Glider Launch (Launch Point End)

<Click Picture To Play Video>
TOPICS COVERED DURING THIS PRESENTATION

Winch Launching -
• Why?
• Where? (Your Airfield)

Funding a Winch -
• How?
• How Much?

The Winch -
• What Power?
• What Transmission?
• Cable Drums

Operation -
• Cable Retrieving Method
• Cables
• Transporting Winch

Aero Club Berlin (Germany)
WINCH LAUNCHING – WHY?
AERO TOW LAUNCHING

Advantages

+ Can tow glider away from airfield if lift is not local
+ Can tow glider clear of airfield to free airspace
+ Can tow glider higher than normal winch launch if required

Disadvantages

- High consumption and cost of fuel (typically 20 times more than winching)
- High maintenance costs
- Repair and maintenance work requires specific qualified engineer
- Slow launch rate
- Trainee pilots experience less launches than is idea for safe and confident circuits and landings.
- Performance diminished at high density altitude airfields
- Strong winds limits are lower than with winch operation
- Tow pilot requires extensive training and qualifications
- Minimal airfield activity will disinterest young people
- Aero to launch failure can result in aircraft landing outside airfield
- Tow pilot is at risk from badly flown glider
WINCH LAUNCHING

**Advantages**

+ Typically fuel costs per launch are 20 times less than winching
+ Very low maintenance and repair costs
+ Repair and maintenance work requires basic knowledge
+ Intensive launching and landing practice available at low cost to pilot and club
+ An organised ground operation will provide rapid launch rates with minimal personnel
+ Can be used in strong wind conditions
+ Winch driver training takes much less time than aero tow pilot training
+ More activity on airfield enthuses young people
+ In case of winch launch failure, glider can land on airfield
+ Winch driver is never at risk from a badly flown glider

**Disadvantages**

- Launch height limited by length of airfield if it is short (height in light winds is typically 43-50% of cable length)
- Release area confined to point above winch
WINCH LAUNCHING - WHERE?
YOUR AIRFIELD

Is your airfield long enough and wide enough?

- 700 Metres (2300ft) minimum length – Any shorter will compromise safe “landing ahead” area in case of launch failure.
  - Best length is 1000m (3280ft) + every 100m (330ft) extra = 40-50m (130–165ft) more height.
  - Launch heights are typically 43-50% of length in light winds
  - Glider can be out of sight from winch. Many clubs operate safety over small hills (Some do not see the glider until it is at 60m altitude).
  - For easy safe winching the airfield width needs to be at-least 10% of its length (ie 1000m airfield length = 100m wide).

(Many airfields do operate narrower but greater winching technique can sometimes be required)
What surface is your airfield?

- The ideal airfield surface for winching is grass. Grass is the least abrasive so minimises cable wear.
- If only concrete, asphalt or stony track is available then the winch can be towed along the airfield (or driven if mounted on a truck) with the cables anchored at the launch point – thus laying the cables on the airfield.
- Almost all surfaces can be used if the correct procedures are in place.
FUNDING A WINCH
- HOW?
Funding can often be found from number of sources:

- National or Regional governments
- Sports/Aвиation authorities, grants or loan schemes
- Club savings/loans
- Members’ loans to club
FUNDING A WINCH - HOW MUCH?
HOW MUCH?

1. Make your own winch

+ Can be made cheap and to a simple design

+ / - Will it give safe launches and be easy to operate maintain?

- Can add up to be very expensive

- Will take much more time and engineering than you think – often causes inter-club politics issues

- Often results in complex engineering as members over design to showcase their expertise

- Availability of spares can be an issue
This winch was built by a club in the Europe. It was very complex, took many years of development and cost up to half a million euros.
This winch was built by a club costing a few thousand euros.
HOW MUCH?

2. Buy a used winch

+ Will be cheaper than new.

- Launch safety/ performance could be poor?

- Usually sold because they are nearing the end of their life and/or being unreliable

- Availability of spares may become a problem

- Reliability could possibly be poor

- Operator safety is often poor
3. Buy a re-engineering kit for older (non-Skylaunch) winches

+ much cheaper than a new winch

- Much time will still be needed, but less design and engineering - by using proven kit of components.
4. Buy a re-engineered winch

+ cheaper than a new winch
+ should give same launch performance as a new winch
+ Support of manufacturer

- Reliability and availability of spares may not be as good as a new winch
RE-ENGINEERED BY SKYLAUNCH - PLANEURS D’ILLE-ET-VILLAINE (RENNES, FRANCE) With Wheelchair Lift
This is a winch that was Re-Engineered by Skylaunch – We also added a wheelchair lift to allow access for disabled drivers.

<Click Picture To Play Video>
5. Buy a new winch
   + All new proven design will give many years of use
   + Support of manufacturer

- Most expensive option
- Long term investment
Skylaunch 2 “Evolution”
This is a new Skylaunch 2 Evo Winch delivered to Berlin in Germany. Using 2000m (6560ft) of Dyneema launch heights were up to 1200 Metres (3940ft).
THE WINCH – WHAT POWER UNIT?
1. Diesel

+ Agricultural diesel is normally the cheapest fuel and is easily available

+ Modern types can be engineered to perform well

- Launch performance with large diesel engines is often poor due to high torque to power ratio and high inertia

- Much more expensive - generally at least 3 times the price of Petrol / LPG engines

- Repair / service costs much higher than Petrol / LPG engines

- Modern Diesel engines use complex systems with engine management and electronics
WHAT POWER UNIT?

2. Petrol

+ Fuel easily available
+ Very good launch performance with minimal complexity
+ Engine and spares much cheaper than diesel

- Fuel can be expensive (depending on country)
A Petrol Engine Powered Skylaunch 2 Evolution In Action

<Click Picture To Play Video>
3. LPG (Propane)

We recommend this option.

+ The benefits of a petrol engine, but smoother output and cleaner exhaust gases
+ LPG fuel is normally much cheaper than petrol
+ Very simple and less maintenance than all other fuel types

- LPG Supply not always easy in some countries
- Power output a little less than petrol
A LPG Engine Powered Skylaunch In Action

<Click Picture To Play Video>
WHAT POWER UNIT?

4. Electric

+ Energy cost per launch is the least of all the power types
+ Mechanically very simple
+ Gives the best launch smoothness
- Electronically very complex
- Can be difficult for members to repair (Very high voltages from batteries)
- More expensive to buy
- Unless funding is obtained, whole life costs are no cheaper than LPG powered winches
- Large infrastructure (underground cabling) required = High Costs
A Electric Motor Powered Skylaunch In Action

<Click Picture To Play Video>
THE WINCH – WHAT TRANSMISSION?
1. Hydraulic (with diesel/petrol engine)

+ Smooth output
+ Good control is possible

- Very high pressure required - safety issues
- Considerable energy loss (up to 40%)
- Very complex in design and maintenance
- Expensive components with limited life due to high wear rates of hydraulic components
- Control can be very complex to operate or computer control is required
WHAT TRANSMISSION?

2. Fluid flywheel (with Diesel Engine)

+ Correct design can give good torque controlled launching
- Expensive to buy and repair
- Can have overheating issues on windy days
- Limited supply of specific type to give the correct and safe launch performance.
3. Automotive type automatic Transmission (with diesel/petrol engine)
We recommend this as the best low cost option.

+ Low cost and good availability
+ Good launch safety and performance
+ Easy to adjust characteristics
+ Low repair costs and good availability of local automotive repair companies

- Windy day launching can require more operator control to reduce the power earlier than some other transmission types.
THE WINCH – HOW MANY CABLE DRUMS?
CABLE DRUMS

A. Single Drum = 13 launches/hr

+ Simple system
+ No risk of cable cross over
+ Can midfield land cable after the launch to reduce cable wind-in and tow vehicle distance, fuel and time.
+ Cable can be towed directly to glider rather than Glider towed to cable
+ Lighter vehicle to tow cables = less fuel + less airfield wear

- Requires one retrieve per launch
CABLE DRUMS

B. Twin (2) Drum = 16 launches per hour
We recommend this system.

+ 2 Cables retrieved for each pass over the airfield
+ Faster launch rate than 1 drum launching
+ Winch driver can drive the tow vehicle with cables and then return for next launch

- Heavier cable tow vehicle required than 1 drum system
- Must drive straight to avoid cable cross over
C. 4 OR 6 Drum = 17 or 18 launches/hr

+ 4/6 Gliders can be launched in quick succession
+ 4/6 Cables retrieved for each pass over airfield
- Expense and weight of winch (if a single 4/6 Drum winch)
- Heavier tow vehicle over airfield
- Tow out speed will be slower
- Higher risk of cable cross over
OPERATION – CABLE RETRIEVING METHOD?
1. Vehicle / vehicle and trailer

We recommend this option.

+ Simple system
+ Old vehicle can be used = low purchase cost
+ Vehicle driving quite easy (most people have a car licence)

- Can cause airfield damage
- Launch rate may be too slow for very busy airfields
- Fuel and running costs for vehicle can be high
- Vehicle wear rate can be high depending on terrain
2. Retrieve Winch

+ Very fast launch rate if required (max possible 30/hr)
+ Reduces airfield wear as no vehicle used
+ Reduces fuel costs on main winch and retrieve winch uses much less than a vehicle

- More equipment costs
- More knowledge / training required to run system
- Gliders cannot land in retrieve cable landing zone
Skylaunch Cable Retrieve Winch
Glider Launching with Retreive winch connected – Main Winch End

<Click Picture To Play Video>
Glider Launching with Retreive winch connected

<Click Picture To Play Video>
Glider Launching with Retreive Winch connected – Launch Point End

<Click Picture To Play Video>
OPERATION – WHAT CABLE?
1. **Steel 4-5MMØ (5/32”- 3/16”)**

+ Best wear rate on convex airfields
+ Lowest stress on cable drums
+ Low price - Approx 280-330 Euros for 1000m (3280ft)

- Can damage airfield or winch the most
- Not as safe as synthetic
WHAT CABLE?

2. Dyneema / Spectra 5-6mmØ (3/16” – 16/64”)

+ Best launch height (least weight)
+ Safer than steel

- Very expensive - Approx 1100–1500 Euros for 1000m (3280ft)
- Care needed to prevent cable damage
- Very high stress on cable drums
- Caution needed if crossing with powered aircraft
- Not suitable for convex airfields
WHAT CABLE?

3. Skyrope 10mmØ (3/8"")

We recommend this option for the first Year of winching unless cable length is more than 1200m (3940ft)

+ Safer and lighter than steel
+ Low cost - Approx 270 Euros for 1000m(3280ft)
+ Very visible
+ Easy to handle and repair

- Limited length on drum due to the large rope diameter (1200m)
- Has some elasticity if the winch is driven aggressively
- Very high stress on cable drums- drums must be very strong
CABLE WEAR

For the purpose of budgeting we would suggest that cables should be expected to last an average of around 2000 launches.

Be aware (especially in your first year of winching) that this may vary from 800 launches to 4000 launches depending on several factors on the airfield which may increase wear rates.

These include :-

• Abrasive airfield surface (Asphalt, concrete, sharp stones etc)
• Airfield form – Convex / Concave / Flat etc
• Design of winch
• Winch driver technique
• Level of care taken
• Cable retrieving method + speed
OPERATION - TRANSPORTING WINCH
TRANSPORTING WINCH

1. Towed (trailer)
We recommend this option.

+ Towing vehicle can be unhitched to tow cables
+ If towing vehicle fails another can be hitched up
+ Safer access to winch at ground level

- More difficult to reverse for some drivers
2. On a truck

+ Easier reversing into hanger / shed
+ Winch raised up for good vision
- Much heavier on soft airfields
- If truck fails you cannot move winch easily
- Access for operation / maintenance higher = safety issues
SUMMARY
(...And recommendation)

1. Re-engineered winch (if funding for a new winch isn’t available)
2. LPG (or petrol) powered
3. Automatic transmission
4. Twin drum
5. Rope for 1st year then maybe Dyneema (if airfield suitable)
6. Mounted on trailer for towing

This is the most popular type of design currently being purchased
Thank you for watching

If you have any further questions, please email us at

Skylaunchwinches@yahoo.co.uk
8.2L GM V8 (Big Block Chevy) Fitted In A Skylaunch 2 Evo
Skylaunch Pulley / Roller & Guillotine System
Skylaunch Pulley / Roller & Guillotine System
Skylaunch Pulley / Roller System in a Skylaunch 2 Evo
Skylaunch Cable Drums
Skylaunch Final Drive, Disc Brakes & Auto Brakes System for cable tow-out
Standard Skylaunch GM V8 (Chevy Big Block), T400 Transmission and Control Panel System With Launch Guides
Skylaunch Upgraded Steel Drums To Fit Tost Winches
Skylaunch Complete Re-Engineering Conversion For Tost Axles Including Disc Brakes Etc
Weak Link Assembly

- Glider Rings to Glider Bow
- D-Shackle
- 3 Metre Strop with Stiffener Hose, Connecting Ring & Glider Rings (Optional High-Visibility Sleeving)
- Quick Release Hook, Quick Release Ring & Parachute Triangle Connector
- Plastic Cable-End Buffer
- 17 Metre Trace with Quick Release Hook

Skylaunch Recommended Launch Equipment - Glider End

- Launch Cable From Winch

Max open diameter:
- Using synthetic cables = 1.2m
- Using steel cables = 1.5m

Parachute—Selection of Designs to Suit Airfield
Skylaunch Control Panel with presets for Glider type and headwind component:

Blue Colour-Coded (Launch) Levers:
A) Transmission Select Lever (N>D)
B) Engine Throttle Lever
C) Drums Brake Lever (both Drums)

Black Throttle Pre-selects:
1) Headwind Speed
2) Glider Type
(See attached Throttle Setting Chart)

For safety, all controls are designed to operate as push to **go**, and pull to **stop**.

**Before Launch (Black Levers):**
- Preselect Headwind Speed (1)
- Preselect Glider type to be launched (2)
- Select left or right Drum

**To Tighten Cable (Blue Lever):**
- Select Transmission Lever to D Position (A)

**To Launch (Blue Levers):**
- Apply Throttle to preselected guide stop (B)
  Throttle damper controls correct acceleration rate
The Very First Skylaunch Main And Retrieve Winch At The Long Mynd (Midland Gliding Club), England In 1991.
Skylaunch 2 Evolution, Kuopio (Finland)
Skylaunch 2 Evolution and Retrieve Winch, Le Mans (France)
Skylaunch 2 Evolution, Berlin Gliding Club, Reinsdorf (Germany)
Aeroclub Les Goelands (France)
Skylaunch 2 Evolution, AVSA Seyne Les Alpes (France)
RE-ENGINEERED BY SKYLAUNCH – BURN GLIDING CLUB (ENGLAND)
Re-Engineered by Skylaunch - Planeurs d’Orleans, France
RE-ENGINEERED BY SKYLAUNCH – ESSEX GLIDING CLUB (ENGLAND)
Regional Gliding Centre, Limousin (France)
Aeroklub Lubelski, Lublin (Poland)
Hanover (Germany)
GOZC, Hilversum (The Netherlands)
Flugsportclub Neumunster (Germany)
Beijing Gliding Club (China)
National Gliding Centre, Saint-Auban (France)
Devon and Somerset (England)
Scottish Gliding Union (Portmoak)
Lasham Gliding Society (England)
Japanese Defence Academy