside, it makes sense to install an inverted functioning Rabe rudder which is coupled to the down elevator and deflects to the outside.

Remark:
“My Way” can alternatively be built with traction propeller drive train. The then to be reversed design measures to compensate for the gyroscopic forces of "Tractor" propellers are indicated on the drawings of the fuselage and the wing. Note, too, that when using a “Tractor” drive with adaptive power control (Igor Burger system) a special motor (AXI 2826/13 710), a lightweight 3-blade propeller and a 6-cell battery should be used.

Finish
For a lightweight finish method other than using monocote check „Finish My Way“

Materials und Sources

Selected Wood (Light = 10 cm x 1 m: 10 Gr. per 1 mm thickness)
Gloor & Amsler
Bruggerstr. 35
CH-5102 Rupperswil
Telefon: 062 897 27 10
E-Mail: glooramsler@bluewin.ch
www.glooramsler.ch

Ceiba (very) **Light Plywood**
Heerdegen
Bröckerweg 66
D- 490082 Osnabrück
Telefon: 0541 51414
E-Mail: firma@heerdegen-balsaholz.de
http://www.heerdegen-balsaholz.de/
In Switzerland, selected balsa is available from Gloor & Amsler

Motor
AXI 2826/12 Gold Line V2 760 KV Brushless Outrunner Motor
Poles: 14
No Load RPM: 760 / Volt
Max. Voltage: 18.5 V
Max. cont.current: 38 Ampere
Max. cont. power 655 Watt
Shaft dia.: 5 mm
Measures: 35 x 57.5 mm
Weight: 177 Gramm
Cost: 98.- Euro
Sources
https://www.modelmotors.cz/product/detail/396/
https://www.modellmarkt24.ch/ki/Motoren-Elektro/Outrunner-Brushless/AXI.html

Battery
Fullymax Lipo 2600mAh 5s1p 80C
Voltage: 18.5 V (5 Cells)
Capacity: 2'600 mAh
Max. charge current: 4 A
Dimensions: 127 x 37 x 39mm
Weight: 372 Gr.
Cost: 79.- SFR
Source
http://www.leomotion.com/shop/USER_ARTIKEL_HANDLING_AUFRUF.php?Kategorie_ID=1095&Ziel_ID=8409

ESC
Castle Phoenix Edge LITE 75A 8S Brushless ESC mit BEC
Max. current: 75 A
Modes: All, incl. c/l (Governor with brake)
In flight data recording: Built-in
Programming: Via Windows PC and Castle Creation Link USB Kit
Dimensions: 30 x 66 x 21 mm
Weight: 84 Gr, with cables
COST: 118.30 SFR
Source
https://www.modellmarkt24.ch/pi/Regler/castle-phoenix-edge-lite-75a-8s-brushless-esc-mit-bec.html

USB Link
Castle Link B3 Programmer
Cost: 29.30 SFR
Source

https://www.modellmarkt24.ch/pi/Regler/Castle-Talon/castle-link.html

WIndows PC Software
Free via Castle Link Download: http://www.castlecreations.com/downloads

Anti-Spark Plug (recommended)
Jeti 4 mm
Cost: 10.95 SFR
Source:
https://www.brack.ch/jeti-anti-blitz-stecker-anti-724932

Timer: (Order by e-mail, pay with PayPal)
Hubin FM-9 with remote switch
Cost: Ca. 12 USD
and:
FM-9 Programmer
Cost: Ca. 85 USD
Will Hubin
719 Cuyahoga St.
Kent, OH 4240
USA
whubin@kent.edu

Pusher Propeller
Fiala Electric Wood 13 x 6 E3 left turning (on Order)
Hope Modellbau
Aarauerstrasse 4
5040 Schöftland
Schweiz
www.hopemodell.ch
philip.hochuli@hopemodell.ch
or,
available on order at hobby shops:
APC Thin Electric Pusher 13 x 5.5 EP Product Code LP 13055EP
https://www.apcprop.com/product/13x5-5ep/

Tractor Propeller
XOAR Electric Woodr 2-Blade PJN 13 x 6
Weight: 21 Gr.
Cost: 12.90 SFR
Source
https://www.modellmarkt24.ch/pi/Propeller/XOAR-Elektro-Holzpropeller-2-Blatt-PJN/Xoar-Electric-Beechwood-13x6-Propeller-PJN-Serie.html
or:
Fiala Electric Wood 13 x 6 E3 right turning. 23 Gr.
Cost: 12.90 SFR
Source
Hope Modellbau*:* https://hopemodell.ch/saas/web/hope/artikel/2-Blatt-Holz-Propeller-Elektro-E3-13-6-natur.aspx

Spinner 51 mm („Cool“ airflow type is recommended for “My Way”)
TTE-2052 - B - T 2in Ultimate 2 Blade Turbo Cool Spinner
Pusher slot “” C “” for APC thin electric pusher 13 x 5.5 EP, Product Code LP13055EP (Pusher prop reverse rotation, control line). Backplate reamed 7/16”
http://www.truturn.com/cgi-bin/store/agora.cgi?p_id=tte2025.13&ppinc=spinners130&exact_match=on

Adapter for AXI 2826/12
Electric motor adapter TTE-0516-050-A 5 mm Collet to 5/16-24 UNF Shaft Adapter Kit
http://www.truturn.com/cgi-bin/store/agora.cgi?p_id=tte0516050a:33&ppinc=adapt&exact_match=on

Romco Manufacturing, Inc.
100 West 1st.Street
Deer Parrk, Texas 77536

USA
http://www.truturn.com/index.html

Ready to fly lines:
Yatsenko Lines, Dia. 0.015 in. or. 0.38 mm., Carbon steel, brass coated. (must regularly be oiled) Ready made eyelets. Made on order to any length to any lenght, such as:. 18.0 m (Eye-eye) for Breitenbach or 19.5 m for Hard:
or:
Dia. 0.015 Zoll or. 0.38 mm., 7-strand, stainless steel. Ready made eyelets. Made on order to any length.

Roger Ladds, England, e-mail: busterjudge@googlemail.com

Clips
https://hobbyking.com/en_us/sullivan-products-heavy-duty-line-connectors-80lb.html?___store=en_us

Handle
http://brodak.com/control-line-parts/handles-1/brodak-large-adjustable-handle.html

ESC Program

Castle	Edge Lite 75A
Vehicle Type: Control Line Throttle Type: Governor Mode Governor Mode Setting: Governor High Governor Gain: Low (15) Initial Spool Up Rate: High (8) Head Speed Change Rate: High (8) Brake Strength: 100% Brake Delay: No Delay Brake Ramp: Medium Cutoff Voltage: Custom 16.1 V Voltage Cutoff Type: Soft Cutoff Current Limiting: Sensitive (90A) Current Cutoff Type: Hard Cutoff Auto-Lipo Volts/Cell: Inactive Battery Pack Voltage: 18.500 Motor Start Power: Medium (59)	Motor Timing: Normal (5) Direction: Reverse PWM Rate: 8 kHz Gearing Info: No Gearing/Direct Drive KV of Motor: 760 Magnetic Poles in Motor: 14 Power-On Beep: Enable BEC Voltage: 5.0 V Link Live Enable: Disabled Auxiliary Wire Mode: Disabled Logging; 2 sample/second: Batt. Voltage, Batt. Current, Contr. Temp., Contr., Input Throttle, Controller Motor Power Output, Motor RPM, BEC Voltage. Automatic Data Reset: Custom (90%) Firmware: V 4.25
Timer Program Battery disconnected, press start button and Programmer ON together to start programming.	Mode: ICE/EDGE Delay: 35 sec. Time: 5'15" RPM: 9'645 RPM Gear-Up: No

Configuration	
Weight	1'770 Gr.
Motor	AXI 2826/12 V2 760 V/Umin
Battery	Fullymax 2600 5S 80C
Delay	35 sec
Run time	5'15"
Flaps setting	Neutral
Elevators trim	1° or 1.5 mm up
Flaps / elevators ratio	1 : 1.25 or. 36° Flaps (30 mm) with 45° Elevators (25 mm)
Hingeline seal	Flaps
Battery position	12 mm rear of mid position
Tail trim weight	0
Center of Gravity	186 mm from hingeline forward
Leadouts guide, centre	40 mm rear of c.g.
Outer tip heavier	24 Gr.
Rudder with elevators neutral	20° out
Rudder with elevators 45° up	33° out

Flight Setup & Data	
Lines	Yatsenko 19.5 m x 0.38 mm (0.015 x 64 ft)
Motor	AXI 2826/12 V2 760 RPM/V
Propeller	2-blade, wood: Fiala 13 x E3 P
Timing	Normal (5)
PWM	8 Khz
Gain	Low (15)
Motor Start Power	Normal (59)
Initial Spool-Up Rate	High (8)
Head Speed Change Rate	High (8)
Constant speed set	9‘645 RPM
Avg. constant speed logged	9‘309 RPM
Speed sec/lap	5.25
Avg. power in level flight	539 W
Max. power / max. current	762 W / 37 A
Min. voltage under load	18.3 V
Max. power out	87.5 %
Max. ESC temperature	65.8 ° C
Battery temperature after landing	40 ° C
Battery re-charge	2‘150 mAh / 83%