

# Flight Inspection of ILS CAT III with DGPS RTK

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## Generation Change in Reference Systems

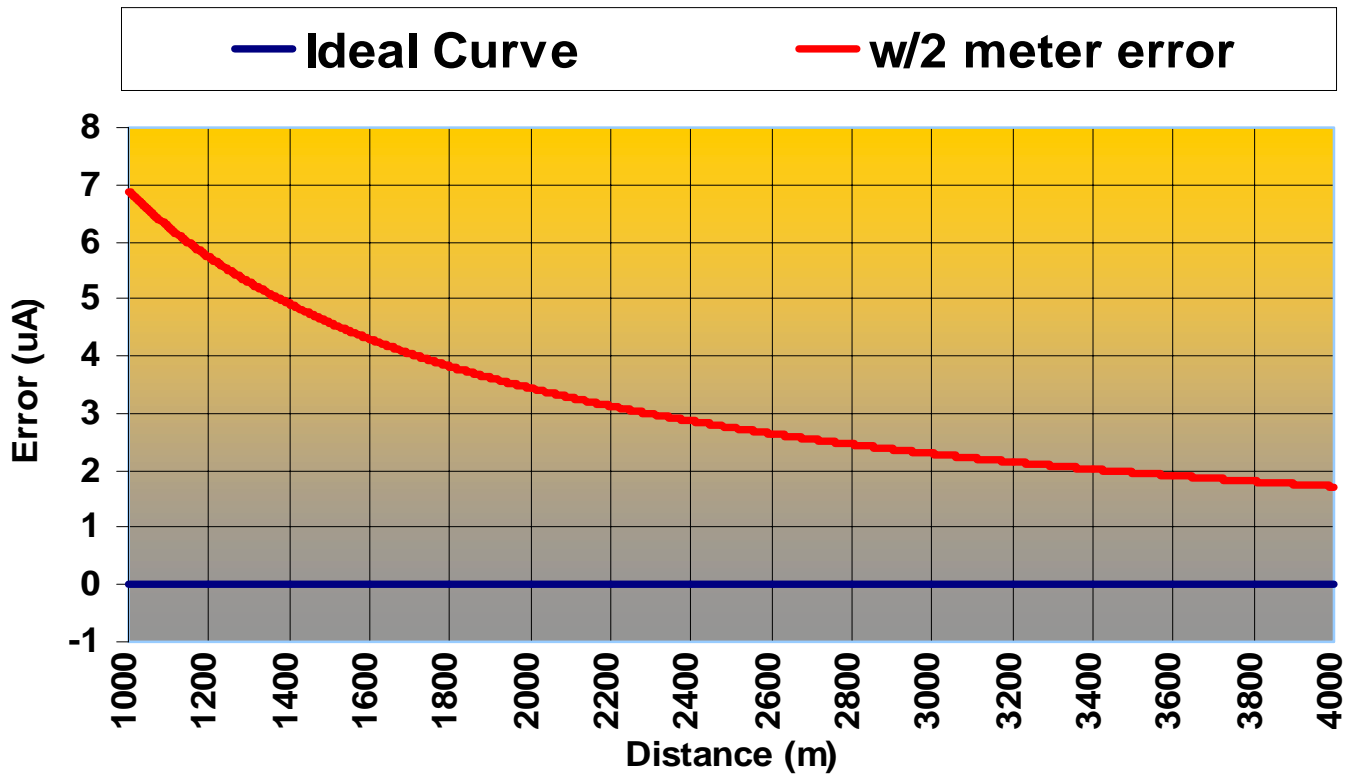
- Higher accuracy Reference Systems
- The room for human error factors are greater than with conventional Reference Systems
- Important to understand these errors nature in order to avoid them
- Important to know what effects they have on precision Flight Inspection

## High accuracy output needs high accuracy input

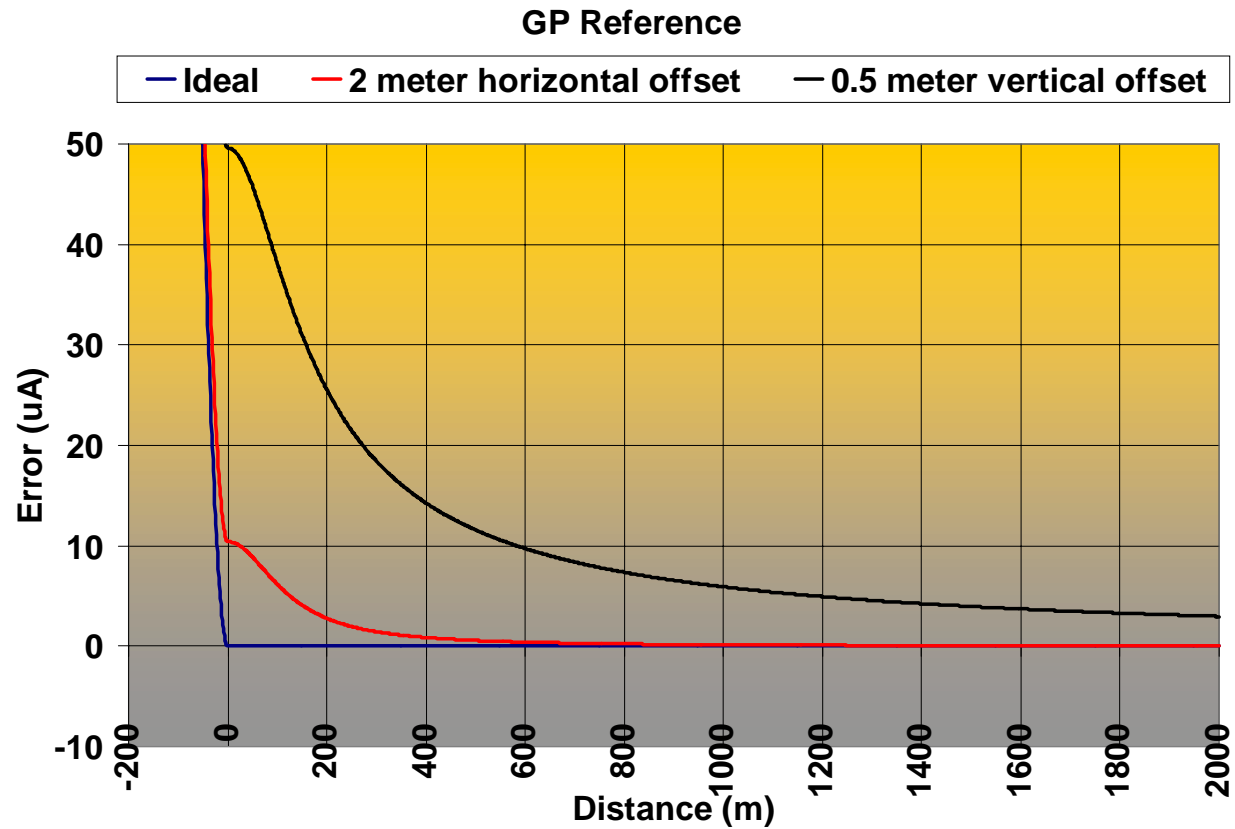
- Ground Transmitter Facility Position
- Aircraft Antenna Position
- Aircraft Attitude Corrections
- Signal Timing Corrections
- Difference in Dynamics

# Effect of error in Localizer Antenna position coordinates

LLZ Reference



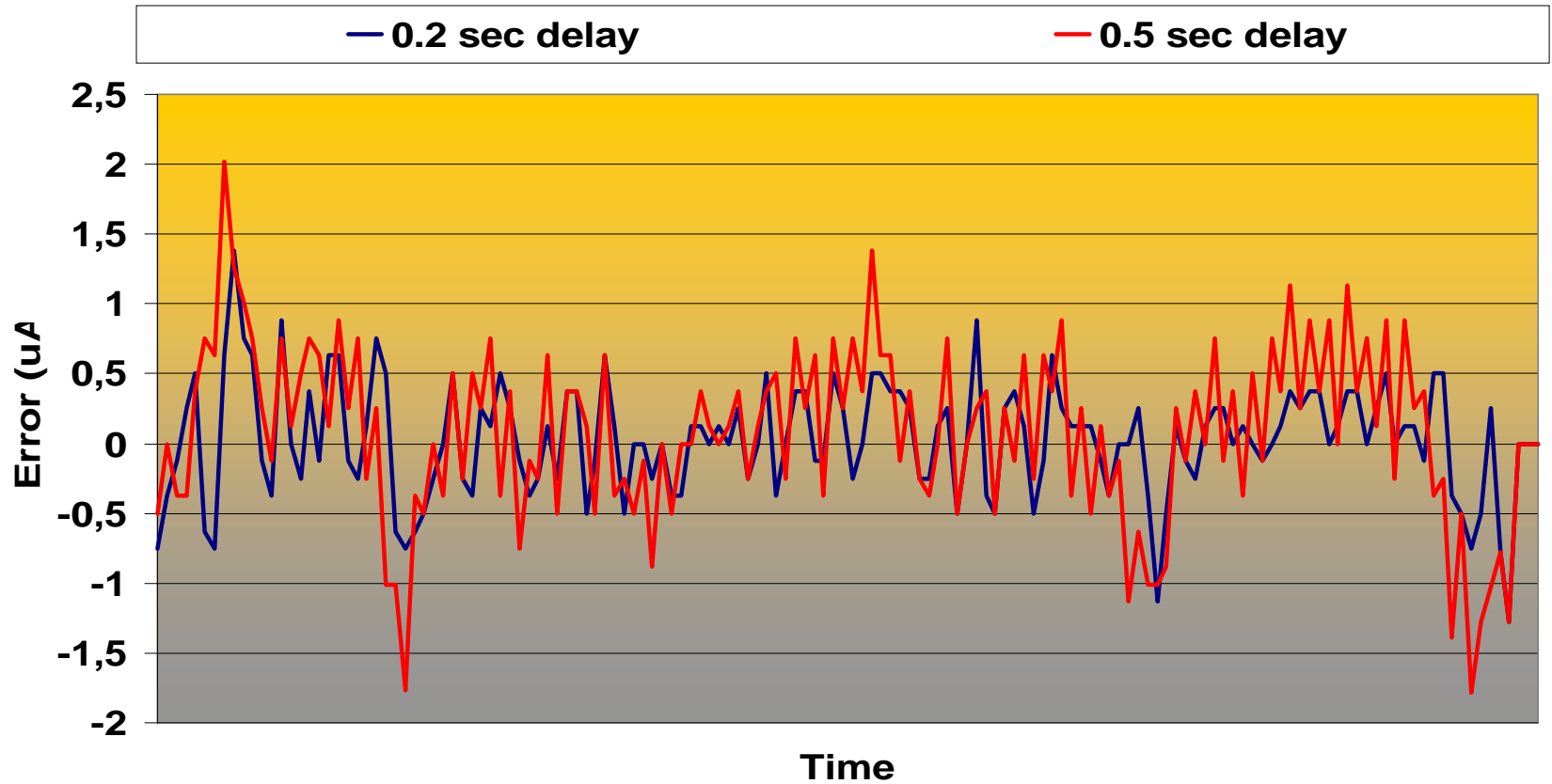
# Effect of error in Glide Slope Antenna position coordinates



## Timing Considerations

- Positions compared must have the same age
- Time delays in Reference Position System and Navigational Receivers must be compensated for

# Typical effect of skewed timing



## Different Dynamics

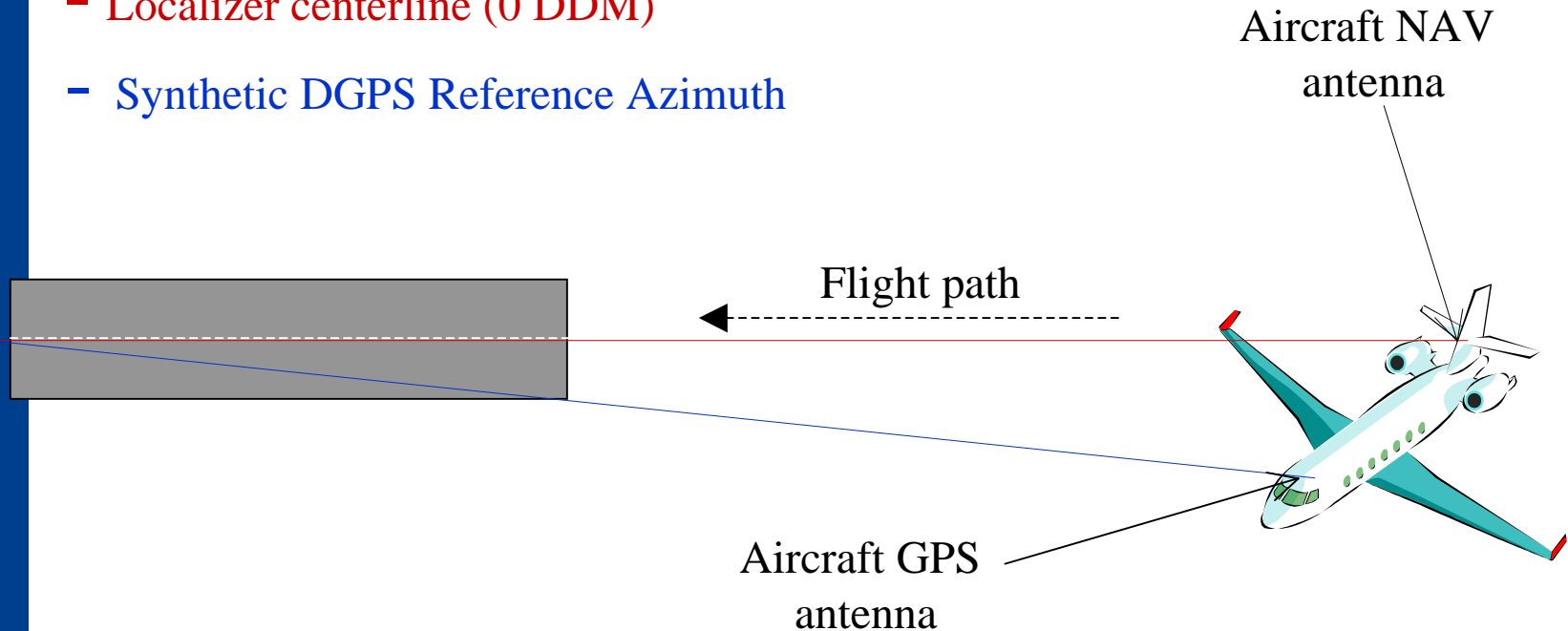
- High precision GPS based reference systems have high frequency response
- Nav receivers may have a slower response time to sudden changes in aircraft position

## Effect of Aircraft Antenna Positions

- High Precision DGPS Reference Systems measures position of Aircraft GPS Antenna
- GPS Position needs to be transformed to position of NAV/GP antennas on the aircraft
- Failing to transforming the aircraft antenna positions will cause similar effect as position coordinate errors in ground transmitter antenna positions

# Effects on Aircraft Crab-angle and Reason for Antenna Compensation

- Localizer centerline (0 DDM)
- Synthetic DGPS Reference Azimuth



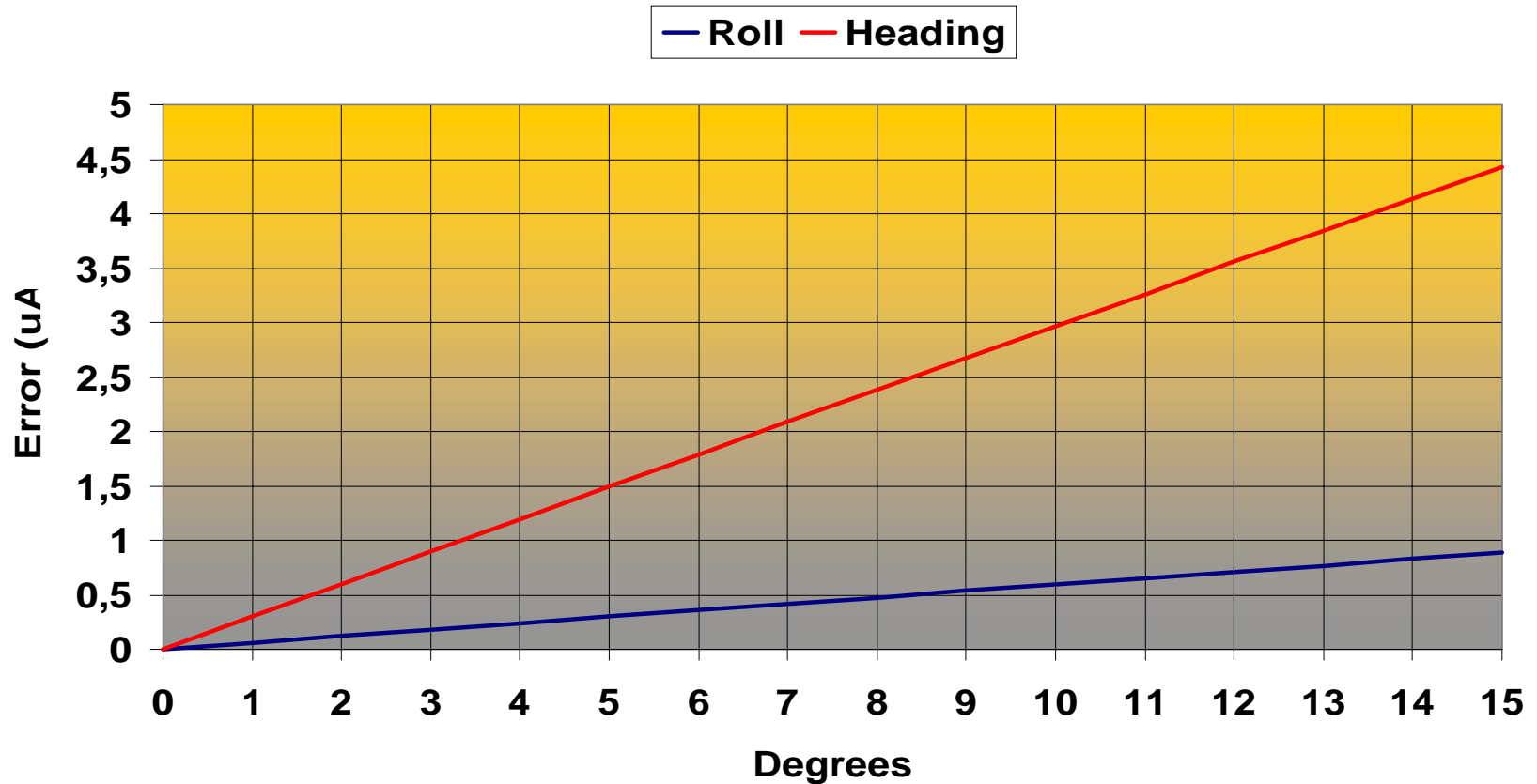
- If no antenna compensation is made, the compare will be different from 0.

## Aircraft Attitude Corrections

- With knowledge of aircrafts attitude (roll, pitch and heading), corrections should be made for the offset of GPS antenna vs NAV/GP antennas
- These corrections require high accuracy attitude input to give accurate results

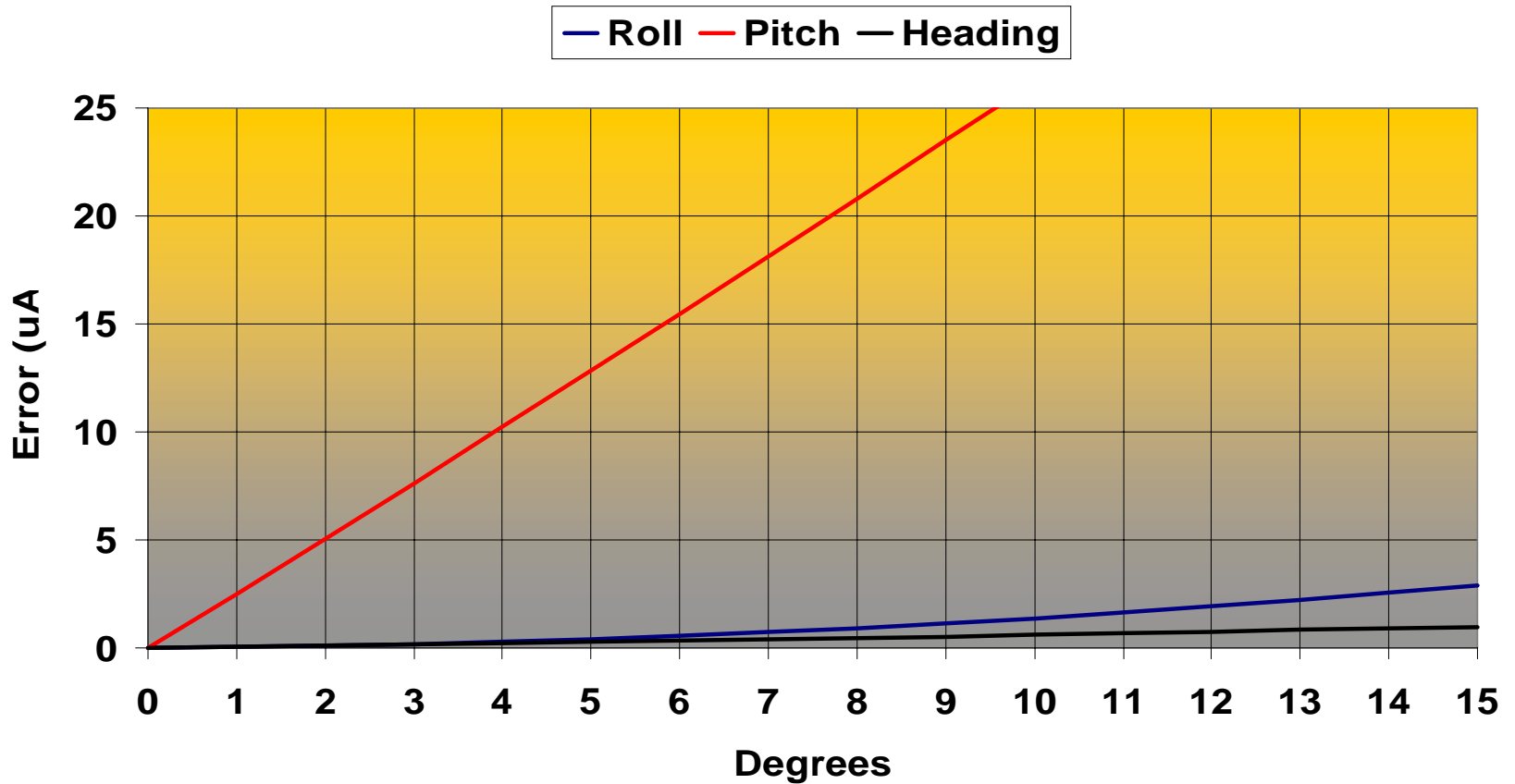
# Effect of errors in aircraft attitude information

Typical Aircraft Attitude Error Effect on LLZ Reference



# Effect of errors in aircraft attitude information

Typical Aircraft Attitude Error Effect on GP Reference



## Conclusion

- High precision output needs high precision input
- Important to know and understand the nature of possible error sources

## Conclusion (cont.)

Modern Flight Inspection Systems should:

- Perform arm corrections
- Perform timing corrections
- Allow reentering of ground facility locations and aircraft antenna positions and subsequent recalculations of all results in previous flights

For further discussions please visit us at our stand in the exhibition hall

