

“Accuracy” Defined

Most LPR manufacturers have a different definition of “accuracy” when referring to the results from high performance imaging systems. Through the careful use of ambiguous and undefined industry terms such as “attach rates,” “accuracy rates,” and “error rates,” some suppliers are able to create the illusion of procurement specification conformance without committing to an objectively measurable standard.

Detection and attach rates are two of the top requirements typically specified by prospective customers. Unfortunately, not every LPR manufacturer measures these targets in the same way, so establishing clear definitions is a good way to hold LPR providers accountable.

At Perceptics, we use the following simple equations:

$$\text{Attach Rate} = \frac{\# \text{ results}}{\# \text{ readable plates}}$$

$$\text{Accuracy} = \frac{\# \text{ correct reads}^*}{\# \text{ results}}$$

$$\text{Read Rate} = \frac{\# \text{ correct reads}}{\# \text{ readable plates}}$$

whereas,

$$\frac{\# \text{ total vehicles} - \# \text{ exclusions}^{**}}{\# \text{ readable plates}}$$

$$\frac{\# \text{ readable plates} - \# \text{ low confidence results}^{***}}{\# \text{ results}}$$

* the number of plates the OCR read correctly
 ** see below for examples of exclusions
 *** threshold set based on confidence level

To maintain our high accuracy rates, Perceptics does proactive “ground truthing”—a process in which humans sample and validate the Optical Character Recognition’s (OCR) interpretation of images. This ensures that our license plate OCR technology continually improves our system’s ability to accurately read new license plate designs and formats, even after the equipment is installed.

Readable vs. Non-Readable License Plates

One of the common misconceptions about LPRs is the ability to read 100% of license plates 100% of the time. Although a great idea, this is simply not possible. End-users and manufacturers often have different ideas about the capability of an automated system, which can lead to confusion and dissatisfaction.

We at Perceptics feel it is necessary to be transparent in how we measure success. An important part of that measurement is a mutual understanding of what is considered a “readable plate.”

License plates are considered “readable” (Figure 1) by Perceptics with the following exceptions known as “exclusions”:

- License plate missing from the vehicle
- License plate outside of the camera(s) field of view



Figure 1 - a good plate read

- Damaged license plates:
 - Portions of the plate are missing (**Figure 2**)
 - Plate is bent or otherwise distorted in a manner that alters the shape of characters that constitute origin or registration number (**Figure 3**)
 - Plate has broken characters (**Figure 4**)
- Plates mounted in a manner inconsistent with the law of the state entered, i.e., plate is displayed in the rear window of a passenger vehicle
- Obstructed plates (**Figure 5**)
 - Any object, such as the ball of a trailer hitch, that prevents clear view of plate origin or the registration number
 - Any object that obstructs the outline of origin or registration number, such as a license plate frame
- Obscured plates (**Figure 6**)
 - Any object that prevents the light source from properly illuminating the license plate
 - Any object that casts a shadow on any part of the characters creating a low contrast



Figure 2 - last character missing



Figure 3 - bent plate



Figure 4 - broken characters

A character is said to be “broken” if the silhouette contains two or more connected components, or the connectivity of holes in the character is altered. (**Figure 4**)

A character is said to be “obstructed” by an object if the silhouette of the object in question overlaps any portion of the character. (**Figure 5**) Obstructions are caused by objects in the path of the imager (the camera) to the target (the license plate).



Figure 5 - obstructed plate

Similarly, a character is said to be “obscured” by an object if the object in question casts a shadow that overlaps any portion of the character. Obscured areas are often caused by objects blocking the path between the light source (the illuminator) and the target (the license plate). (**Figure 6**)



Figure 6 - obscured plate (low contrast)

All other plates are said to be “readable” and are therefore included in our accuracy measurements.



Figure 7 - half-height and stacked characters

Note that license plates containing half-height and stacked characters (**Figure 7**) are considered readable by the Perceptics LPR system. Perceptics LPRs can also read up to three plates per vehicle and plates on vehicles traveling up to 120 mph.

For more information on the capabilities of our LPR system, please contact your Perceptics representative.