# Wide Format Scanning Whitepaper

The Top Five Reasons to go CCD vs. CIS scanning

Whether you are replacing a current wide format scanner or purchasing for the very first time, it's important to consider the two basic technologies currently in use for wide format image capture and how these technologies fit into the workflow and business model of your scanning needs.

Wide format scanners today use either a Charge Coupled Device (CCD) or a Contact Image Sensor (CIS) to capture data. Information enters into the scanner through a lens system and a light source that is reflected from the document and captured by the photo sensors.

Overview of CIS Technology: CIS or (Contact Image Sensor) technology was originally developed for small format devices and has been in use for many years on fax machines, check readers and ATM card readers. The technology uses multiple CIS modules that contain lenses and lighting within each module. The modules are placed side by side just under the scanning glass. The self-contained modules typically use low power light emitting diodes (LED) of red green and blue to light up the document. The light is then reflected by the document and captured by a glass rod lens, directing the light towards the image sensors which capture the pixel.
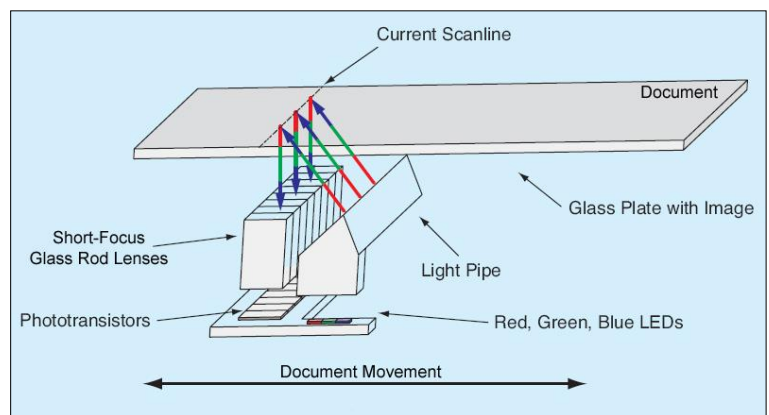
Contact Image Sensor

Overview of CCD Technology: CCD or (Charged Coupled Device) technology, commonly referred to as camera technology, has been designed for all types of digital imaging including scanners, video cameras, security systems, as well as, equipment for industrial testing, monitoring and measurement. This technology has been in use for years. Most synonymous with high quality scanning, camera technology employs a linear array of CCD's or cameras and a sophisticated lighting system to illuminate the image to be scanned. The more advanced systems utilize 4-channel RGB cameras- red, green, blue and panchromatic mono channels that deliver 48-bit color depth at 16 bits per channel.
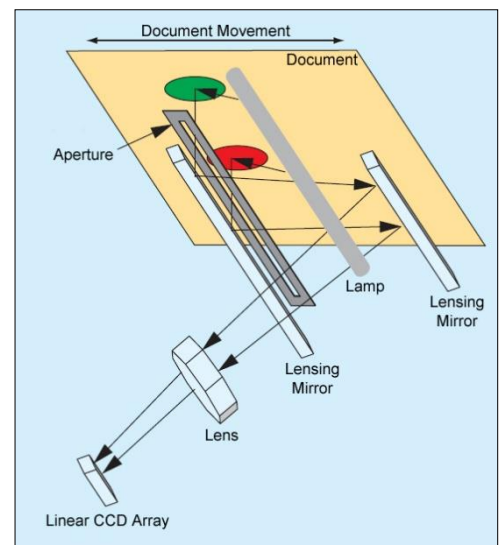
Linear CCD Array

Now that you have a basic idea of the technology, lets examine our *top 5 reasons* why we recommend camera over contact image sensor technology:

1) **Image Quality and Flexibility**: CCD scanning technology produces quality scans for virtually any type of document that will fit through a roll fed scanner. Whether your originals are hand drawn engineering drawings, B&W photos, or maps, CCD scanning technology will capture 16-bit grayscale (64,000 shades of grey) using a dedicated panchromatic monochrome channel for a much sharper clearer image. CIS scanners deliver only 8-bit grayscale (256 shades) and green capture only and have restrictions in some document classes like full bleed graphics and copying to 8 and 12 color printers. If you need to run GIS maps, blueprints with stiff edges, newspaper, delicate documents or mylars a Contex CCD scanner is highly recommended over CIS technology.

2) **Productivity**: CCD scanners (Contex only) scan with originals face down. Some might argue that face up scanning allows for better quality control but assuming sheets only take 3 to 4 seconds to scan, quality control is better performed at the software level using Line of Sight Scanning techniques like the National /AZON Zero Turn system. CIS scanners and most non-Contex brand CCD scanners employ face up scanning which requires operators to "double handle" every document to keep them in their original order. Face down scanning allows for true scan and drop capability which offers the most efficient way to handle documents. In addition to face down scanning, CCD scanning software, coupled with the latest developments in media sensing technology, reads the input media size much faster and more accurately, reducing post scan error correction.

   File transfer is another serious productivity feature in Contex CCD scanners. The enhanced utilization of USB 3.0 for file transfer guarantees a much higher degree of productivity as operators will experience virtually zero wait time for file transfer between images. Side by side productivity tests generate a minimum of a 2 to 1 speed increase for CCD vs. CIS scanning.

3) **Color Fidelity when close isn't good enough**: Due to the inherent technical advantage of camera-based technology, the color gamut is much wider, color fidelity is greater and image noise is reduced. Since cameras capture up to 48-bit color, printing and copying to 8 or 12 color printers produces significantly better results than CIS. Color depth and the ability to recognize the nuances of gradients is superior on CCD scanners.

4) **Thick Document and folded document Scanning**: Scans of mounted originals up to .60" thickness can be done with CCD scanners but not with (most) CIS scanners. The reason is that the lighting system and focal point of the CIS technology does not lend itself well to raised or uneven surfaces. If your document archives consist of a good percentage of any of these two documents, go with CCD. In addition, if you are a print service provider (PSP) and are at the will of your customer, go with CCD to ensure the highest level of customer satisfaction and business retention.

5) **Optical Calibration/Stitching**: Contex CCD scanners come equipped with 4 to 7 Quad linear CCD's. These CCD's are each controlled by an adjustment motor that sets height and width and are accurate to 1/400th of an inch when stitching between cameras. CIS elements are fixed in place or in some cases have a single element across scan widths. Contex CCD scanners offer the only "self-correcting" optics available without a technician being required for adjustment or having an operator physically turning screws inside the scanner.

   This factors in when using Closed Loop Calibration which performs the function of printing a wide color target to a customer's scanner, then scanning that target with a CCD scanner to provide Nextimage Repro copy software with an accurate reading of how the printer is delivering defined colors in its output.

In summary, CIS scanners hold a significant market space and are very well suited to scanning CAD/GIS generated images as well as AEC markups and building plans, they are more portable and lightweight and generally less expensive than CCD based scanners. However, if your output quality is of utmost importance, if you are a print service provider, if you have an archive full of varied originals, if you plan to scan color graphics, maps photos or thick originals a Contex CCD scanner is best suited to your needs.

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