Sources of optical error

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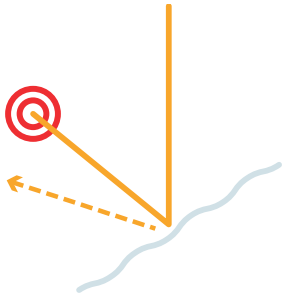
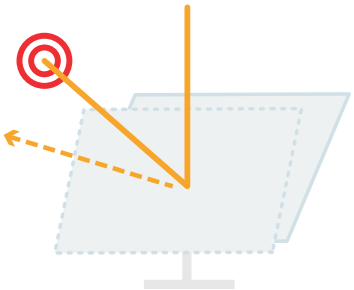
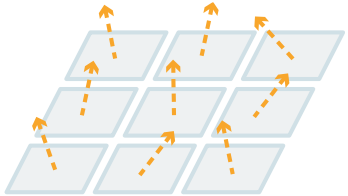
A high-performance heliostat field must address each of these error sources



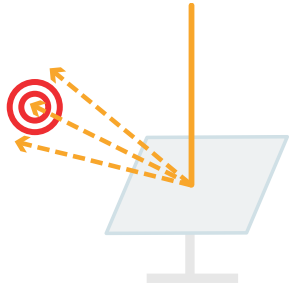
Mirror Shape Error
Deviations from ideal shape reflect rays in wrong direction, defocusing the beam



Tracking Error
Imperfect tracking places beam in incorrect position at the receiver



Canting Error
Misalignment between mirror facets enlarges and defocuses the beam



Off-Axis Aberrations
“Ideal” shape of mirror depends on sun position; at other orientations the beam is distorted

Time to think outside the box

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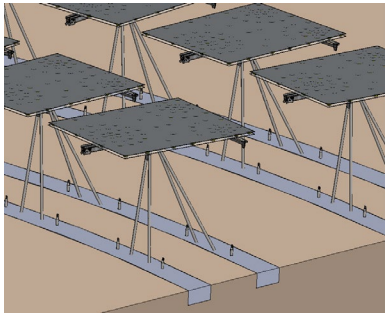
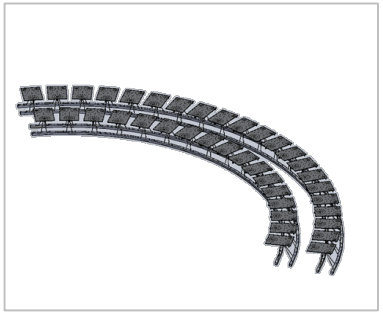
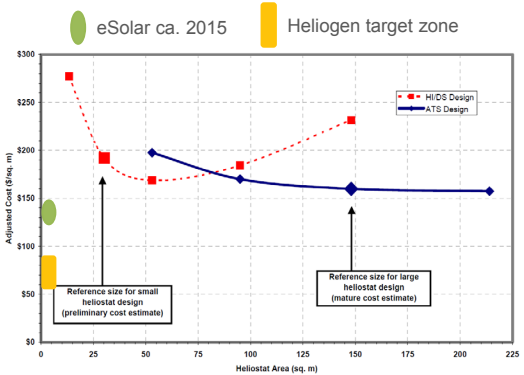
Computer vision based closed-loop tracking: System for Observing Heliostat Orientations while Tracking (SOHOT)



Design for high-volume (auto, consumer electronics) manufacturing processes



Field layout optimized for installation, cleaning, and maintenance



Small heliostats are more expensive?

From Jones et. al. 2007 “Heliostat Cost Reduction Study”