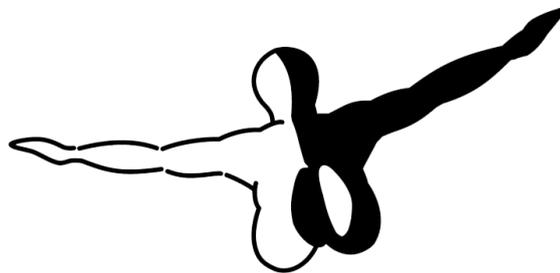


Aerosoft Cuzco X



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Contents

Contents.....	2
Introduction	3
Copyrights	4
Credits.....	4
Contact support.....	5
Installation and removal	5
What can be found in this addon?	5
Finding the airport.....	5
Mission.....	6
Display settings.....	7
Information for Teniente Alejandro Velasco Astete intl.....	10
Charts	10
F.A.Q.	11
Appendix A: Airport chart	12
Appendix B: High Altitude operations	13



Introduction

The life of an airline pilot in the 21st century is mostly boring. FMC and autopilot programming, checklists, hours and hours of uneventful flying. But there are still a few challenges left that make this job one of the most demanding assignments in the world. Emergencies, bad weather and most of all: dangerous approaches and airports! Names like "Kai Tak", "St. Maarten", "Innsbruck" or "Madeira" bring a sparkle to every pilot's eye. There is one airport though, that tops all others: Aeropuerto Alejandro Velasco Astete, also known as "Cuzco airport".

It might not be as popular as Hong Kong or Madeira, but it offers a combination of challenges that make it - in total - one of the most difficult and dangerous airports in the world:

- Location: Cuzco airport is located right in the city of Cuzco with buildings all around the airport. The city itself lies in a narrow valley, on all sides surrounded by mountains that rise more than 2.000 feet above the city.
- Altitude: With an altitude of approx. 10,800 feet MSL Cuzco is one of the highest commercial airports in the world. The air is a lot thinner in this altitude, which requires higher speeds on takeoff and landing, making a runway shorter than it really is.
- Approach: Due to the high mountains around Cuzco, there is no Instrument Landing System (ILS) available. Pilots have to fly a demanding circle approach instead, an approach that is partly flown visually and requires high precision if the aircraft is not supposed to crash into steep mountain sides. There are also no airport lights, the airport closes as soon as visibility does not allow visual aviation activities.
- Runway: This is definitely the most challenging part. The airport was built on a sloped and uneven terrain, with one end of the runway lying more than 150 feet (!) higher than the other end, that is an altitude difference of more than 50 metres! Due to this slope the runway can only be used in one direction, that is: uphill on landing, downhill on takeoff. No matter what the winds are, you can only use runway 28 for landings and runway 10 for takeoff. Both manoeuvres require special training, so only experienced and specially skilled pilots are allowed to fly to Cuzco.

Adding up all those points, Cuzco airport is one of the biggest challenges in real aviation as well as in flight simulator.

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Credits

Concept:	Aerosoft
Programming:	Thorsten Reichert
Project Management:	Thorsten Reichert, Mathijs Kok
Manual, documentation:	Thorsten Reichert, Mathijs Kok
Chart:	Konrad Cissowski
Sounds:	William Lennox, Alejandro Diaz
Installer:	Andreas Mügge
Testing:	Several good folks who will all be getting a copy

System requirements

- Intel Core 2 Duo E6850 CPU (Core 2 Quad advised)
- 2 GB RAM
- Direct X 9 compatible Graphics Card with minimal 512 MB
- Microsoft FSX (with SP2 or Acceleration)
- Windows XP, Windows VISTA, Windows 7 (fully updated)
- Adobe Acrobat® Reader 8 minimal to read and print the manual ⁽¹⁾

⁽¹⁾ Available for free, download at: <http://www.adobe.com/prodindex/acrobat/readstep.html>

Contact support

Support for this product is done by Aerosoft. We prefer to do support on the support forum for one simple reason, it is fast and efficient because customers help customers when we are sleeping.

Aerosoft forums: <http://www.forum.aerosoft.com/>

We feel strong about support. Buying one of our products gives you the right to waste out time with questions you feel might be silly. They are not.

Installation and removal

Installation is simple, start the exe file you downloaded and follow the instructions on screen. Make sure FSX is closed and we do advise you to reboot your system before installing. After installing it can help to defragment your hard disk.

Removal should never be done manually but only using the software removal applet you will find the the Windows Control panel.

What can be found in this addon?

- Custom terrain, landclass and LOD11 mesh of Cuzco and surroundings (reaching to the famous Inka site Machu Picchu)
- Custom landclass textures and seasons
- Cuzco scenery with city, landmarks and airport
- Extremely dense and realistic autogen buildings (typical ochre roofs)
- Custom aerial image with night effects
- Special sloped runway for highest possible realism
- AI aircraft and airport vehicles *
- Circle approach mission

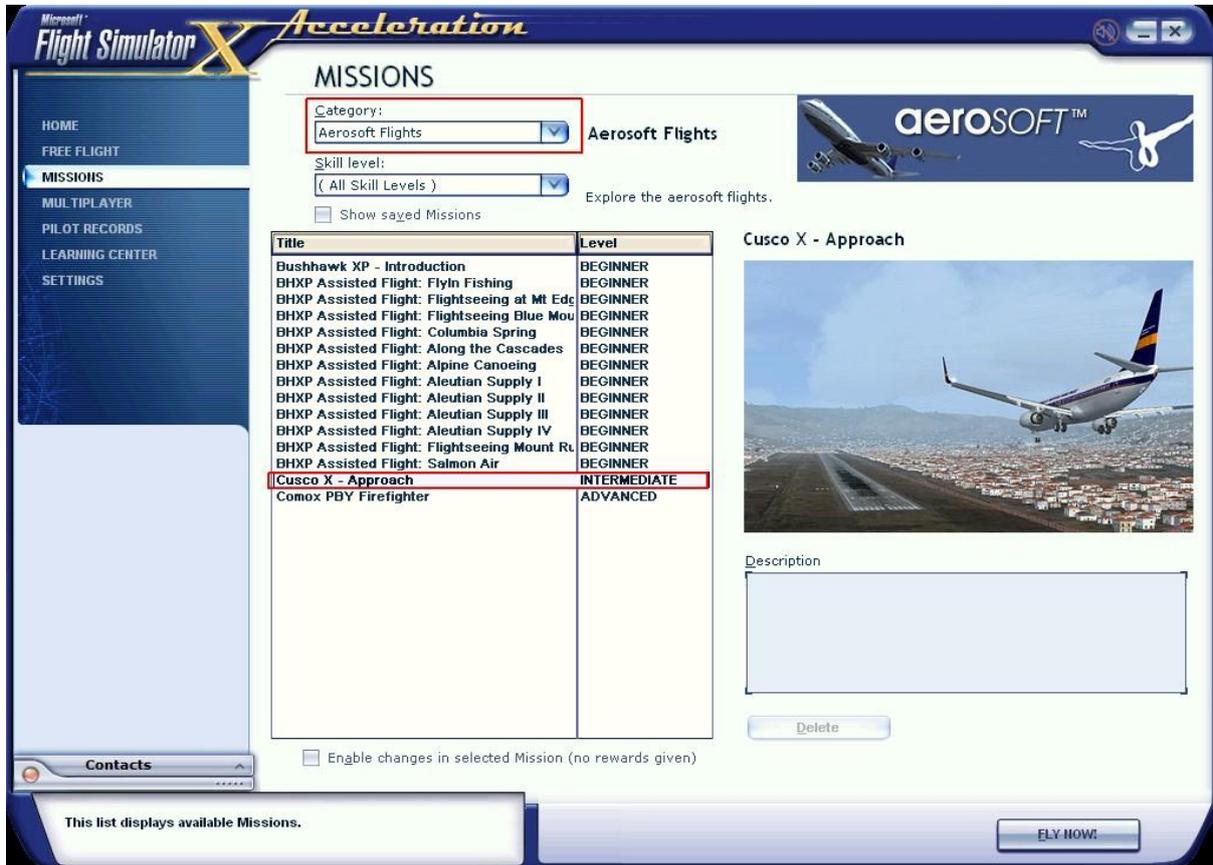
* Due to the runway slope and FSX limitations no AI takeoffs or landings are possible at this moment (except in missions)

Finding the airport

You will find the airport using either the airport name (Tnte Fap Alejandro Velazco Ast), the city name (Cuzco) or the airport ID (SPZO).

Mission

This addon includes a mission that makes you familiar with the circle approach to Cuzco. You will find the mission as shown below. We highly recommend you start exploring the scenery with this mission.



MISSIONS

Category: **Aerosoft Flights**

Skill level: (All Skill Levels)

Show saved Missions

Explore the aerosoft flights.

Title	Level
Bushhawk XP - Introduction	BEGINNER
BHXP Assisted Flight: FlyIn Fishing	BEGINNER
BHXP Assisted Flight: Flightseeing at Mt Edge	BEGINNER
BHXP Assisted Flight: Flightseeing Blue Mou	BEGINNER
BHXP Assisted Flight: Columbia Spring	BEGINNER
BHXP Assisted Flight: Along the Cascades	BEGINNER
BHXP Assisted Flight: Alpine Canoeing	BEGINNER
BHXP Assisted Flight: Aleutian Supply I	BEGINNER
BHXP Assisted Flight: Aleutian Supply II	BEGINNER
BHXP Assisted Flight: Aleutian Supply III	BEGINNER
BHXP Assisted Flight: Aleutian Supply IV	BEGINNER
BHXP Assisted Flight: Flightseeing Mount Ru	BEGINNER
BHXP Assisted Flight: Salmon Air	BEGINNER
Cusco X - Approach	INTERMEDIATE
Comox PBV Firefighter	ADVANCED

Cusco X - Approach

Description

Enable changes in selected Mission (no rewards given)

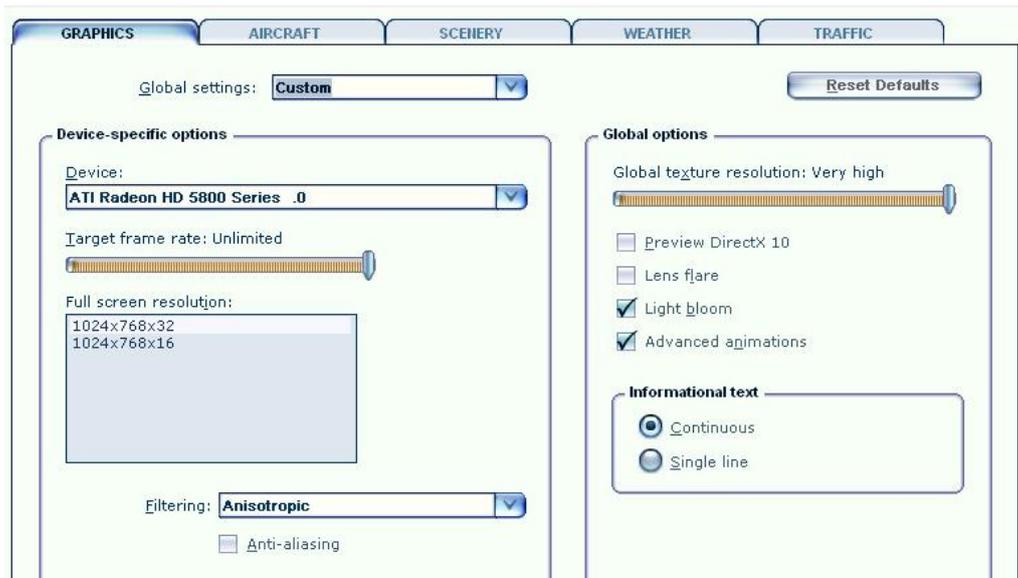
This list displays available Missions.

Display settings

To change your scenery settings, go to Settings -> Display

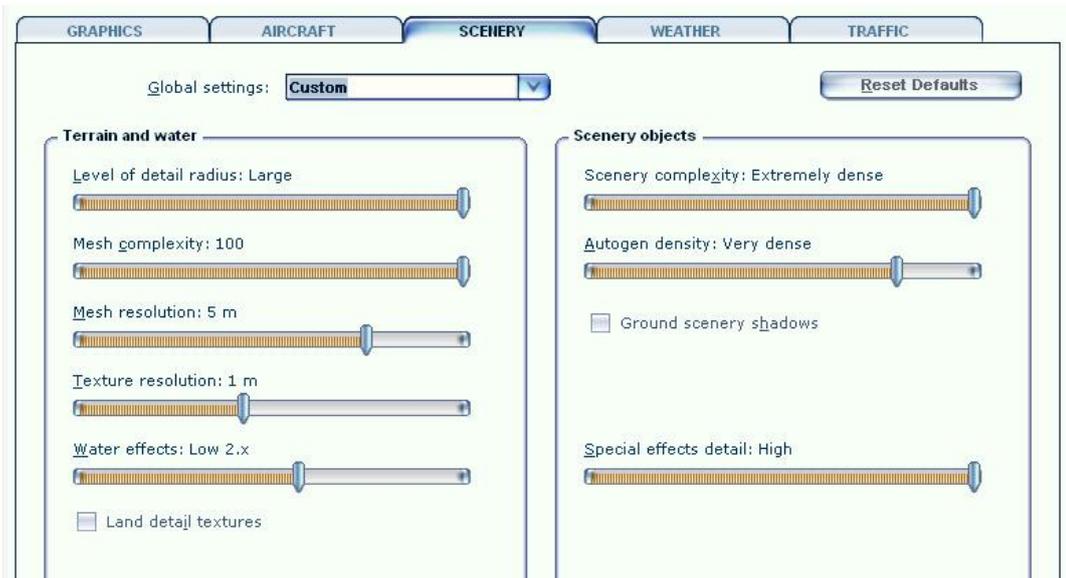
Note: All other settings not mentioned here are up to you. They don't actually affect the scenery very much. Keep in mind to do your settings with care otherwise you may overload your system.

Graphics menu



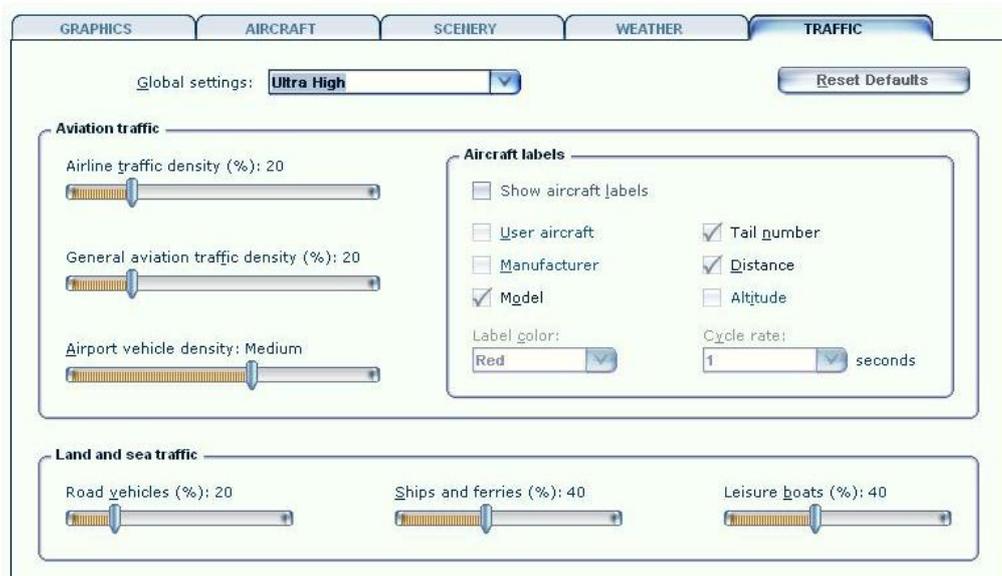
- **Target frame rate** set to **Unlimited** is strongly recommended.
- **Global texture resolution** should be at **Very high** to get the full detail in textures.
- **Advanced animations** has to set to **ON**.
- **Light bloom** set to **On** will allow you to see the lighting in more detail and the low demands on fps should make this setting possible.

Scenery settings



- **Mesh** is important for this scenery. Set **Mesh Complexity** to **100** and **Mesh resolution** to **5 meters**.
- **Texture resolution** should be at **1 m** to get the best resolution of the aerial image under the 3D objects.
- **Scenery Complexity** strongly affects the speed of the scenery. Start with **Extremely dense** and reduce that if your system finds it hard to cope.
- For best results we recommend to set **Autogen Density** to **Very dense**. But keep in mind not all systems can handle this much detail!
- **Ground scenery shadows** can be **on** or **off** depending on your own preference.
- **Special effects details** should be on **High** to see all the special animations.

Traffic settings



- For the TRAFFIC settings we advise a cautious **Ultra High Global setting**. If this affects your fps too much reduce it to **Medium high**.



Information for Teniente Alejandro Velasco Astete intl

IATA code: CUZ

ICAO code: SPZO

Serves: Cuzco, Pery

Longitude: 71° 57' 34" W / -71.959

Latitude: 13° 31' 45" S / -13.529444

Elevation: 3310 Meters / 10895 feet

Magnetic variation: 3.62°W (2009)

Radio communication frequencies

- Tower 118.1
- Ground 121.9
- ATIS 127.0
- Approach 120.6

Runways

- Runway 28: 3397 x 45 meters (11146 x 148 feet) Asphalt (elevation: 10702 ft MSL)
- Runway 10: 3397 x 45 meters (11146 x 148 feet) Asphalt (elevation: 10860 ft MSL)

Closest nav aids

Type	ID	Name	Channel	Freq	Distance	Bearing
VOR-DME	ZCO	CUSCO	096X	114.9	4.3 NM	106.6

Charts

Unfortunately Peru does not share it's aviation maps online as many other countries do and it was not possible for us to get a license for the maps. However a search online might point you to charts that you might be using. We asked Konrad Cissowski of DigitalMapStudio to make the most important chart however and it is attached to this manual.

F.A.Q.

Q: Is this add-on DX10 compatible?

A: It is (apart from the airport lights flickering at night using DX10).

Q: Is this add-on compatible with other add-ons in the area?

A: We made sure it is compatible with UTX Alaska, FSGlobal and other mesh add-ons. If you have compatibility troubles with other add-ons, feel free to contact us.

Q: After arriving at the airport I get texture flickers on the apron. How can I fix this?

A: Open the scenery library and directly click OK (or use a shortcut key for "refresh scenery").

Q: I can't see AI aircraft, they're not landing or vanishing. Is this normal?

A: Due to technical limitations in FSX it's not possible to use AI aircraft on sloped runways. You should see parking and flying AI traffic though.

Q: Are there no airport lights at night?

A: No, the airport is only opened on VFR conditions.

Q: I sometimes get texture or graphical errors in Cusco. Is this a bug?

A: FSX seems to have a limitation of autogen objects that can be rendered at a time. The autogen in Cusco is extremely dense, maybe the highest density for any FS Add-on ever. This can sometimes lead to graphical issues. Move the autogen slider to a medium position to solve the problem.

Q: My aircraft falls through the ground or crashes if I leave the runway. Can you solve this?

A: Flight Simulator has a very unrealistic way of reacting if an airliner rolls onto grass. In reality you immediately get stuck and damage the gears or even crash your aircraft. Thus you should never taxi outside the official runway or taxiways. To answer your question: The sloped platform only covers the apron, runway and taxiways because it improves frame rates compared with a platform covering the whole airport area.

Appendix B: High Altitude operations

If there is one thing that makes this product special it is the high altitude of the airport. It is our experience that many sim pilots do not fully understand the effects of the resulting lower air pressure, so a full chapter on flying in these conditions is in order.

High Density Altitude

In this chapter we are going to use the Cessna 182RG as our base model, for all other aircraft the principle is the same, only the figures change. There is one complete factor that should be used when dealing with Density Altitude that we will not mention, humidity. It is not a major factor and in FS it is not used. In case you're interested: high humidity will RAISE the Density Altitude.

IMPORTANT: The ACTUAL altitude of an airport is of little or no consequence, the only aspect that matters is the DENSITY ALTITUDE of the airport. The only thing that is of relevance is the AMOUNT of air molecules!

Air is needed for many things (we will use the word 'air' to describe the mixture of gases we experience);

- to create lift
- to create a forward pushing force for jets or pulling force for propeller planes (props)
- to assist the combustion of the fuel
- to cool the propulsion system
- and of course, the pilot also needs something to breathe.

If there is less air all of these aspects will not be as efficient as under optimal conditions. So what is the effect on the performance of the aircraft? And in particular on takeoff and landing? Well how does a takeoff run of 1,800 ft. sound to you? For a Cessna that is not loaded very heavy? Is that impressive or not? Look at the following table that shows the relation between altitude, temperature and pressure. The data for takeoff and landing are for a moderately loaded Cessna 182 RG.

<i>Altitude in-ft.</i>	<i>Temperature in degrees F</i>	<i>Altimeter Setting in Inch Hg</i>	<i>Resulting Density Altitude</i>	<i>Required Runway Takeoff</i>	<i>Required Runway Landing</i>
0	59	29.291	0 ft.	640 ft.	600 ft.
4,000	59	29.291	4,924 ft.	950 ft.	720 ft.
8,000	59	29.291	9,816 ft.	1,350 ft.	900 ft.
8,000	100	29.00	13,255 ft	1,850 ft. ?	1,200 ft. ?

Where there are question marks they are there because the Cessna manual does not supply these

numbers and they have been extrapolated from the other numbers. Keep in mind that a turbo-charged aircraft like the 182 is built to operate at higher altitudes and that it will perform much better than a non turbo-charged aircraft. If you try to take off with a Piper Cub meant for a Density Altitude of 1,300' you'll probably never reach takeoff speed before running out of runway and landings will have to be done at speeds ABOVE cruise speed. In the last row of the example the aircraft is located at 8,000' feet but for all logical and practical purposes it is 5,000' higher.

Density Altitude is the altitude that the aircraft THINKS it is at.

Also it is not only performance that suffers; your engine will also overheat MUCH faster because there is less air to cool the engine. And when winter comes and Density Altitude becomes less of an issue you run into another problem. It's very easy to run into very cold layers of air only minutes after takeoff and icing is a real danger. One thing to keep in mind... your air speed indicator is always corrected for the density altitude, it shows what it feels.

High (Density) Altitude Operations

Flying from high altitude airports is something that is inherently more dangerous than flying from airports located nearer to sea level. But the major issue is that it is different and that the problems escalate much faster into real dangers.

Preparation

Reduce your load; kick out those six-packs and your mother-in-law. Better leave them behind than scatter them all over the last few feet of the runway. Don't fly with more fuel than is needed. Rule of thumb, for every 10% under max gross weight, performance increases 20%. Keep in mind that an aircraft like a Cessna 175 only delivers 50% of its rated power at 8,000 ft. Above all, make sure your aircraft CAN fly in the current conditions. A Piper Cub with a ceiling of 11,500 feet simply will not fly if the density altitude is 12,000 feet. It simply will not be able to take off even if the runway is 20 miles long. If the ceiling of your aircraft and the Density Altitude come close together your margins of safety decrease. You might need to wait for cooler conditions to fly!

Starting

Depending on the aircraft starting procedures will be different. In the Cessna 182 you will need to pre-lean the engine and give a bit of throttle to get the engine started. Do not run at high power settings for a long time because the engine might overheat. However, it is a very good idea to briefly try high power settings just before entering the runway to make sure the engine will rev up without problems. Under these marginal conditions you do not want to have an engine that does not spool up fast and smoothly. But keep an eye on the temperature!

For some aircraft the FSX "Auto Start" function ([CONTROL]-[E]) will NOT work to start the engine at this altitude! You will have to start the engine manually with the mixture leaned and a bit of throttle set.

Takeoff

The first thing to remember is to trust your instruments and above all your airspeed indicator. Visual impressions might be misleading and the point where you normally take off might not be the point where you have enough airspeed in a high Density Altitude situation! Do not use Short Field flap settings as this most likely increases your takeoff run. Always lean your engine for max performance before starting your takeoff.

Make sure you understand that not only your takeoff run will be longer as Density Altitude increases but also that your climb performance will be affected.

Landing

Again, do NOT rely on your eyes but on your airspeed indicator. The INDICATED airspeed is the only thing that keeps you aloft. But in the end it is only the groundspeed that is different. The landing itself is actually surprisingly normal -- as long as you use your engine to keep the correct speed. The only real surprise might be the lack of any ground effect as that seems to drop off over 5,000'. Be prepared to see everything go a LOT faster than you might be used to and be prepared to use a lot more ground than normal. That is not a major issue most of the time as mountain runways are often rather long.

The real problems start when things go wrong. At a normal landing you have almost all of your power to get you out of a problem, but at high Density Altitudes you might not have much to use, and in the thin air the difference between max speed and stall speed is very small.

If you've never flown at a high altitude airport before, you run a major risk when you do so for the first time because on your standard checklist there will be the item [Full Rich Mixture]. Now if you do that at 8,000' you run a high risk of the engine stalling on you. If you are lucky this will not happen before the engine slows down on the rollout, but if you are not it will die on you before you hit the next item on your checklist. Make sure you keep high rpm on the prop but it is easy to over-rev the prop shaft so keep the needle just below the red line.

How do I estimate the Density Altitude?

Actually the correct calculation is very complex and involves tables and many variables, but as always in aviation there is a rule of thumb that is close enough for almost any purpose.

- Set your altimeter to 29.92 (1013).
- Read the altitude indicated. This is your Pressure Altitude (pa)
- Now find the closest figure in the first column.
- In the correct temperature column you can read a good approximation of the current Density Altitude.

	41°F / 5°C	50°F / 10°C	59°F / 15°C	68°F / 20°C	77 °F / 25°C	85°F / 30°C	94°F / 34°C	104°F / 40°C
4000	<i>3,750</i>	4,350	4,900	5,450	6,000	6,550	7,100	7,650
4500	<i>4,400</i>	5,000	5,500	6,050	6,600	7,150	7,700	8,250
5000	<i>4,990</i>	5,550	6,100	6,650	7,200	7,750	8,300	8,850
5500	<i>5,600</i>	6,200	6,700	7,250	7,800	8,350	8,900	9,450
6000	<i>6,200</i>	6,800	7,300	7,850	8,400	8,950	9,500	10,050
6500	<i>6,850</i>	7,400	7,950	8,500	9,050	9,600	10,150	10,700
7000	<i>7,500</i>	8,000	8,550	9,100	9,650	10,200	10,750	11,300
7500	<i>8,100</i>	8,650	9,150	9,700	10,250	10,800	11,350	11,900
8000	<i>8,700</i>	9,250	9,750	10,300	10,850	11,400	11,950	12,500
8500	<i>9,300</i>	9,900	10,350	10,900	11,450	12,000	12,550	13,000

Note the italic numbers actually give a Density Altitude BELOW your actual altitude.

If the temperature is below 50° you can almost always assume Density Altitude will not be an issue, just as it will almost never be at an airport near sea level.

A much better way to find the Density Altitude is to use a flight calculator. Aerosoft sells a very useful one that connects to FSX!