REDIM V3 FAQs

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https://www.atsl.cee.vt.edu/products/redim.html

2 Where is the REDIM User Group?

https://groups.google.com/d/forum/runway-exit-design-interactive-model
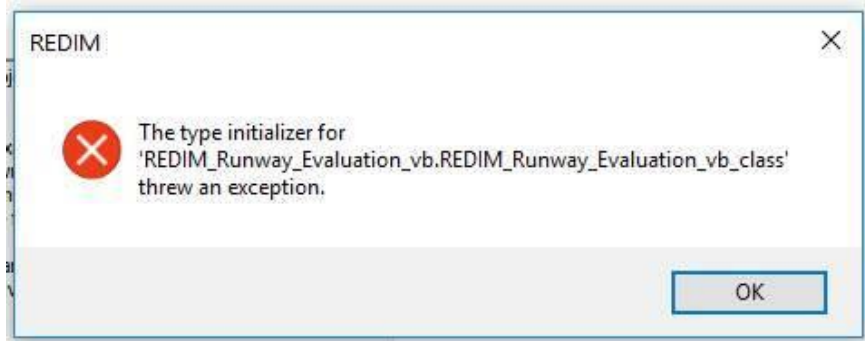
3 How do I fix the error "The type initializer for..."?

The MATLAB R2018b 64Bit runtime may not have installed if you get the following type of error:

The MATLAB R2018b 64Bit runtime needs to be installed manually. Please download it from:
http://ssd.mathworks.com/supportfiles/downloads/R2018b/deployment_files/R2018b/installers/win64/MCR_R2018b_win64_installer.exe

4 Why does REDIM 3 produce very different ROT results compared to REDIM 2?

The following changes between REDIM 2 and REDIM 3 can contribute to large differences in the results:

a. Overall individual aircraft performance:
- REDIM 2: Based on TERP Grouping
- REDIM 3: More than 200 individual aircraft modeled. Similar aircraft with few data points fallback to an assigned surrogate aircraft type or AAC grouping.

b. Runway individual aircraft performance:
- REDIM 2: Based on video recorded at few select airports.
- REDIM 3: Based on 290 runways at 37 ASDE-X airports grouped into 20 runway clusters. Each aircraft type and runway cluster will have a unique distribution for each performance parameter.

c. Exit individual aircraft performance:
- REDIM 2: Based on video recorded at few select airports.
- REDIM 3: Based on 3,500 exits at 37 ASDE-X airports grouped into 20 exit clusters. Each aircraft type and exit cluster will have a unique distribution for each performance parameter.

5 Are any wind factors taken into consideration in the model?

The threshold crossing speeds have been adjusted to ground speed using the historical wind observations at the airport. Therefore, average wind effects are taken into account in the model.

6 The previous model allowed for an input of pilot safety factor. Is there any such factor taken into consideration in this model?

The safety factor included in REDIM 2.1 affected the calculations of runway exit performance. The new model uses Kernel distributions containing observed runway exit speeds estimated from 3,200 runway exits at 37 ASDE-X airports. The safety factor is not required because the Kernel distributions bound the runway exit speeds.

7 Will a more detailed User Guide released which will explain the inputs and outputs in more detail?

We will provide an updated version soon.

8 What aircraft speeds are assumed for each exit type?

Exit types are grouped into 20 clusters based on all exit types at the 37 airports analyzed. Point of Curvature (PC) speed distributions are generated for all aircraft. Aircraft Approach Category (AAC) PC speeds distributions are used when there is not enough data for a certain type of aircraft.

9 Can the runway gradient be adjusted? If not, is there any assumption made for this?

REDIM 3 does not have an adjustment for runway gradient. The data collected for model calibration includes 37 large commercial airports with limited grades. Because we do not have detailed runway gradient information, we do not include a runway gradient correction in the model. Commercial airport runways are limited by design regulations to maximum grades of 1.5% (limited to 0.8% in the first and last quarter of the runway). A simple method to correct the landing distance is to add 10% for every 1% in effective grade.

10 In the ROT results table, what does the provided ROT represent? Wet conditions? Dry conditions? Weighted average? Is there a way to show the differences between the wet and dry ROT for each aircraft type?

The ROT is the weighted average of dry and wet conditions for each aircraft based on the percent wet conditions set for the current analysis. We will add the ability to display the dry and wet ROT in the results table.

11 How can I run multiple scenarios based on similar settings?

You can use the "Edit Runway" feature in the output of your previous run to run a new scenario with previously saved settings. See below.
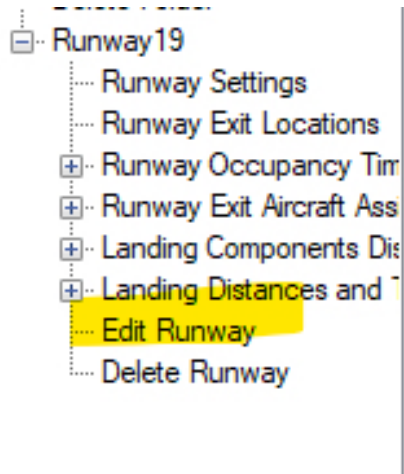

Then as you edit the runway, rename the analysis, and you will have a clone of the previous analysis with all input features of the previous run inherited to the new one, including the fleet mix. You can then go through the input screens quickly and change the values as needed. This is a quick way to do sensitivity analysis.

12 Which temperature should be used in the inputs? Average annual? Average of the hottest month? Average max of the hottest month?

REDIM is calibrated using landing distributions averaged over 2 years. It is recommended to use the average annual temperature. However, if you are interested in some seasonal effects, you can enter other values.

13 What is the background of an 800-foot minimum separation between 2 high-speed exits?

This is our rule of thumb for high-speed runway exits. Right angle exits can be placed closer as needed. The 800 feet is defined so that the centerline light elements of two successive high-speed exits are not confusing to the pilot. See the example below. If you are landing on the runway in a corporate jet (pilot's eye position low), the two high-speed runway exits could be confusing at night.

S11

S10

New HS1

Runway 27L
Landing Direction

S8

S11
6,073 feet

New HS1
5,280 feet
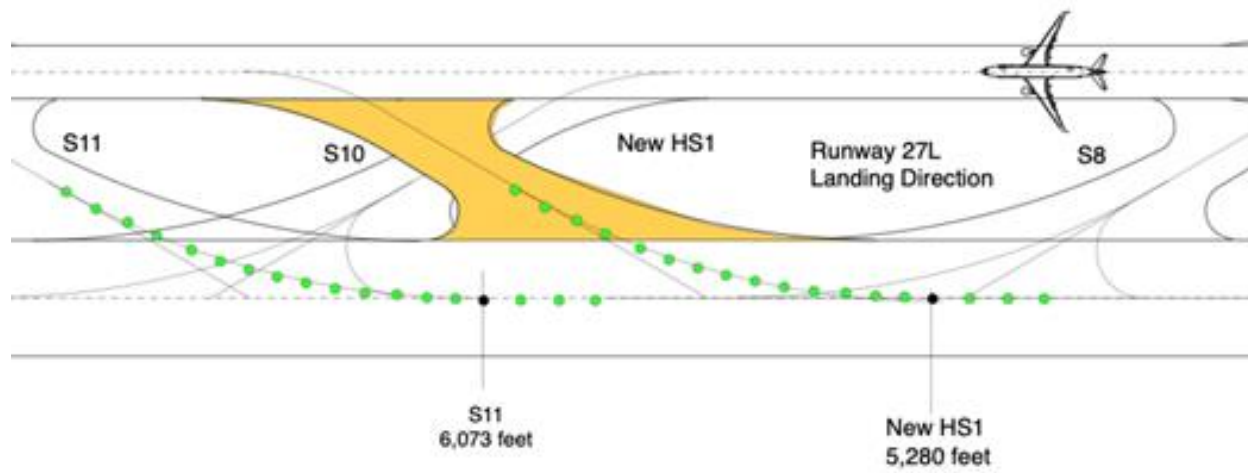
14 How about the separation between two 90-degree exits, or a 90-degree exit and a high-speed exit?

If a 90-degree exit follows an acute angle exit, it would be good to have enough separation to avoid a three-node taxiway junction. The minimum distance will depend on the runway centerline to parallel taxiway centerline. See the example below. This is located at an existing airport.
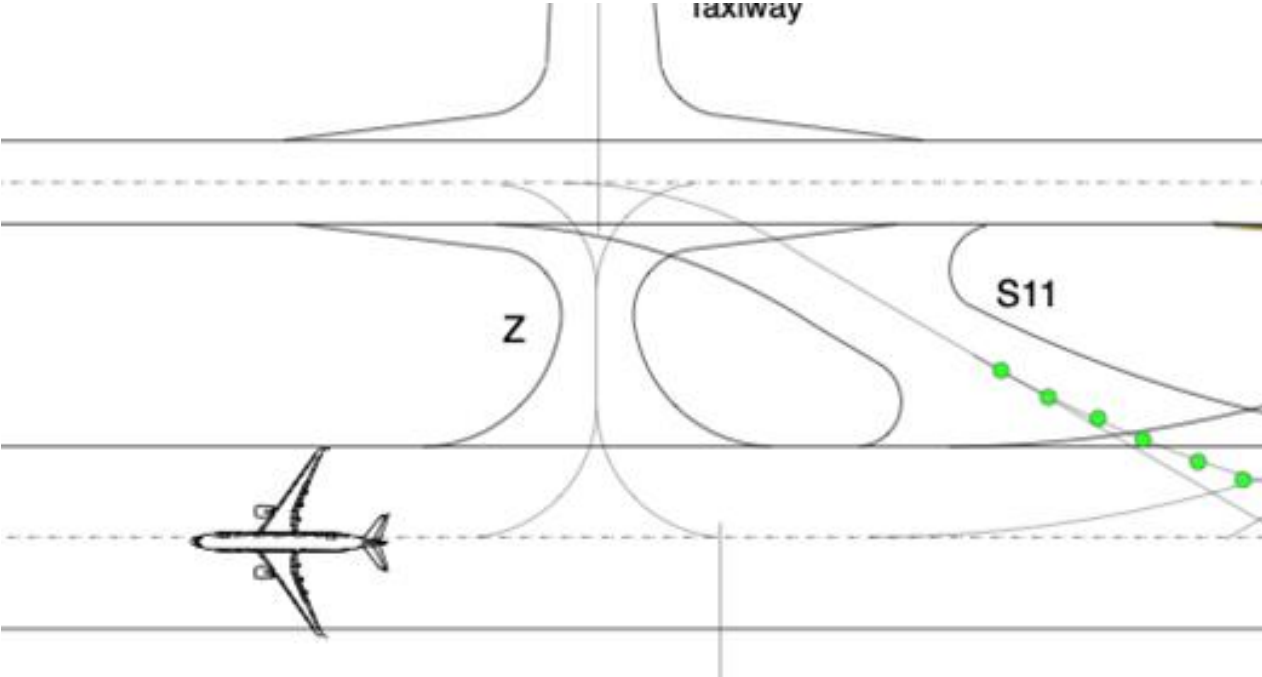
15 How is the Wide Throat exit type defined in the model?

The Wide Throat geometry is not a standard runway exit in the current FAA AC 5300-13A. However, the geometry was implemented at Orlando (MCO) on Runway 35L at exits H5, H3 in the 1980s. See figure below of exit 35L-H5 at MCO.

We included the Wide Throat geometry in REDIM because the geometry seems to have interesting features. Pilots tend to enter such geometry faster than expected (40-60 knots at the Point of Curvature), yet the spiral distance varies between 900-1000 feet to the hold bar. This implies that pilots need to apply higher deceleration if they are expected to stop at the hold bar when exiting the runway.

16 What is WINGTIP_RADIUS_m?

WINGTIP_RADIUS_m and FULL_LENGTH_m parameters are not used by REDIM. These parameters will be removed in future versions.

17 What is the minimum speed on the exit ramp?

Aircraft are decelerated to a minimum speed of 13 knots or kept at the exiting speed if it is lower than 13 knots. For example, an aircraft exiting at 36 knots will be decelerated to no less than 13 knots. However, an aircraft exiting at 10 knots, will simply maintain 10 knots on the exit ramp.

18 How is the geometry of the default exits defined in REDIM?

Exit Type	Angle (deg)	Path Length (ft)	Radius (ft)
30° (with 1,500 ft circular arc)	30	1100	1500
30° (with 1,800 ft circular arc)	30	1400	1800
45°	45	620	800
90°	90	360	135
30° (with 1,400 ft spiral)	30	1500	1800
Wide Throat	45	1050	600

19 How can I export all the raw data of a run?

REDIM saves the raw data of each run automatically. The large CSV file can be found in the project's output folder.

20 What are the definitions of the aircraft dimensions required by REDIM?
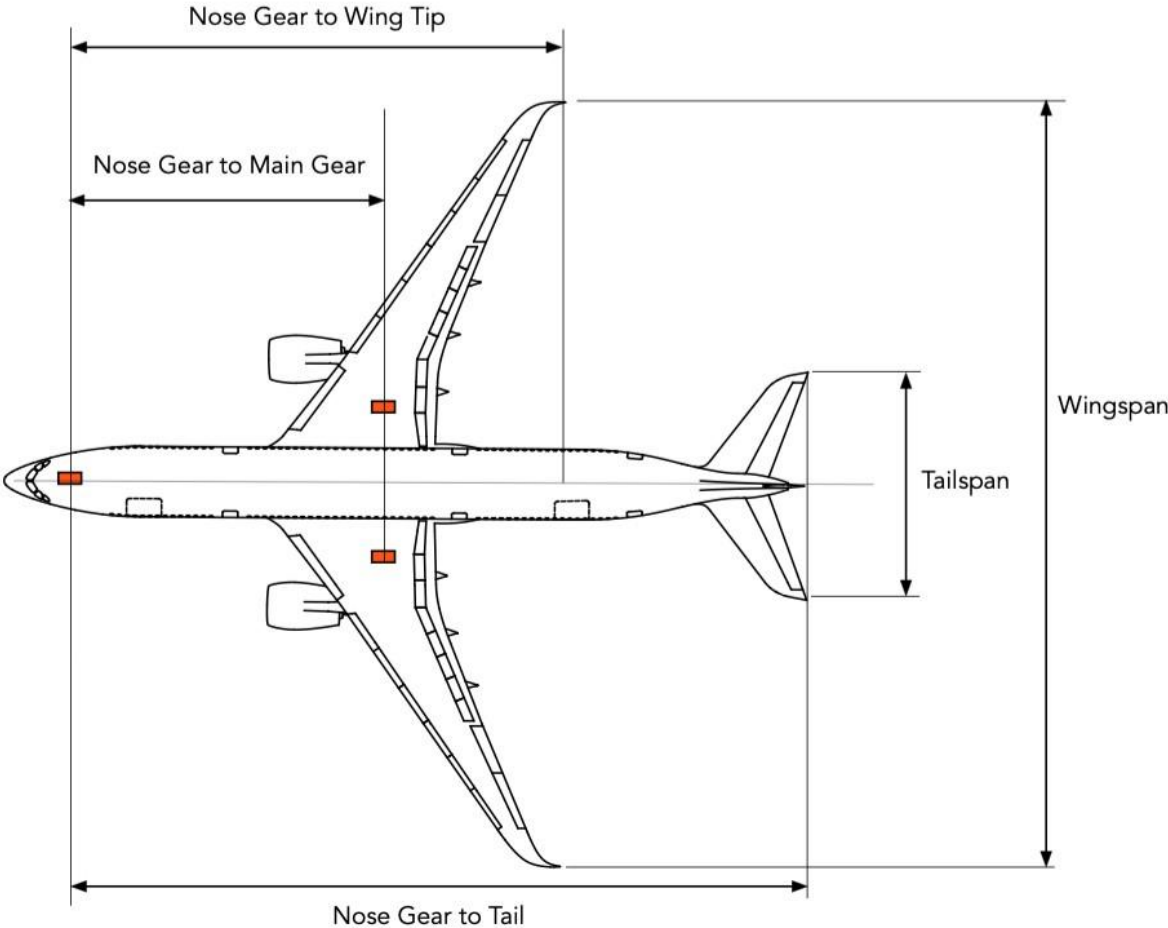
21 How can I reduce the memory used by REDIM?

REDIM's memory usage is directly tied to the aircraft with the lowest value in the aircraft mix. REDIM requires at least 1,000 landings per aircraft type to generate accurate results. Therefore, the number of landings simulated follows the example below:

Aircraft Type	Aircraft Mix (%)
A320	25
B737	20
PC12	1
B767	15
A332	8
A321	10
B787	12
A319	9
TOTAL	100

$$Number\ Of\ Landings = \frac{Minimum\ Number\ Of\ Landings\ Per\ Aircraft\ Type}{Smallest\ Fraction\ Of\ Aircraft\ Mix} = \frac{1000}{0.01} = 100,000$$

Smallest Percent Of Aircraft Mix (%)	Corresponding Fraction	Number Of Landings Simulated
10	0.1	10,000
5	0.05	50,000
1	0.01	100,000
0.5	0.005	500,000
0.1	0.001	1,000,000