

## Shrouded prop./Ducted fan

Pro: more static thrust vs. open propeller

Cons: SINGLE DESIGN POINT

- design for high static thrust results in higher drag at high speeds
- design for low drag results in low static thrust

## Channel wing

Pro: more thrust than open propeller

Cons:

- too small increase in thrust (<10%)
- no control at slow speed
- vibrations cause loading difference
- structural weight increase

## Lip Wing system

A compound system that generates more static lift without the inherent drag increase at higher speeds.

Static lift preliminary experiments:

- 65% more lift than open propeller
- 20% more lift than a shrouded propeller

more details:

<http://lipwing.hypertriangle.com>

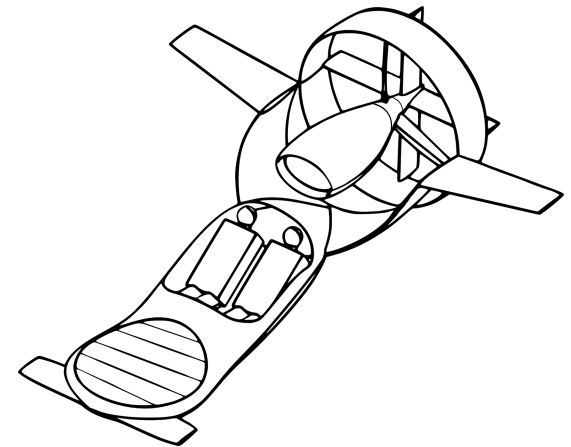
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# Lip Wing

## Lift at zero speed



## Fixed wing aircraft

Pro: Most efficient transport device to date

Cons: STALL

- cannot fly slow
- safety issue - "failure to maintain airspeed"
- needs costly runways
- basically restricted to airfields

## Helicopter

Pro: Most efficient hovering aircraft to date

Cons: SLOW

- retreating blade stall limits speed
- inefficient transport media

## Tilt wing/rotor

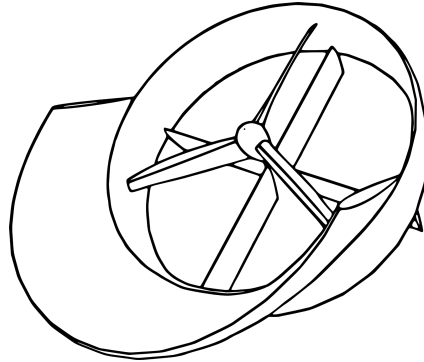
Pro: Hovers and is faster than helicopters

Cons: COMPROMISE

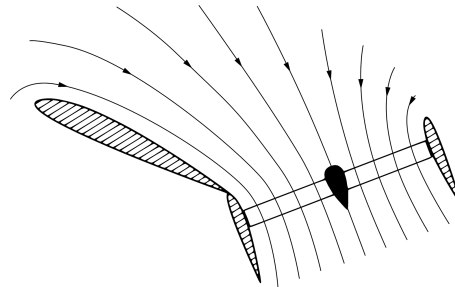
- less efficient in hover vs. helicopter cause of higher disk loading
- less efficient and slower in horizontal flight vs. fixed wing cause of bigger propeller that creates more drag

## Lip Wing VTOL configuration

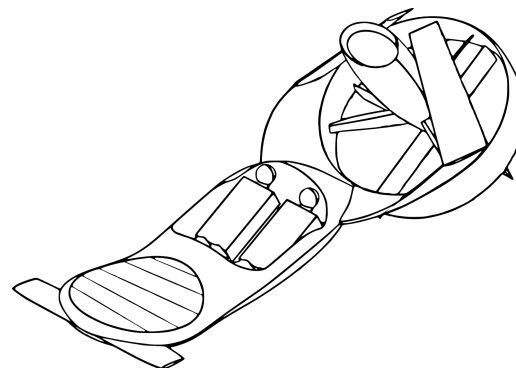
The elliptically shaped wing increases the shroud (duct) intake area and generates more lift



Isometric view VTOL configuration



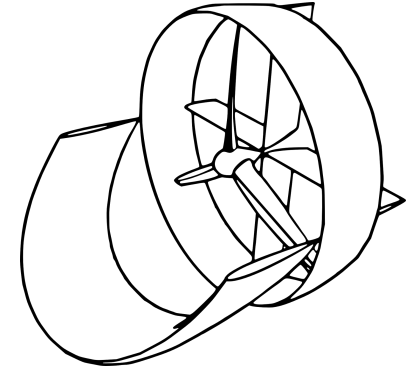
air flow VTOL configuration



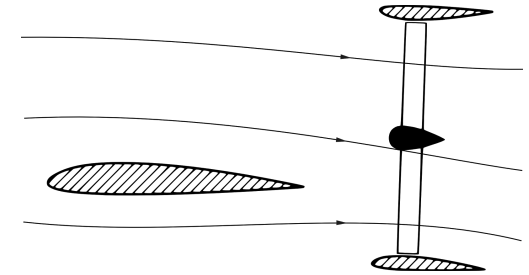
Lip Wing aircraft VTOL configuration

## Lip Wing Horizontal configuration

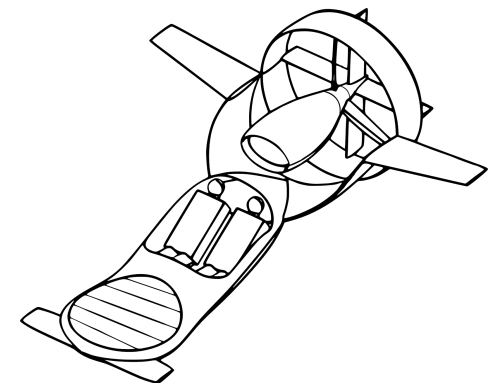
All airfoils are aligned to provide low angle of attack, decreasing drag



Isometric view horizontal configuration



air flow horizontal configuration



Lip Wing aircraft horizontal configuration