



# Runway Status Lights (RWSL)

## Training for Pilots: THL Operational Evaluation at DFW

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**Runway Entrance Lights (RELs)**



**Takeoff Hold Lights (THLs)**

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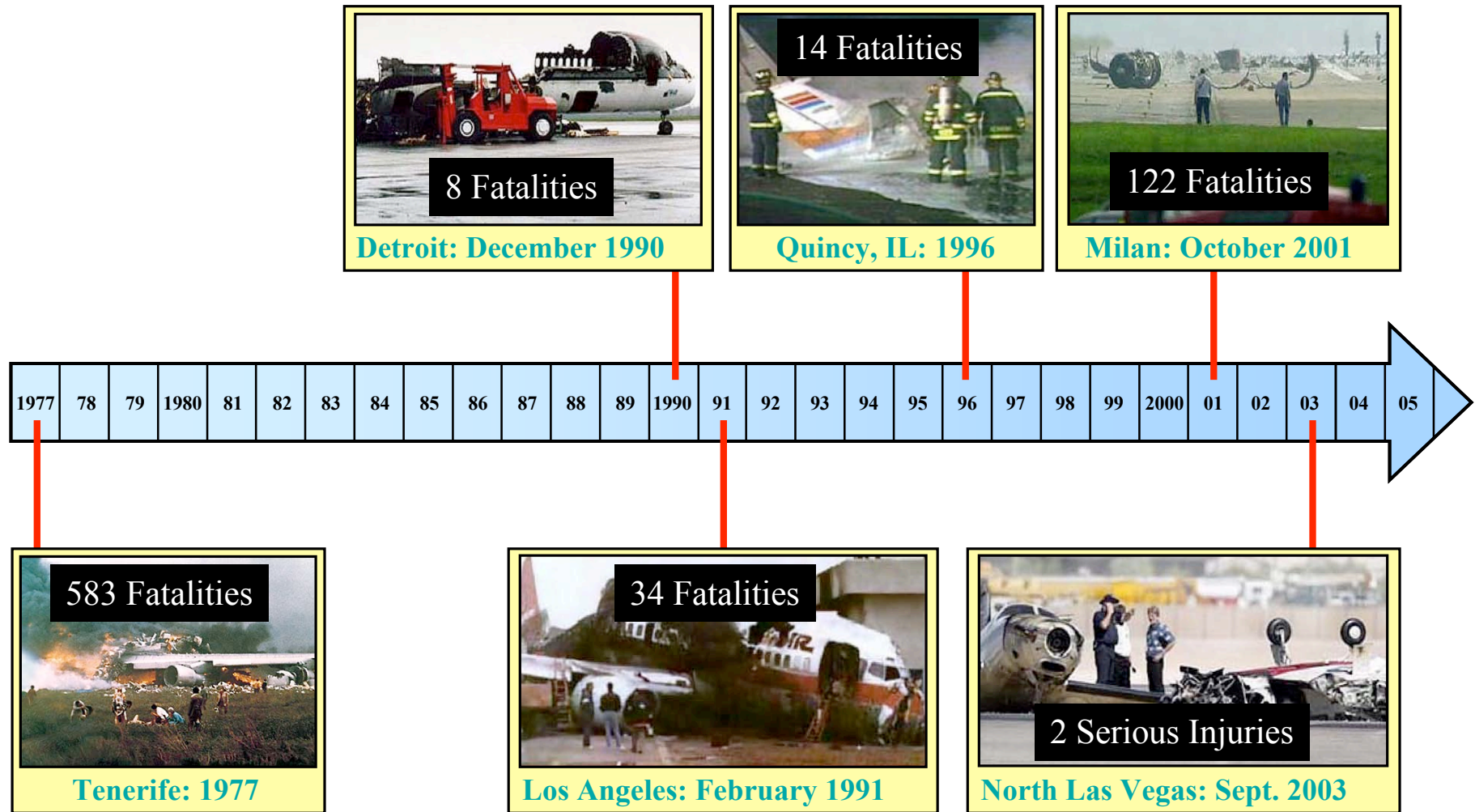
# Overview of RWSL

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- Runway Status Lights consist of Runway Entrance Lights (RELs) and **Takeoff Hold Lights (THLs)**
- Runway Status Lights Purpose
  - Reduce frequency and severity of runway incursions
  - Prevent runway accidents
- How do Runway Status Lights do this? By increasing pilot situational awareness
  - RELs provide a *direct indication* to pilots when it is unsafe to cross or enter a runway
  - THLs provide a *direct indication* to pilots when is unsafe to depart from a runway

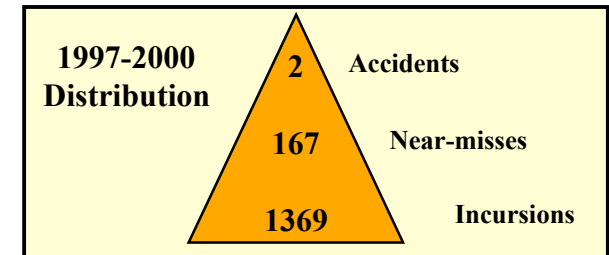
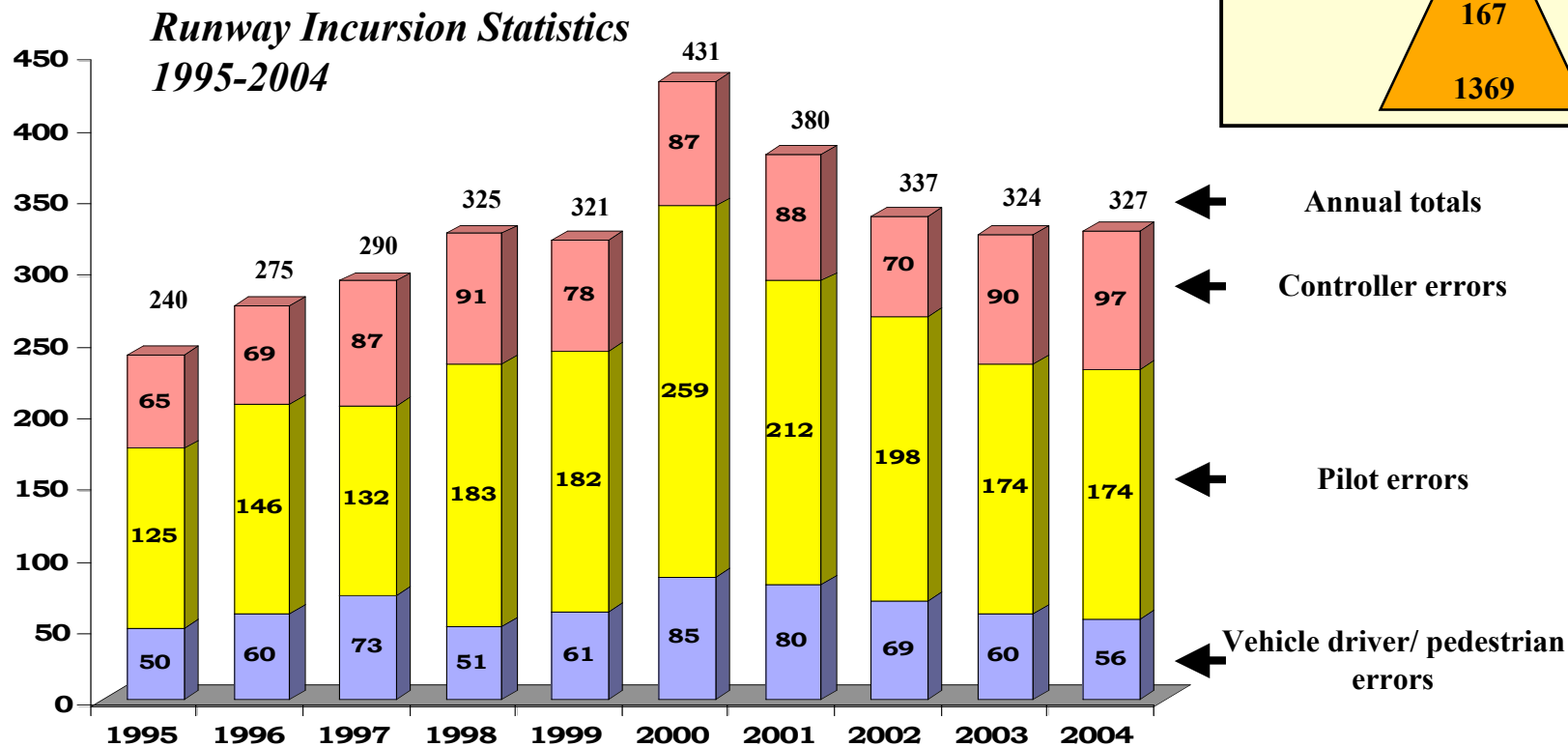


# Motivation: Prevent Runway Accidents





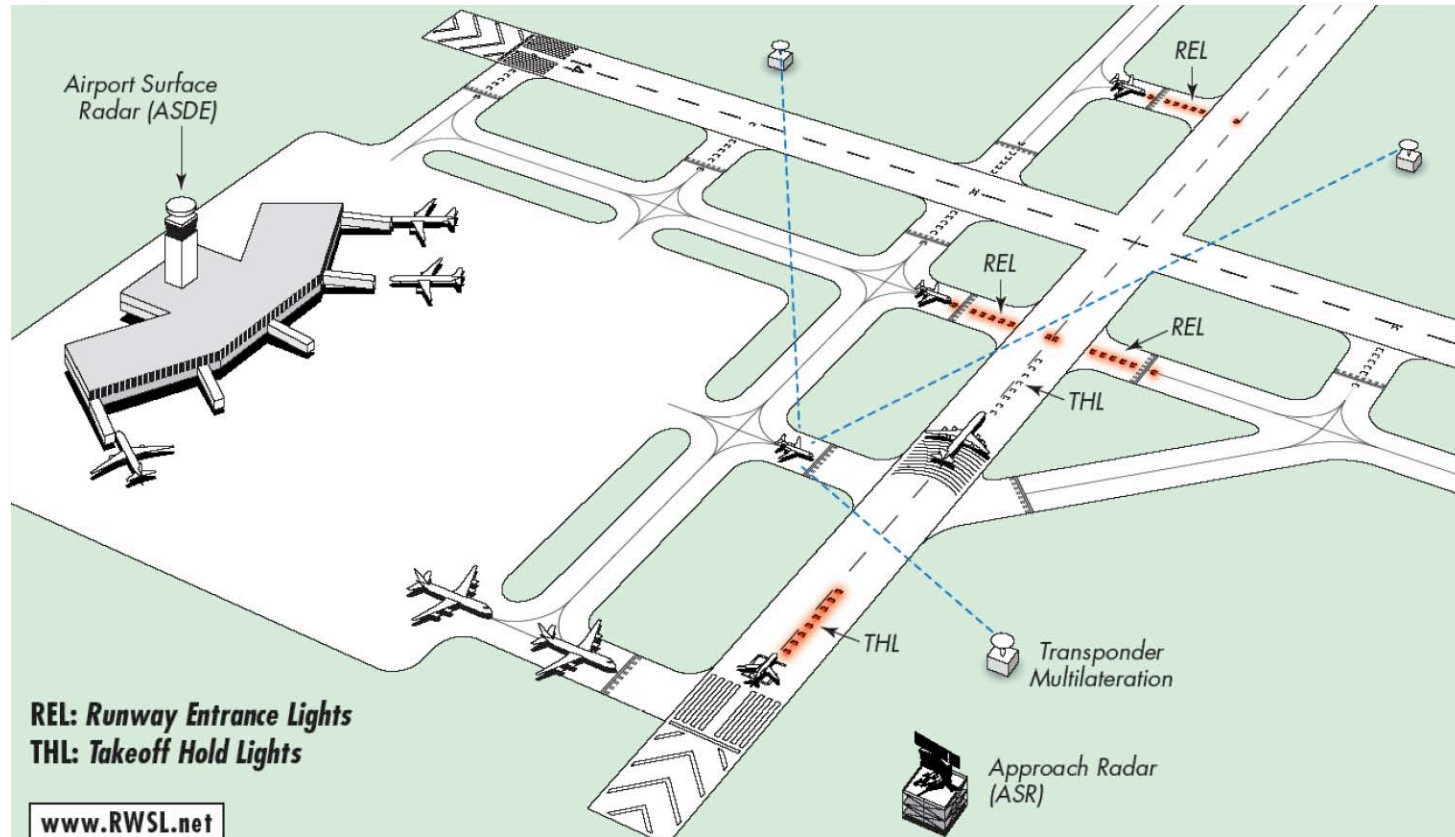
# FAA's Runway Incursion Distribution



*Most runway incursions result from pilot deviations.*



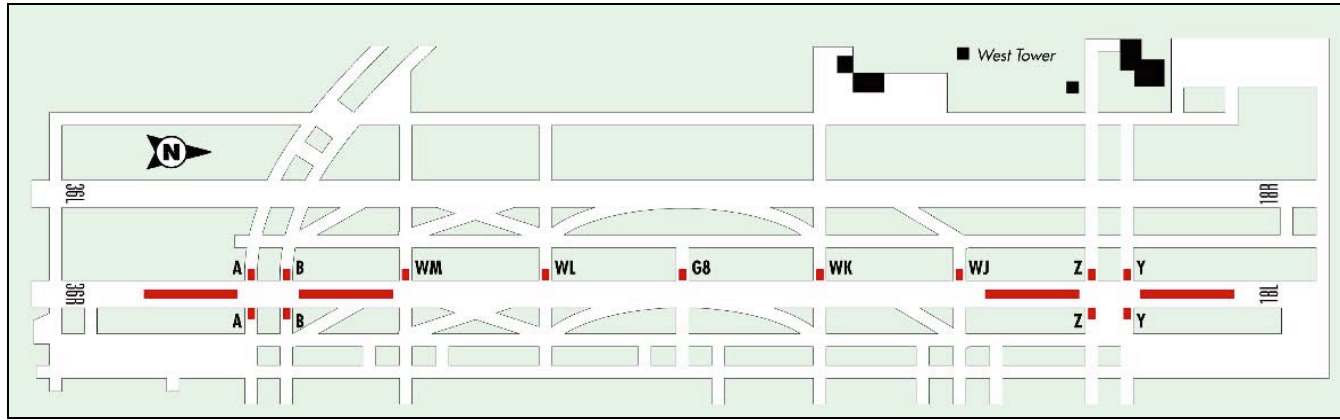
# RWSL Operational Concept



- RELs and THLs turn on and off automatically, driven by fused multi-sensor surveillance
- RELs turn on when it is unsafe to enter runway; THLs turn on when it is unsafe to depart from runway
- THLs are visible from takeoff hold position (and final approach); RELs are visible from taxi hold position



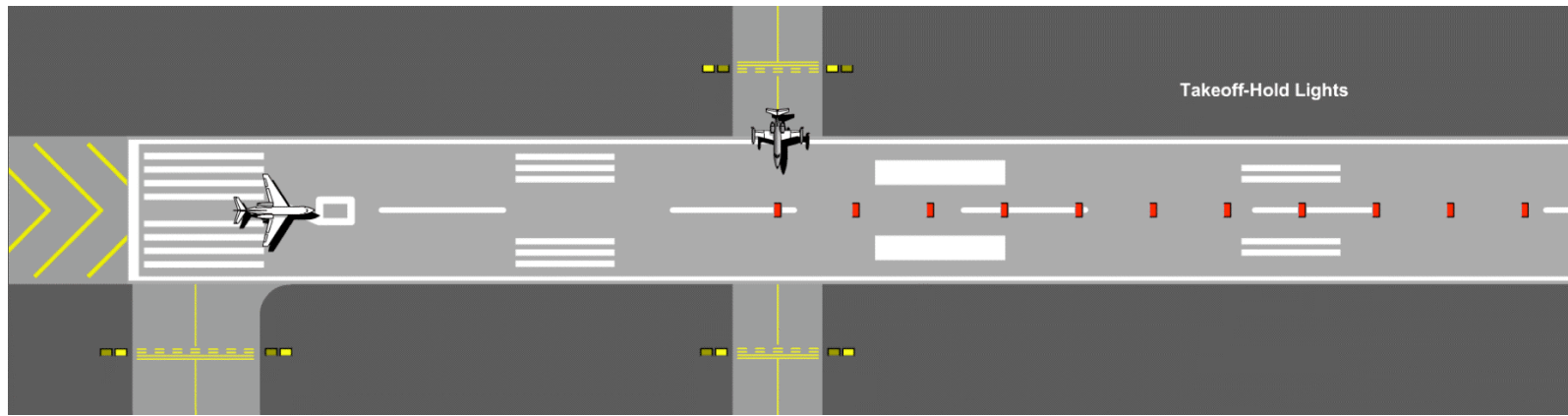
# Operational Evaluation at DFW



- THLs are installed on west side of DFW
- THLs on runway 18L/36R are in addition to existing RELs at selected taxiway intersections (as shown)
- THLs located at both full length and intersection departure positions



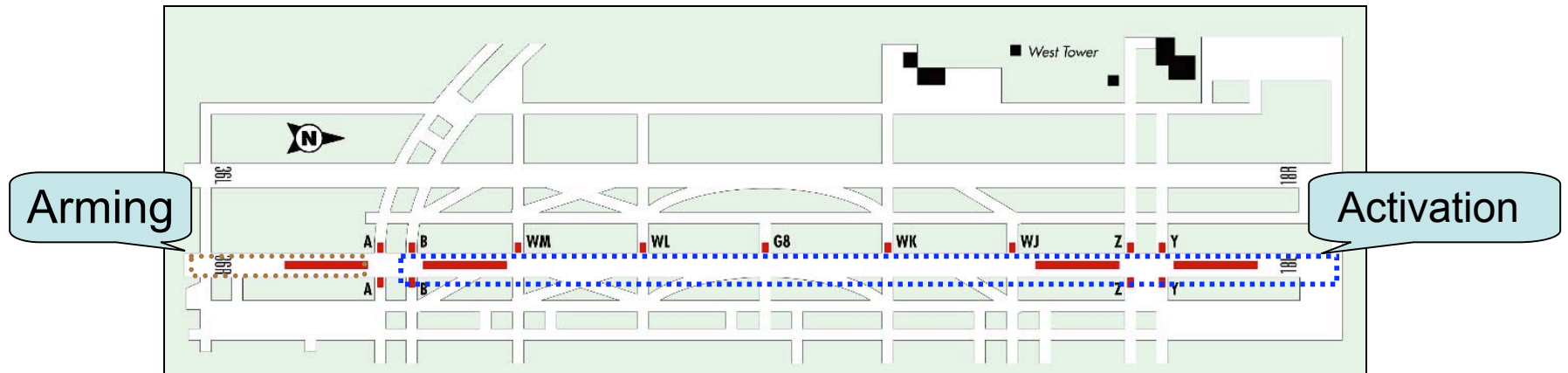
# High Level Operational Requirements



- THLs must have target in position for takeoff *and* target “on” runway in order to turn on (**red**)
- THLs must turn off (no illumination) once either condition is no longer met
- THLs must not interfere with normal safe operations
- THLs must operate automatically for each operation
  - No controller action required
- THLs must accurately depict that it is unsafe to takeoff



# “Arming” and “Activation” Regions Defined



*Illustration of one **arming** and one **activation** region for full length departures from 36R*

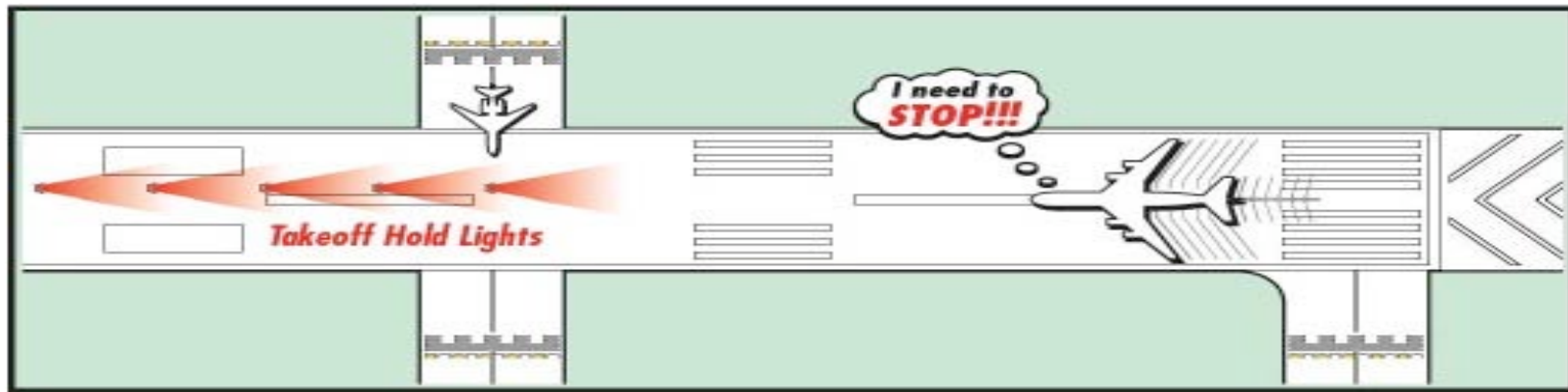
- There are four arming regions on the THL-instrumented runway 18L/36R (one shown outlined with brown dots, above)
- All arming regions are 1875' long, one for each departure point
  - Full length departure region begins at runway threshold
  - Intersection departure region begins abeam of taxiway crossing
  - THLs cover the last 1000' of each arming region with 11 red lights evenly spaced 100' apart
- There are multiple activation regions that cover entire runway in both directions (overruns not included, one shown outlined with blue dashes, above)
- Shape of activation region bumps out in areas where taxiways meet the runway, adjusted for normal direction of crossing traffic





# THL protocol

- THLs are directed toward the approach end of the runway
- THLs are visible to pilots
  - 1) in position for takeoff, or
  - 2) just commencing departure, or
  - 3) on final approach to land
- To be consistent in appearance with Runway Entrance Lights (RELs), THLs are placed longitudinally along the runway centerline
- An ATIS message will indicate when the THLs and RELs are operational
- Remember:
  - **LIGHTS TURNING OFF DOES NOT CONSTITUTE A CLEARANCE TO CROSS, ENTER, OR DEPART FROM A RUNWAY!**





# Pilots' interaction with THLs

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- If in position and holding on the runway and the THLs illuminate
  - crew should remain in position for takeoff
- If takeoff roll has begun and illuminated THLs are observed
  - crew should stop the airplane and notify Air Traffic that they are stopped because of red lights
- If aborting the takeoff is impractical for safety reasons
  - crews should proceed according to their best judgment of safety (understanding that the illuminated THLs indicate the runway is unsafe for departure) and contact ATC at the earliest opportunity
- If on short final and THLs are illuminated red
  - crews should inform ATC they are going around because of red lights on the runway.



# RWSL website: RWSL.net

**Runway Status Lights**

Created on November 29, 2004

RWSL is a fully automatic, advisory safety system designed to reduce the number and severity of runway incursions and thus prevent runway accidents while not interfering with airport operations. RWSL is compatible with existing procedures.

**The Problem**

Aircraft taxiing across while runway in use

**The Solution**

Aircraft stopped at hold line because of red lights

Most runway incursions are caused by a lack of situational awareness.

Runway Entrance Lights (RELs) illuminate red when a runway is unsafe to enter or cross due to a high-speed operation on the runway. [ [More...](#) ]

As part of an ongoing effort to explore new technologies, the FAA's Runway Incursion Reduction Program (RIRP) has developed the Runway Status Light System (RWSL). RWSL aims to improve crew and vehicle operator situational awareness through accurate and timely indication of runway usage.

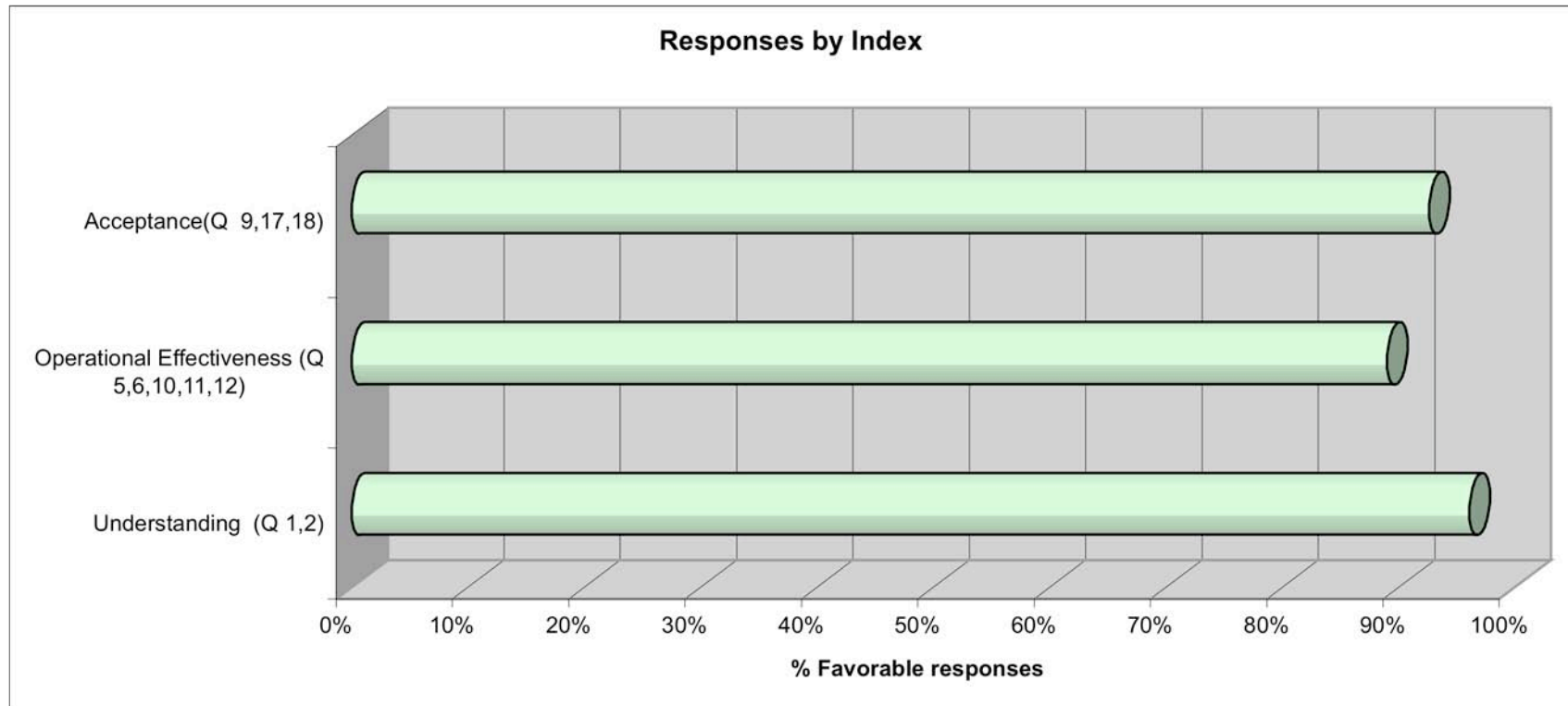
RELs have been installed at two test sites, Dallas/Fort Worth International Airport (DFW) and San Diego International Airport (SAN), and will undergo operational evaluations in 2005.

Home page of **RWSL.net** with one-click access to:

- Surveys (circled for emphasis here)
- Training Briefings
- Pilot information



# Pilots Results from REL Surveys



- **Acceptance**
  - Situational awareness enhanced, RELs valuable and valid
- **Effectiveness**
  - RELs functioning, visible, consistent with clearances
- **Understanding**
  - ***Do not cross*** red RELs, and REL off is ***not*** clearance



# RWSL Project Status Summary

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- RWSL operational evaluation of RELs went well
  - Pilot and vehicle operator education is critical to success
  - AAL has added RWSL to recurrent training for all their pilots
  - Surveillance quality is also critical
  - Methods for training, conducting surveys and getting feedback confirmed
  - Human Factors survey results support proof of RWSL operational concept
  - Relationship with air traffic controllers, pilots, and vehicle operators established
- RWSL is performing as designed
  - Performance is robust with improved surveillance and safety logic
  - Feedback from users supports decision to deploy
  - Anomaly rates are in line with requirements
- RWSL THL Shadow Operations Evaluation completed successfully as scheduled
  - ATC Tower Supervisors and Pilots recommended proceeding to operational evaluation
- Next steps
  - Operational Evaluation of THLs at DFW (see new Jeppesen insert and Class II NOTAM)
  - Operational Evaluation of RELs at SAN

***Please provide feedback online at [www.RWSL.net](http://www.RWSL.net).***