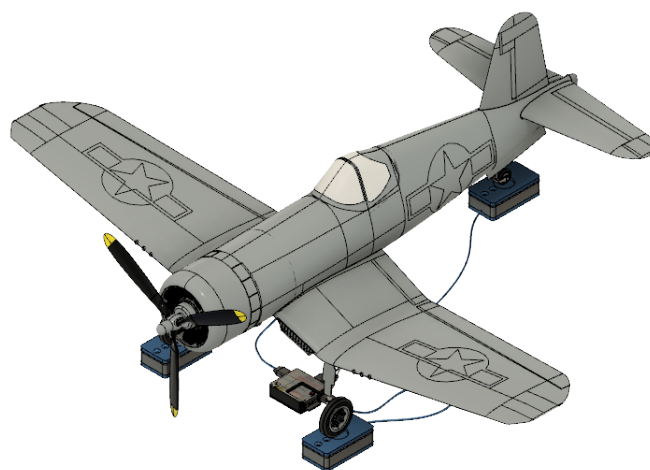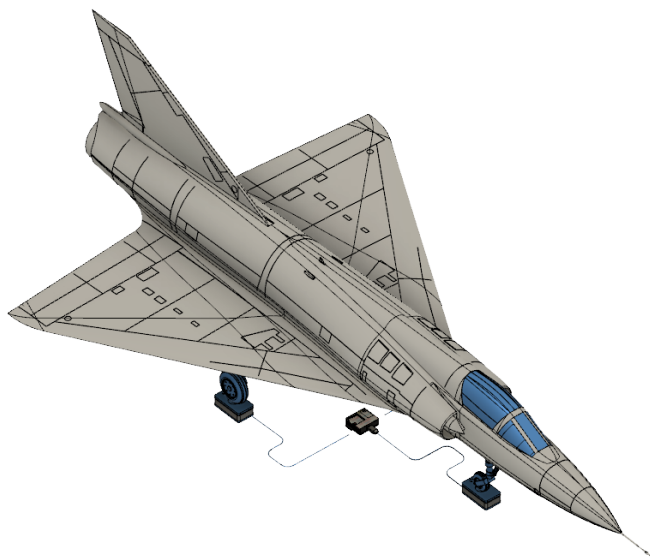# CG Wizard Pro

User Manual

Version 1, January 2018

General safety rules

Please take the time to read this manual. Failure to follow all instructions may result on injury or material damage.

This tool has a Class 1 laser pointing device, please don't stare into beam.
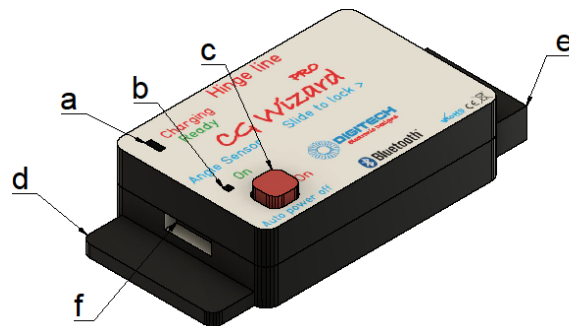
Functional description

CGWizard Pro is a versatile measuring tool to find and set the center of gravity of a plane and to measure the angle and throw of most of the moving surfaces.

Product features

1. Core unit

   a. Charge/ready LED   b. Run LED

   c. Power On button   d. Extraction tab

   e. Docking connector   f. Charge connector

2. Docking station

   a. Core unit slot   b. Sensor connectors

   c. Laser pointer   d. Reference notch
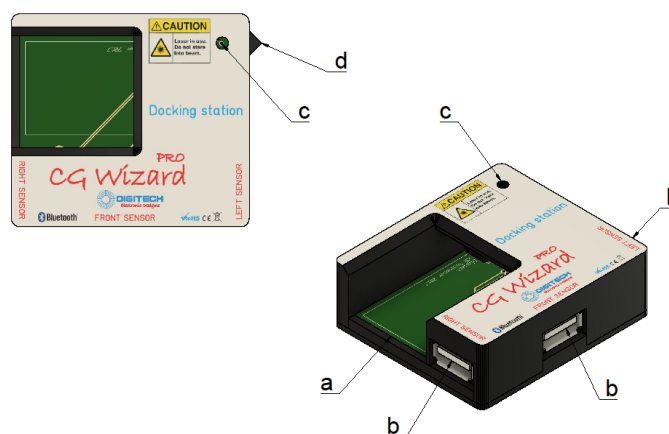
    a.   Recessed wheel hole
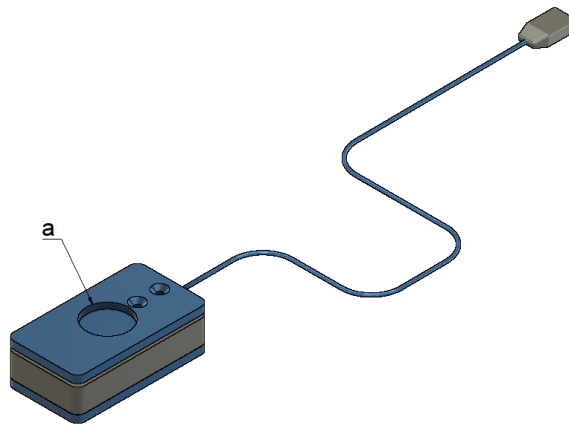
Applications features

1. CGWizard

- Connection status indicator
- Main Left/Right and Front gears
- Total weight
- Sensor gap value
- Current CG position
- Tare button
- Pointer on/off button
- Unit selector

2. ATWizard

Searching

Chord: 0 — Connection status indicator

Chord value

Travel

0,0 — Current throw value

Angle

0,0 — Current angle value

Zero button

Zero

mm | inch (frac) | inch (dec) — Unit selector
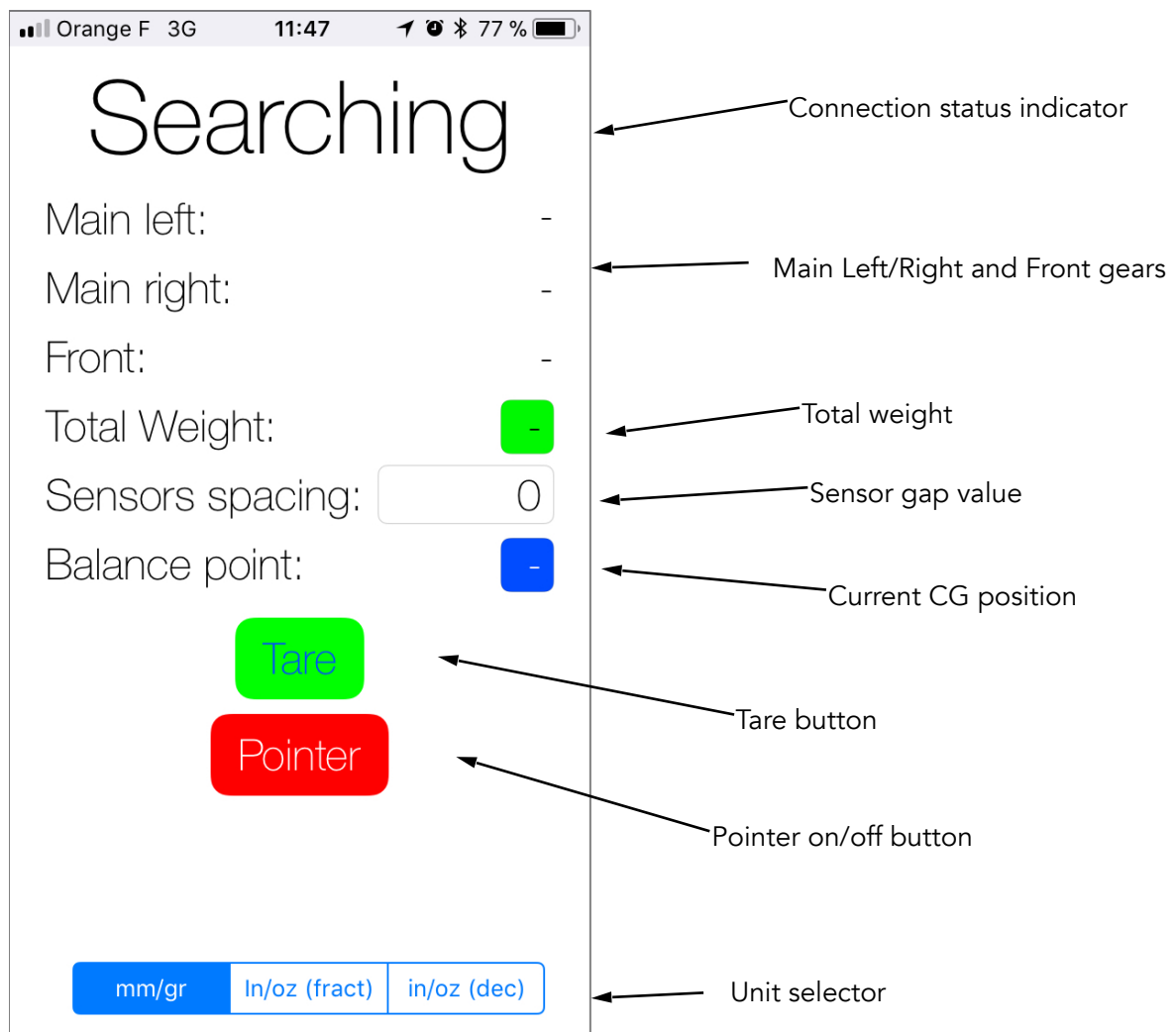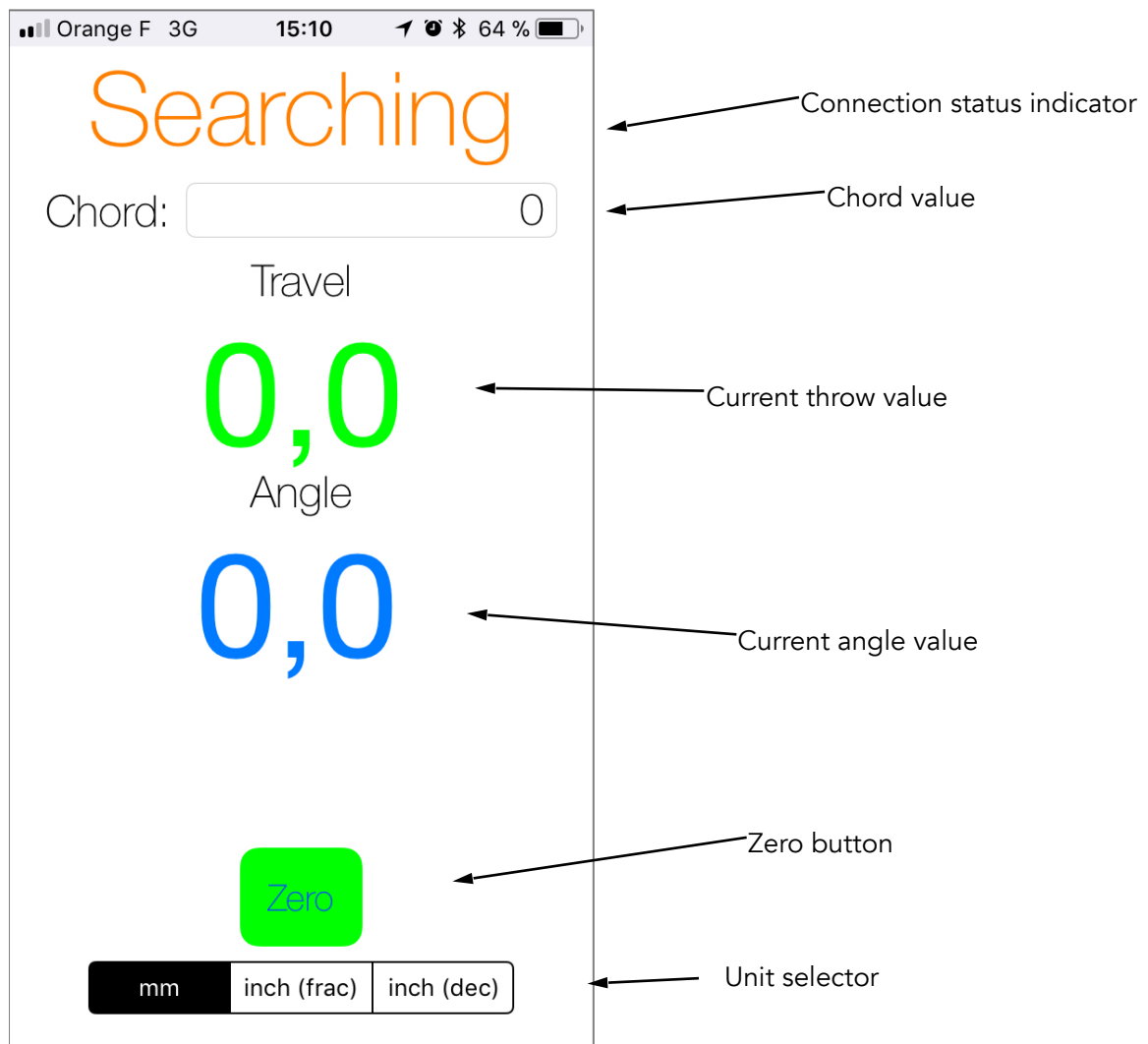
Technical data

- Max load on main left and right sensors: 25 Kilograms (about 55 pounds)

- Max load on front sensor: 5 kilograms (about 11 pounds)

- Average error on weight: 1%

- Power Off timeout: 30 seconds (when no Bluetooth connection)

- Internal battery: Li-Ion, 70mAh, rechargeable thru the USB charge connector

- Model Max weight: 50 kg (about 110 pounds)

Utilisation in CG setting mode

Preparation

In addition of the CGWizard Pro, a measuring tool is needed (like a ruler or a measuring tape).
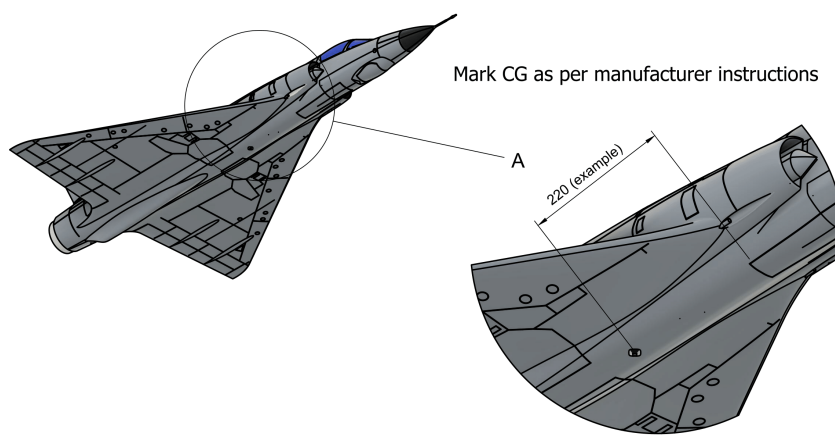
Prepare a flat and levelled surface with enough space to accommodate the plane.

Step 1

Mark the CG on the lower side of the fuselage of the plane as per indicated by the manufacturer.

See Figure 1 for reference.

Figure 1

Mark CG as per manufacturer instructions

Step 2

Plug the three sensors on the docking station. Each sensor must be plugged on its corresponding port.

Put the core unit on the docking station slot until it is flush with the docking station.

Launch the CGWizard application on the smartphone or tablet.

Press and hold the power button for 3 seconds on the core unit.

The CGWizard Pro will connect to the application automatically.

Press on the "Tare" button and wait until each sensor displays a zero value (maybe it will oscillate between -1 and 1, but don't pay attention to this).
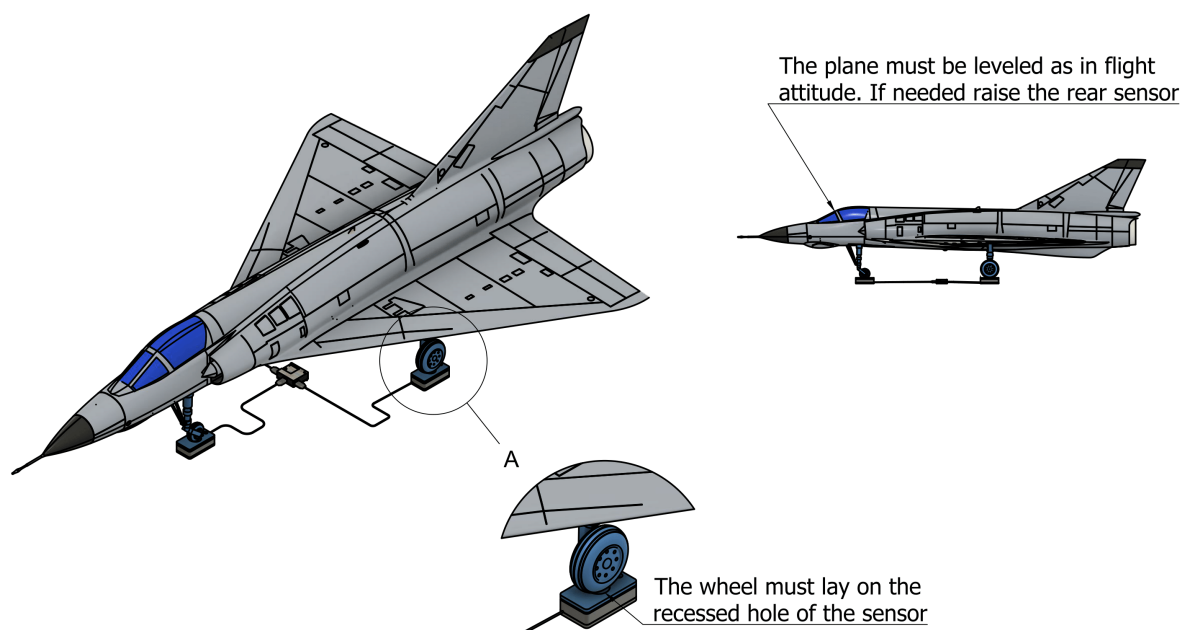
Step 3

Put the plane on the sensors, each wheel must lay on the recessed hole of the sensor.

WARNING: if the plane is over 25 kilograms make sure to put all the wheels on the sensors at the same time, don't tilt it too much!

If one of the sensors exceeds the 25 Kilograms load, it might be damaged.

Ensure that the plane is roughly on a flight attitude. If it is too nose up, rise the main sensors (left and right), until the plane is on the desired attitude. See Figure 2 for reference.

Figure 2

The plane must be leveled as in flight attitude. If needed raise the rear sensor

A

The wheel must lay on the recessed hole of the sensor

At this point, the application displays the load on each sensor and the total weight as well.

Draw a line joining the rearmost edges of the main left and main right sensors. This line will be the reference line.

Now, measure the distance between the rearmost edge of the front sensor and the reference line, as per show in Figure 3. Ensure that this measure is perpendicular to the reference line.

Figure 3
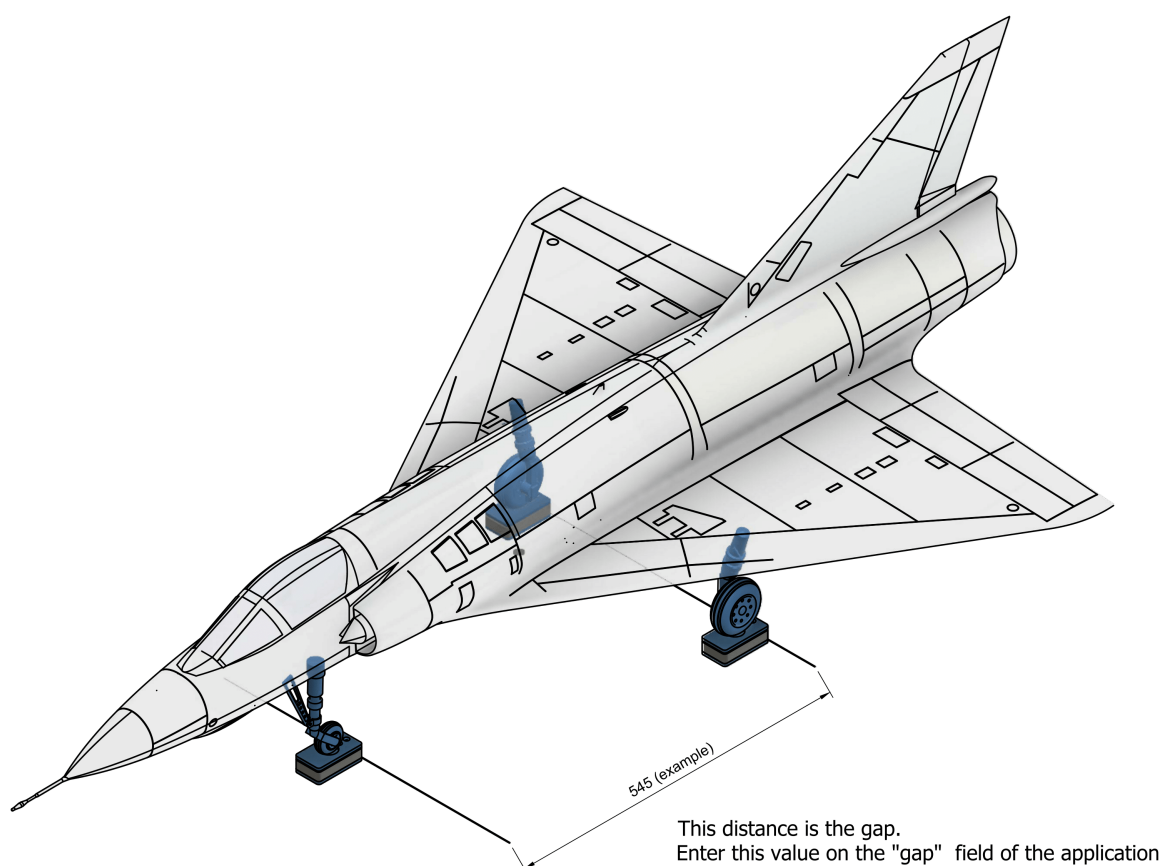
545 (example)

This distance is the gap.
Enter this value on the "gap" field of the application

This distance is the sensor gap, and must be entered on the application at the corresponding field.

Step 4

Now, press on the "Pointer" button of the application, in order to turn on the laser.

Aim the CG marked on the very first steps with the laser pointer, and measure the distance between the reference notch and the reference line. Once again, ensure that this measure is perpendicular to the reference line. Check also that the docking station front sensor connector is pointing towards the front sensor.

This last distance is the target CG value. Write this value somewhere for reference.

See Figure 4 for reference.
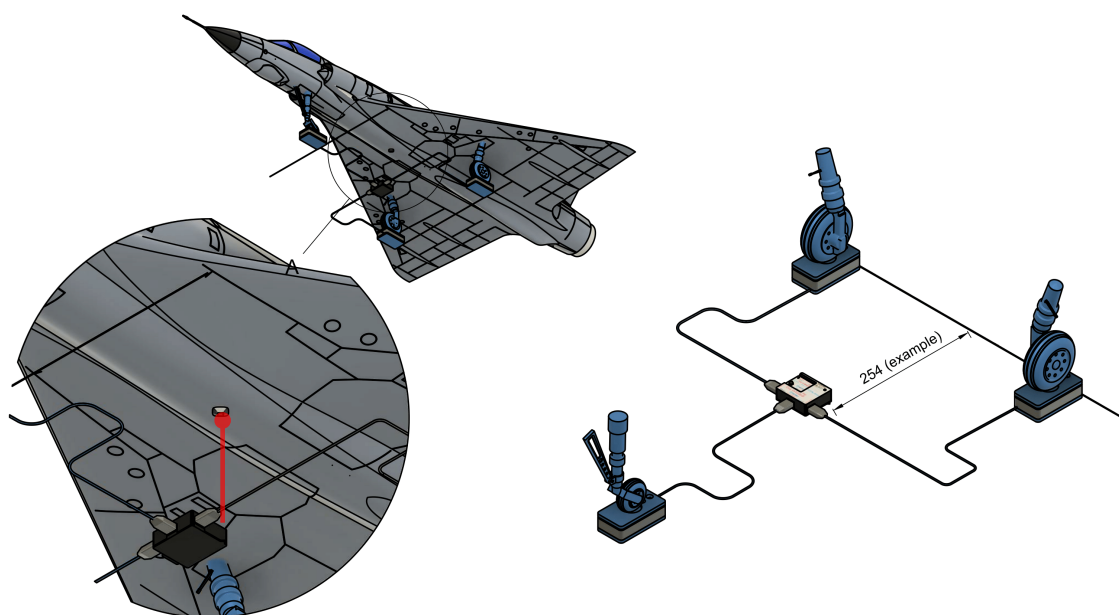
Step 5

Now add or remove weight accordingly in order to make the value shown on the filed "balance point" match the target CG value.

If the "balance point value" is smaller than the target CG value, the plane is tail heavy. Remove weight on the back or add weight on the front of the plane.

If the "balance point value" is greater than the target CG value, the plane is nose heavy. Remove weight on the front or add weight on the back of the plane.

Utilisation in CG setting mode on a tail dragger plane

Preparation

In addition of the CGWizard Pro, a measuring tool is needed (like a ruler or a measuring tape).

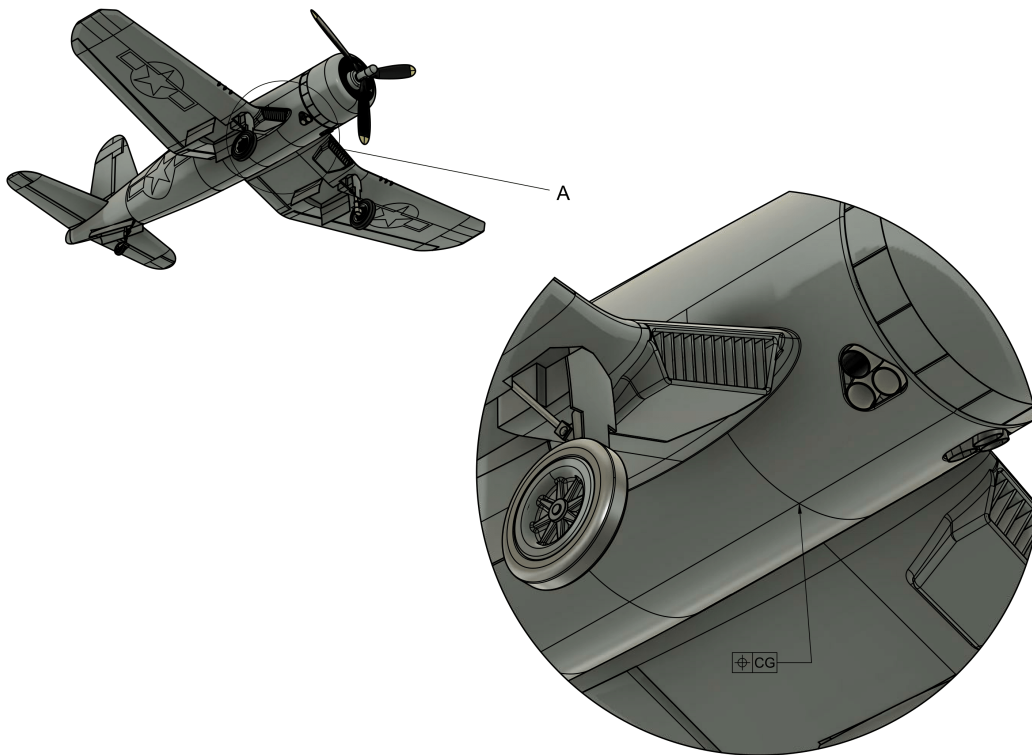Prepare a flat and levelled surface with enough space to accommodate the plane.

Probably you will need to rise the tail wheel to set the plane in its flight attitude. Prepare some objects to put between the surface and the sensor.

Step 1

Mark the CG on the lower side of the fuselage of the plane as per indicated by the manufacturer.

See Figure 1.1 for reference.

Figure 1.1

Step 2

Plug the three sensors on the docking station. Each sensor must be plugged on its corresponding port.

Put the core unit on the docking station slot until it is flush with the docking station.

In this type of plane (tail dragger), the right sensor will accommodate the left main gear, the left sensor will accommodate the right main gear and the front sensor will accommodate the tail wheel.

Launch the CGWizard application on the smartphone or tablet then press and hold the power button for 3 seconds on the core unit. The CGWizard Pro will connect to the application automatically.

Press on the "Tare" button and wait until each sensor displays a zero value (maybe it will oscillate between -1 and 1, but don't pay attention to this).

Step 3

Put the plane on the sensors, each wheel must lay on the recessed hole of the sensor.

WARNING: if the plane is over 25 kilograms make sure to put all the wheels on the sensors at the same time, don't tilt it too much! If one of the sensors exceeds the 25 Kilograms load, it might be damaged.

Ensure that the plane is roughly on a flight attitude. If it is too nose up, rise the sensors of the tail wheel (the sensor labeled "Front"), until the plane is on the desired attitude.
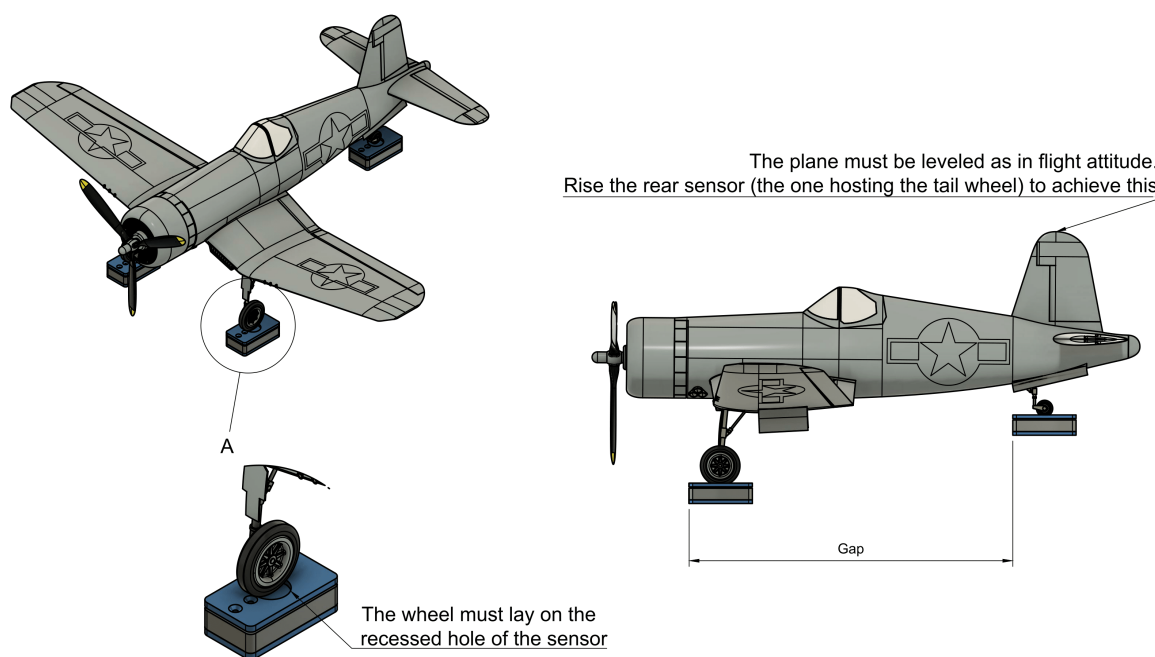
At this point, the application displays the load on each sensor and the total weight as well.

Draw a line joining the frontmost edges of the main left and main right sensors. This line will be the reference line.

Now, measure the distance between the front edge of the tail wheel sensor (the sensor labeled "Front") and the reference line, as per show in Figure 2.1.

Ensure that this measure is perpendicular to the reference line.

Figure 2.1

A

The wheel must lay on the recessed hole of the sensor

The plane must be leveled as in flight attitude. Rise the rear sensor (the one hosting the tail wheel) to achieve this

Gap

This distance is the sensor gap, and must be entered on the application at the corresponding field.

Step 4

Now, press on the "Pointer" button of the application, in order to turn on the laser.

Aim the CG marked on step 1 with the laser pointer, and measure the distance between the reference notch and the reference line. Once again, ensure that this measure is perpendicular to the reference line. Check also that the docking station front sensor connector is pointing towards the sensor of the tail wheel (the sensor labeled "Front").

This last distance is the target CG value. Write this value somewhere for reference.

See Figure 3.1 for reference.

Step 5

Now add or remove weight accordingly in order to make the value shown on the filed "balance point" match the target CG value.

If the "balance point value" is smaller than the target CG value, the plane is nose heavy. Remove weight on the front or add weight on the back of the plane.

If the "balance point value" is greater than the target CG value, the plane is tail heavy. Remove weight on the back or add weight on the front of the plane.

Figure 3.1
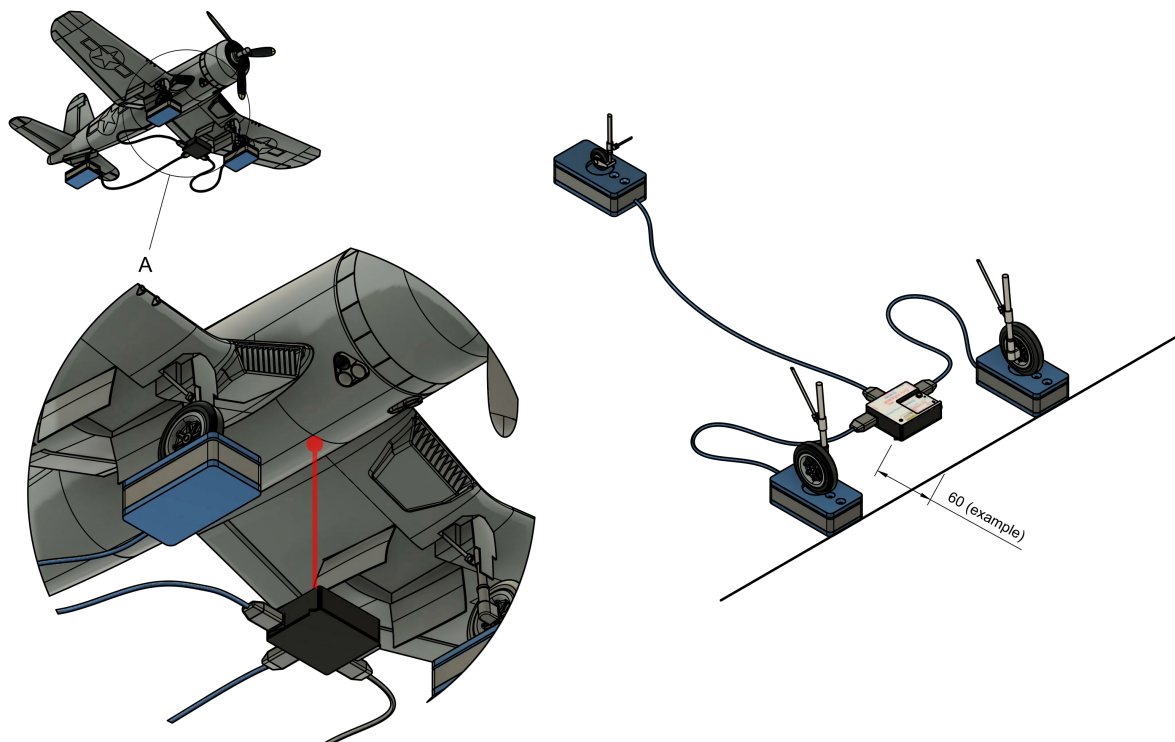
Utilisation in Angle and throw metering mode

Preparation

In order to measure angles and throws, the core unit must be fixed to the moving surface (aileron, elevator, and flap).

Use a soft glue like a double faced removable tape or a glue pad like UHU Patafix. This last one is the best.

CGWizard Pro can't be used to measure the throw of a vertical fin. However, acceptable result can be obtained on surfaces inclined on angles up to 50 degrees (like v-tail elevators).

CGWizard Pro uses accelerometers to determine the angle and position of the moving surface, thus any movement or excessive vibration may affect the readings. Keep the plane as still as possible during zeroing and reading phases.

Prepare a flat and levelled surface with enough space to accommodate the plane.

Step 1

Remove the CGWizard Pro core unit (if not already done) and stick it to the surface to be measured.

Take care to put the face labeled "hinge line" as parallel as possible to the hinge line of the moving surface.

You can place the unit anywhere on the surface as long as this last condition is met.

Step 2

Measure the chord.

To do so, please measure the distance between the hinge line and the trailing edge of the surface.

If the surface has a slant shape (not rectangular), measure the chord at the point on which the manufacturer indicates where the throw should be measured.

For example, if the manual says that the travel of an aileron must be measured at the root side (the closest of the fuselage), measure the cord of the aileron at the root side of it.

If the manual says that the travel must be measured at the tip side of the aileron (the one closest to the wing tip) measure the cord of the aileron on the tip side of it.

On fully moving surfaces (like the elevators of F15 Eagle or F22 Raptor or canard surfaces of a Rafale), the hinge line is the rotating axle of the surface, and the chord is the distance between the center of this axis and the trailing edge of the surface. See Figure 5 and Figure 6 for reference.

Step 3

Power on the radio and the plane, and set the surface to be measured to its neutral position.

Launch the ATWizard application on the smartphone or tablet.

Press and hold the power for 3 seconds on button on the core unit.

CGWizard Pro will connect to the application automatically.

Step 4

Once the readings are steady, press the "Zero" button on the application

Now, as the surface moves up and down, the value of the angle and throw are shown on the application.

Set the travel limits of the surface to the desired values.
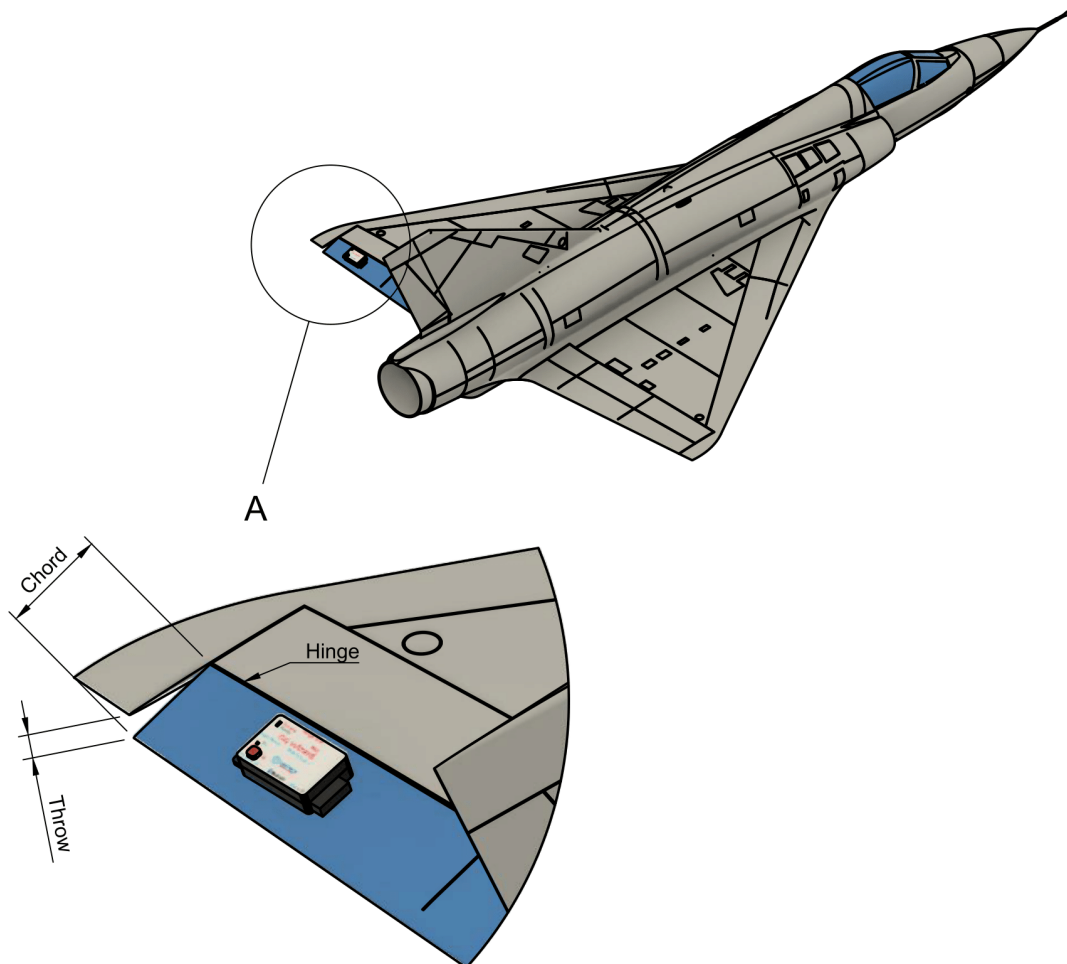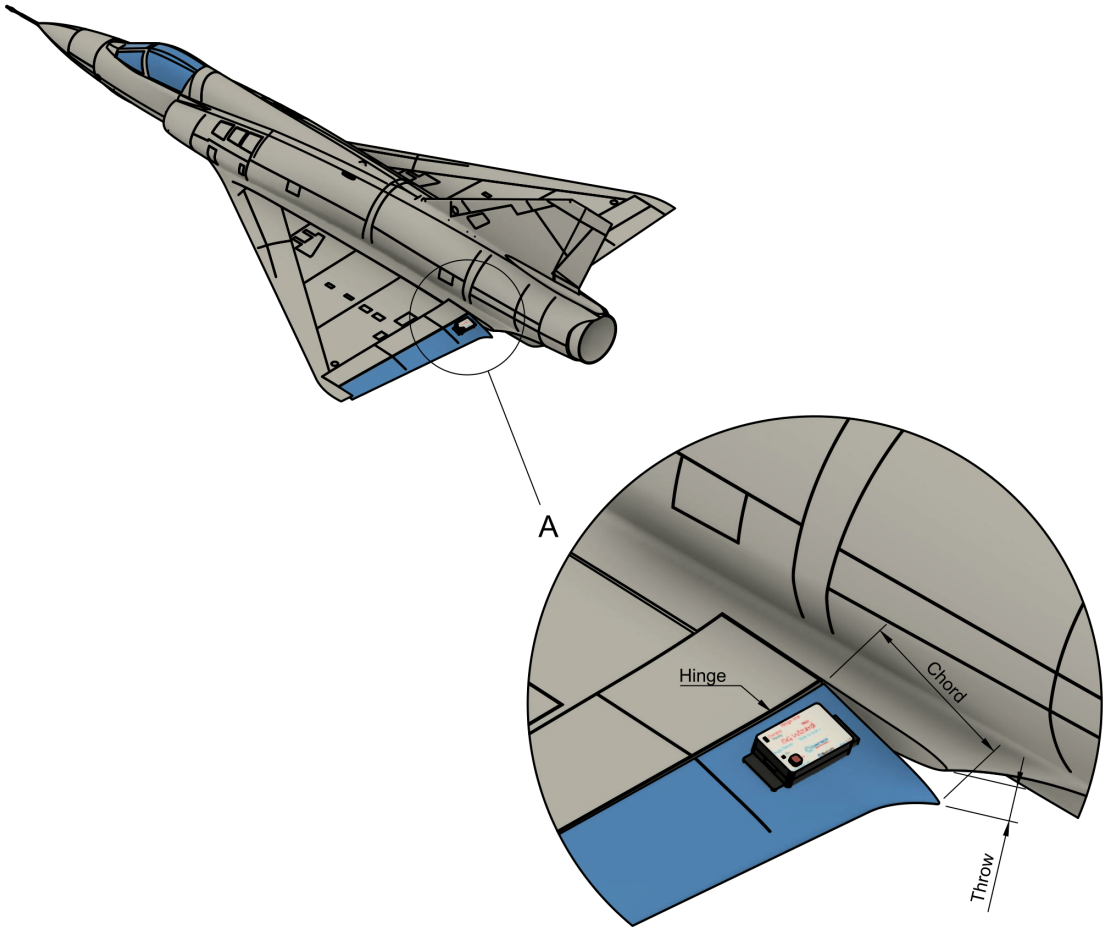
Figure 5

Figure 6

A

Hinge

Chord

Throw

Conformiteit verklaring

wij : Fast & Curious

$C\,\epsilon$

Oliemolenstraat 5

6343PW Weustenrade

Verklaren dat de Laser diode zoals verwerkt in de CG Wizard Central box DSP-03-01

De volgende Richtlijnen, Standaard en voorschriften omschrijft

 Central box CG Wizard laser module DSP-03-01

EMC directive 2004/108/EC

EN 61000-6-3: 2007 +A1: 2011

EN 61000-6-1: 2007 LVD directive 2006/95/EC

EN 60825-1: 2007 RoHS directive 2011/65/EU

Weustenrade 01-03-2017

G,P.H.S Kruise