



## APPLICATION NOTE

# RAPID MEASUREMENT OF PLASTIC COMPONENTS

*Vision Engineering's Swift PRO and Hawk® systems are unique non-contact measurement systems that offer both, a true optical image display combined with fully automatic video edge detection in a single system. Systems like the Swift PRO and Hawk allow for both techniques to be used in one system. This opens up many opportunities where previously either technology alone would be insufficient. One significant application area for this dual technology is molded plastic component inspection.*

*This application note looks at typical inspection applications in the manufacturing of plastic components in the automotive industry, however, many of these applications can be applied to plastic part manufacturing in other industries as well.*

### Manufacturing Criteria

Automotive components have critical quality requirements in terms of function, tolerance and aesthetic appearance. Increasingly, plastic components are being used in automotive manufacture where previously steel or aluminum would have been necessary. This isn't simply limited to interior trim but includes mechanical components as well.

While reducing overall weight and improving the cosmetic finish available, this trend does demand that the manufacturing criteria on such plastic components now equates to that previously associated with machined metal.

### Unique Benefits of The Swift Pro Series And Hawk Systems

Automotive moldings tend to be manufactured in dark, low contrast colors; most frequently, black, near black or various shades of gray. As a result, these components coordinate well with the huge variety of color schemes available in today's cars. While this is good for the car designer, it makes accurate viewing and gauging much more problematic.

To measure a black low contrast object on a black low contrast background presents significant challenges to most non-contact measurement systems. This is where the unique benefits of the Swift PRO and Hawk systems come into play.

As an example, a climate control fascia panel is molded in very dark gray. This panel must fit exactly into the climate control assembly or the unit may rattle and the driver would see a bad fit.

This panel is manufactured in high volume and requires several key measurements to be accurately verified. An operator using an optical system may not be cost-effective because many of them are highly repetitive.

An automated video-based system would face difficulties because the contrast between black on black edges is too low. The solution is the ability to have a system with both optical and video based edge detection.

Clearly defined edges can be automatically measured using Video Edge Detection (VED) technology. This allows for the majority of the checks to be fully automated, relieving an operator from time-consuming, repetitive tasks.

Once these are completed, the patented optical display head can be used, allowing the operator to use their experience and the ability to manually define a feature to measure the difficult, low contrast features. The result is a system that offers the best of both worlds.

### Two in One (Optical And Video Measurement) Non-Contact Systems

The Swift PRO and Hawk systems can run either manually, motorized or in fully automatic mode. For rapid product changeover, manual operation allows for a very quick setup in any measurement task. For high volume throughput, automation allows repeated, objective inspection much faster than manual measurement.

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In between these extremes, there are many applications that benefit from partial automation – where components can not be automatically checked or where product variety makes multiple measurement routines impractical.

### Designed By Engineers, For Engineers

Patented Dynascope technology presents a clear, pure optical image to the operator through the expanded exit pupil display head. This image has not been digitized and will not suffer from loss of color rendition or contrast problems.

Video-based systems always suffer when viewing low contrast black on black, white on white or transparent features, as typified by many automotive moldings. The human brain is by far the most powerful image processing system available and for difficult optical subjects, the best results will come from a pure optical image being presented to a human operator.

When using a fully automated optical and video system, the majority of measurements can be controlled by the PC software with only complex parts being presented to the operator, who can input edge locations.

Over specification has become a problem in the production environment. Usability is equally important as capability on today’s shop floor, as a powerful and all-capable system will only earn its keep if it can be used, day to day by production staff. It is this thinking that has driven the development of the Swift PRO and Hawk systems to be “designed by engineers, for engineers”.

### Reduced Inspection Cycle Time And Improved Repeatability

The Swift PRO and Hawk systems are intended to be used on or close to the shop floor, directly, by operators of all skill capabilities. Because components can be taken directly from the molding or machining station to these systems, feedback is rapid and directly to where the information is needed. If the component is distorted or out of tolerance, remedial action can be taken immediately.

Both systems can be set up to run manually or fully automatically. In the case of the climate control panel moldings, this means initial pre-production runs can be closely monitored and measured using a completely manual inspection setup.

The flexibility of manual operation means that changes can be quickly accommodated without the need for skilled programming knowledge. Once volume production begins, many of these checks or measurements can be fully automated, resulting in higher throughput, reduced inspection cycle time, and improved repeatability.

As plastic components become more complex and quality critical, consumers grow more demanding and have higher expectations. This all drives the need for non-contact measurement systems that are accurate, user-friendly, and capable of measuring optically difficult components in volume.

### Quick Specification Comparisons

	Measurement Range	Dimensions (WxDxH)	Measurement uncertainty (X_Y)	Measurement accuracy (Z)	Magnification range	Maximum load	CNC control option
Swift PRO Family	8" x 4" x 3.9"	35" x 36" x 43.6"	5 + (6.5L/1000) μm *	10 μm *	10X, 20X, 50X & 100X	26 lbs	Not Available
Hawk Family	8" x 4" x 9.6"	29.5" x 27.5" x 30.7"	2 + (4.5L/1000) μm *	10 μm *	10X, 20X, 50X, 100X, 200X, 500X & 1000X	26 lbs	Hawk DUO



Hawk DUO System



Swift PRO DUO



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