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```
clear all
close all
clc
```

Weight -> Lift -> Drag -> Thrust

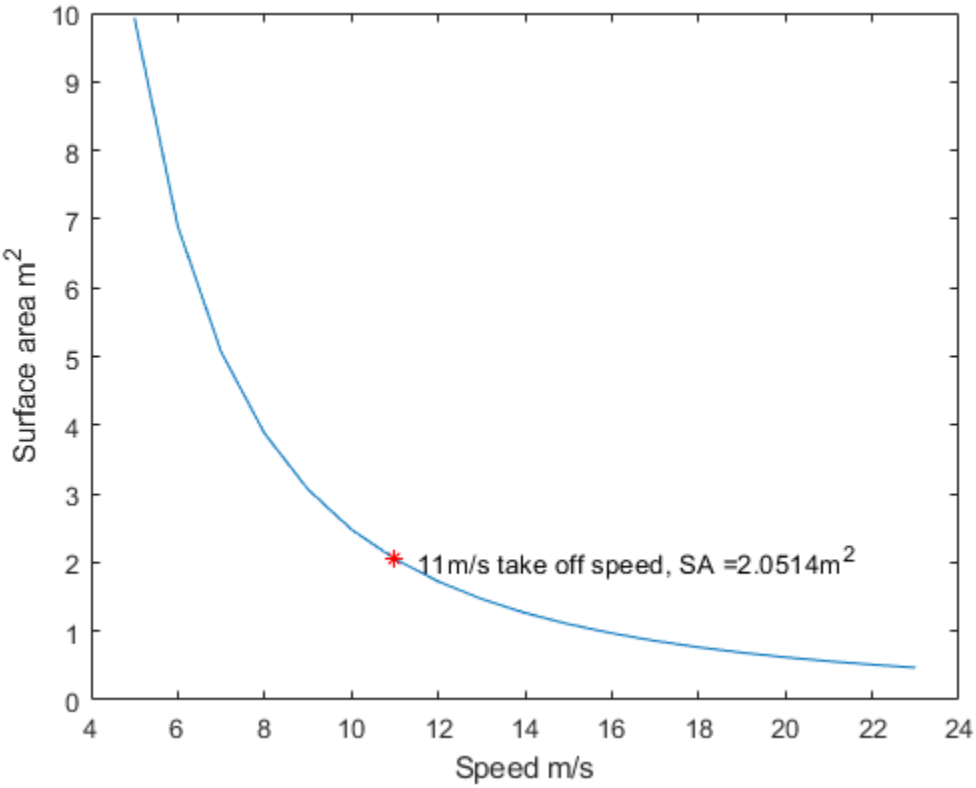
weight

```
weight = 41*.453592*9.81;%weight 55 lbs in newtons
```

Lift

```
d = 1.225; %kg/m^3 = will be a function of altitude in final flight
 calc
CL = 1.2;%Coefficient of lift
vp = 11;% take off speed m/s

Lift = weight;
length = 11*.3048;
SA = 0;
speeds = [5:1:23];

for i = speeds
vel = i;
S = ((2*Lift)/(d*vel^2*CL));

width = (S/length);%*3.28084;
SA = [SA S];
end

take = ((2*Lift)/(d*vp^2*CL));

plot (speeds,SA(2:end))
hold on
plot(vp,take,'r*')
ylabel('Surface area m^2')
```

```
xlabel('Speed m/s')
x1 = vp;
y1 = take;
txt1 = ['    ', num2str(vp) ,'m/s take off speed, SA
 =',num2str(take),'m^2'];
text(x1,y1,txt1);

surf = take*10.76391;
wit = (take*10.76391)/11;%width in feet of wing
```



Drag

```
DA = 22;%drag area
V = vp;%stall velocity
cd = .05; %standard drag coefficient of a plane

Drag = cd*DA*0.5*d*V^2;
```

Thrust

```
diami = 15;
pitch = 6;

RPM = 18000;
```

```
C1 = 4.392399*10^-8;
C2 = 4.23333*10^-4;

propC = .015;
P = RPM*propC;
Thrust = C1*RPM*((diami^3.5)/sqrt(pitch))*(C2*RPM*pitch); %source:
 http://www.electricrcaircraftguy.com/2013/09/propeller-static-
dynamic-thrust-equation.html
```

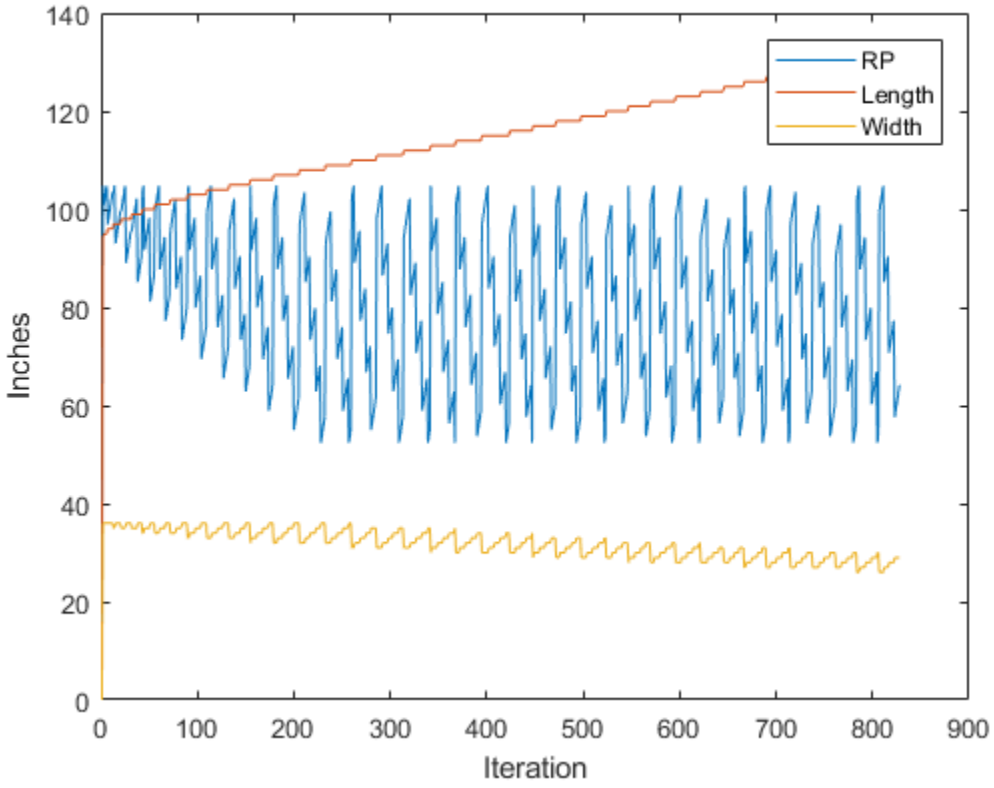
DATA

```
T_ex = Thrust - Drag;%excess thrust
acc = T_ex/weight; %acceleration achievable
% dis = (0.3048*170);
%TOV = sqrt(2*acc*dis)
dis = ((vp^2)/(2*acc))*3.28084;
time = (2*(dis))/vp;
```

Wing Shape

```
prompt = 'Which point would you like to pull?';
point = 800;%input(prompt);

%prompt2 = 'What is the wing length?';
%x = input(prompt2);

B_Perc = .4;
SA = surf*144;

Length = 0;
Width = 0;
RP = 0;


for x = 0:1:132
    L = x;
    for y = 0:1:36
        W = y;
        for z = .4:.01:.8
            R = z;

            B = W*B_Perc;
            ll = L*R;

            T = L - ll;
            Q = W - B;

            Surf = (ll*Q)+(B*L)+((Q*T)/2);

            if Surf>SA && Surf<(SA*1.02)
                Length = [Length L];
                Width = [Width W];
                RP = [RP R];
```

```
            end

        end
    end
end

Wing_Length = Length(point);
Wing_Width = Width(point);
Wing_RP = RP(point)*Wing_Length;

figure(2)
plot(RP*Wing_Length)
hold on
plot(Length)
hold on
plot(Width)
hold on
legend('RP','Length','Width')
xlabel('Iteration')
ylabel('Inches')
```



Display

```
Saa=['Surface Area = ',num2str(surf)];
ac=['Acceleration = ',num2str(acc)];
dists=['Distance = ',num2str(dis)];
```

```
thr=['Thrust = ',num2str(Thrust)];

wl=['Wing Length = ',num2str(Wing_Length/12/2)];
ww=['Wing Width = ',num2str(Wing_Width/12)];
cl=['Chamfer Location = ',num2str(Wing_RP/12/2)];

disp('-------')

disp(wl)
disp(ww)
disp(cl)

disp('-------')

disp(Saa)
disp(ac)
disp(dists)
disp(thr)
```

```
-------
Wing Length = 5.4583
Wing Width = 2.4167
Chamfer Location = 2.5654
-------
Surface Area = 22.0808
Acceleration = 0.61046
Distance = 325.1475
Thrust = 192.8963
```

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