

SEMS, INC.

SEMS Optical Pinhole Detector



294E 600N
Valparaiso, IN 46383
USA

Phone: 1-219-462-2373
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SEMS Optical Pinhole Detector



A) Description of Operation:

The SEMS Pinhole Detector works by examining the surface of moving web based product. The system detects, measures, and logs holes, edge cracks, and web width. The customer's product is back-lit with LED lighting to provide a sharp image for the sensors.

The system uses highly sensitive CMOS cameras with optical lenses and LED frequency matching monochrome filters that see only a single line across the product. Two overlapping cameras with continuous imaging guarantee inspection of the entire web. These cameras take pictures of the moving product at 3880 images per second. Each image is processed and evaluated for pinholes, weld holes, edge cracks, and product width. The on-board computer receives data from the two cameras and displays the results in real time on the built-in Operator's Station.

The Operator's Station is conveniently located on the operator's side of the hole detector – No additional desk space is required. Operator and maintenance setups are made on the Operator's screen. Maintenance setups can be protected with a customer supplied password. These setups and additional factory-set setups are contained in a text file that is read during system power-up. The Operator's Station keeps a record of all Small Holes, Large Holes, Edge Cracks, Weld Holes and Strip Width until the end of the coil is detected. A report is then saved and a new report begins once the next coil is started. Optional Speed and Footage displays are available with the addition of a customer supplied pulse tachometer. The last 11 months of data is always available locally for customer download, and is shared on the network.

The system is self-contained and does not require plant air or water on hot mill applications.

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Typical Installation:



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B) SYSTEM SPECIFICATIONS

- 1) Standard and Custom Industrial Frames available
 - a) Frames designed and manufactured by SEMS to function on your production line without interfering with existing operations
 - b) Manufactured from rectangular steel tube with 3/16" wall
- 2) Solid state Industrial Sensing Arrays
 - a) Highly sensitive multi-element sensors
 - b) Precision high speed optical lenses
 - c) Long lasting LED illumination with matching optical filters
- 3) Dual on-board purging and cooling systems
 - a) The air purging system allows the sensor arrays, optics and LED back-lighting to remain clean, even in oily environments associated with production lines
 - b) Uses 'toolless quick-change' 10" x 20" x 2" air filters
- 4) Includes strip threading table with polyurethane wheels
- 5) Minimum installation requirements
 - a) 120Vac at 5A or optional 240Vac at 3A
 - b) Run Permissive electrical input
 - c) Hole Detected output
 - d) No plant air required
 - e) No plant water required (even on hot mill applications)
- 6) Minimum pinhole size = 0.0004" (0.010mm)
- 7) Maximum operating line speed
 - a) Detects 0.001" (25um) pinholes up to 3000fpm (900mpm)
 - b) Detects 0.0004" (10um) pinholes up to 2000fpm (600mpm)
- 8) Automatic LED back-light status check at the end of each coil
- 9) Electronic edge detection of product
 - a) Non contact edge mask is located in Back-light assembly

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- 10) Scans all product to 0.12" (3mm) of material edge
 - a) Edge crack detected when it propagates beyond 0.12" from edge
- 11) Width measurement = +/- 0.04" (1mm)
 - a) Continuously measures and displays strip width
 - b) Continuously displays strip speed (with optional tach)
 - c) Continuously displays strip length (with optional tach)
- 12) Includes Operator Station with Touch Screen
 - a) LCD Touch Screen display with real-time imaging and trending
 - b) Maintenance setups may be password protected
 - c) Ethernet interface for customer data collection and control

Inputs and Outputs found in 13) and 14) are all included with the system. 13(a) and 14(m) are the only required connections.

- 13) System inputs . . . (customer terminated)
 - a) Run Permissive (Required)
 - b) End of Strip 1 (Make Report 1)
 - c) End of Strip 2 (Make Report 2)
 - d) Tracking adjustment for wavy edge
 - e) Pulse Tachometer for speed and length
- 14) System outputs . . . (customer terminated)
 - a) Small Hole Detected
 - b) Large Hole Detected
 - c) Edge Crack Detected
 - d) Weld Hole Detected
 - e) Hole Detected
 - f) System On-Line
 - g) Logging
 - h) Tracking Left-Left
 - i) Tracking Left
 - j) Tracking Right
 - k) Tracking Right-Right
 - l) System Ready
 - m) Hole Detected (12µs fast output) (Required)
 - n) Data and Reports available via TCPIP Ethernet

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C) SOFTWARE

- 1) Windows Workstation software license is supplied.
- 2) All system application software is supplied - no license required
 - a) No customer programming required for system operation
 - b) Customer setup via Operator Touch Screen
- 3) Ethernet interface allows access to system data and reports

D) OPTIONS

- 1) Field installation by SEMS is available
- 2) Custom Industrial Frames available

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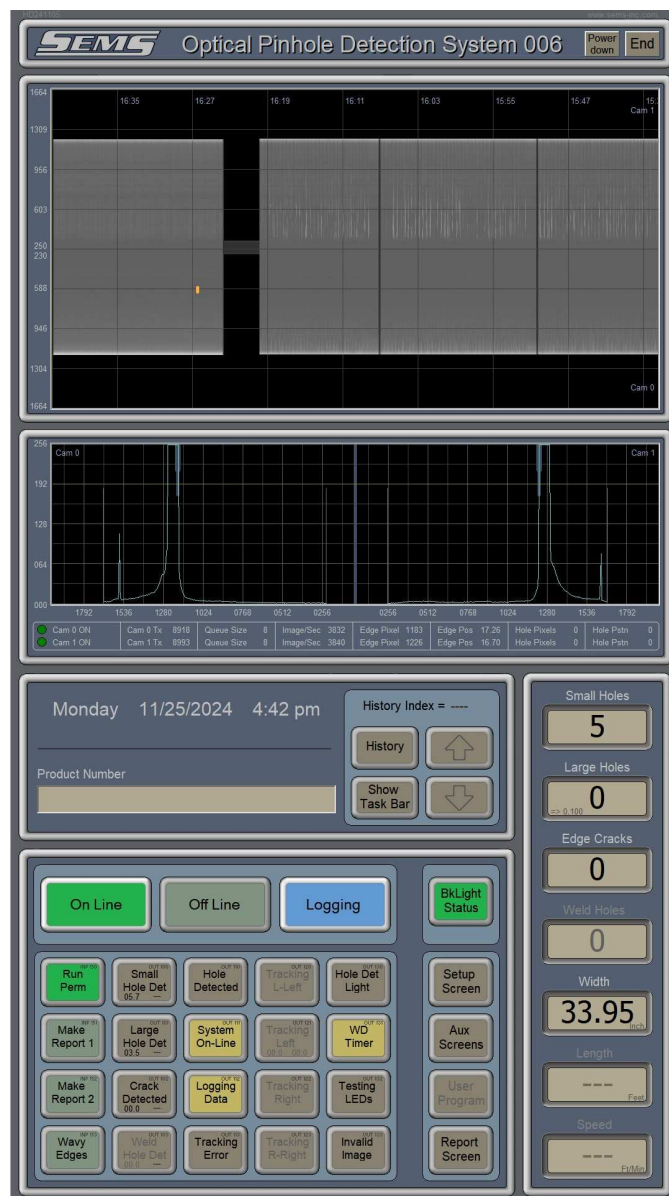
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OPERATOR'S STATION Screen Shots :

Main Screen:



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Report Screen

D:\HoleDet Reports\Reports 2025-01		Save All Img To USB	(Logging) Clear Log	Print to Printer	Copy to Clipboard	Exit Reports
D:\		Save Today Img To USB	Yesterday Dat To USB	Save Today Dat To USB	Save Month Dat To USB	Save Year Dat To USB
HoleDet Reports						
Reports 2025-01						
		HoleDet Log.txt				
		Report-2025-01-21-165923.txt				
		Report-2025-01-22-100916.txt				
		Report-2025-01-22-101622.txt				
		Report-2025-01-22-101935.txt				
		Report-2025-01-23-105946.txt				
		Report-2025-01-25-125949.txt				
		Report-2025-01-27-130611.txt				
		Report-2025-01-27-130624.txt				
		Report-2025-01-27-130637.txt				
		Report-2025-01-27-130701.txt				
		Report-2025-01-27-130714.txt				
		Report-2025-01-27-130727.txt				
		Report-2025-01-27-130740.txt				
		Report-2025-01-27-130753.txt				
		Report-2025-01-27-130806.txt				
		Report-2025-01-27-130819.txt				
		Report-2025-01-27-130832.txt				
		Report-2025-01-27-130845.txt				
		Report-2025-01-27-130858.txt				
		Report-2025-01-27-132248.txt				
		Report-2025-01-27-132301.txt				
		Report-2025-01-27-132314.txt				
		Report-2025-01-27-132327.txt				
		Report-2025-01-27-132740.txt				

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Setup Screens

Nbr Crack Samples 1000	Edge Crack Min Pxls 5	Detect Minimum Speed 0000	Min Time Between Holes 100	Hole Detect Slope 016	Large Hole Size 0.100	BkLight Amps Bright 3.3	BkLight Amps Dim 1.0	BkLight Control Adjust 28	Edge WhitePxl Minimum 020	Edge Detect Level 192	Hole Repeat Time 50	Hole Setup
↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	Weld Track
0900	50	1000	1000	256	1.000	4.0	4.0	50	200	256	200	Cam 0
0800	45	0900	900	231	0.900	3.6	3.6	45	180	230	180	Cam 1
0700	40	0800	800	205	0.800	3.2	3.2	40	160	206	160	Width Misc
0600	35	0700	700	180	0.700	2.8	2.8	35	140	179	140	Edge Step
0500	30	0600	600	154	0.600	2.4	2.4	30	120	154	120	
0400	25	0500	500	129	0.500	2.0	2.0	25	100	129	100	
0300	20	0400	400	103	0.400	1.6	1.6	20	80	103	80	
0200	15	0300	300	078	0.300	1.2	1.2	15	60	077	60	
0100	10	0200	200	052	0.200	0.8	0.8	10	40	051	40	
0000	5	0100	100	027	0.100	0.4	0.4	5	20	026	20	
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	
↺	↺	↺	↺	↺	↺	↺	↺	↺	↺	↺	↺	

Use Run Permissive Input Off On	Use Auto LED Test Off On	Use Weld Hole Detection Off On	Enable Screen Keyboard Off On	Load Default	Load Setups	Save Setups
Use Foreign Text Off On	Enable Tracking Outputs Off On	Use Report Header Off On	Calib. Width	Show Cursor	Save History	

Metal Detect Delay 050	Metal Ret Use Delay 030	Weld Hole Position 25.0	Weld Hole Max Error 0.5	Weld Hole Min Error 0.5	Tracking L Left Error -01.0	Tracking L Right Error -00.5	Tracking Center Offset 25.0	Tracking R Left Error 00.5	Tracking R Right Error 01.0	Tracking Mode BL IC 2R 0.00	1	Weld Setup
↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	Weld Track
040	020	20.0	0.4	0.4	-0.1	-0.5	20.0	0.5	1.0	0.00	1	Cam 0
030	010	15.0	0.3	0.3	-0.1	-0.5	15.0	0.5	1.0	0.00	1	Cam 1
020	005	10.0	0.2	0.2	-0.1	-0.5	10.0	0.5	1.0	0.00	1	Width Misc
010	000	5.0	0.1	0.1	-0.1	-0.5	5.0	0.5	1.0	0.00	1	Edge Step
000	000	0.0	0.0	0.0	-0.1	-0.5	0.0	0.5	1.0	0.00	1	
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	
↺	↺	↺	↺	↺	↺	↺	↺	↺	↺	↺	↺	

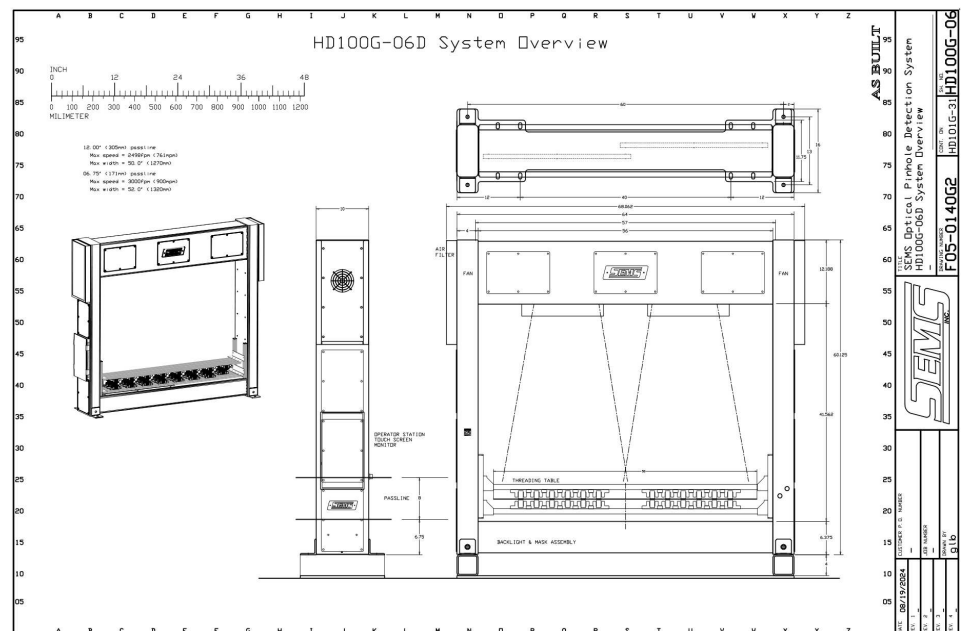
Scan Edge Mask 5	Weld Edge Scan Adj 10	Belt Test Level 064	LED Test Level 192	LED Test Amps 0.30	Cam 1 Exposure aSec 0250	Cam 0 Offset 157	Cam 0 Starting Pixel 0336	Cam 0 Ending Pixel 1800	Cam 1 Offset 147	Cam 1 Starting Pixel 0336	Cam 1 Ending Pixel 1800	Hole Setup
↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	Weld Track
4	9	63	191	0.29	0240	156	0324	1791	146	0324	1791	Cam 0
3	8	62	190	0.28	0230	155	0314	1781	145	0314	1781	Cam 1
2	7	61	189	0.27	0220	154	0304	1771	144	0304	1771	Width Misc
1	6	60	188	0.26	0210	153	0294	1761	143	0294	1761	Edge Step
0	5	59	187	0.25	0200	152	0284	1751	142	0284	1751	
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	
↺	↺	↺	↺	↺	↺	↺	↺	↺	↺	↺	↺	

White Pixel Target 075	Weld Edge Wht Adj 07	Use Wht Edge Adj 0	Stopper High Spd Err 15	Stopper Pat Err Deadband 05	Step Speed In Hi 08000	Step Speed In Low 04000	Step Speed Out Low 02000	Step Speed Out Hi 06000	Step Max Amps 2.0	Step Accel 1000k	Max Move Time 0150	Weld Setup
↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	Weld Track
74	6	-1	14	4	7900	3900	1900	5900	1.9	999k	0140	Cam 0
73	5	-2	13	3	7800	3800	1800	5800	1.8	989k	0130	Cam 1
72	4	-3	12	2	7700	3700	1700	5700	1.7	979k	0120	Width Misc
71	3	-4	11	1	7600	3600	1600	5600	1.6	969k	0110	Edge Step
70	2	-5	10	0	7500	3500	1500	5500	1.5	959k	0100	
69	1	-6	9	-1	7400	3400	1400	5400	1.4	949k	0090	
68	0	-7	8	-2	7300	3300	1300	5300	1.3	939k	0080	
67	-1	-8	7	-3	7200	3200	1200	5200	1.2	929k	0070	
66	-2	-9	6	-4	7100	3100	1100	5100	1.1	919k	0060	
65	-3	-10	5	-5	7000	3000	1000	5000	1.0	909k	0050	
64	-4	-11	4	-6	6900	2900	900	4900	0.9	899k	0040	
63	-5	-12	3	-7	6800	2800	800	4800	0.8	889k	0030	
62	-6	-13	2	-8	6700	2700	700	4700	0.7	879k	0020	
61	-7	-14	1	-9	6600	2600	600	4600	0.6	869k	0010	
60	-8	-15	0	-10	6500	2500	500	4500	0.5	859k	0000	
59	-9	-16	-1	-11	6400	2400	400	4400	0.4	849k	-0010	
58	-10	-17	-2	-12	6300	2300	300	4300	0.3	839k	-0020	
57	-11	-18	-3	-13	6200	2200	200	4200	0.2	829k	-0030	
56	-12	-19	-4	-14	6100	2100	100	4100	0.1	819k	-0040	
55	-13	-20	-5	-15	6000	2000	0	4000	0.0	809k	-0050	
54	-14	-21	-6	-16	5900	1900	-100	3900	-0.1	799k	-0060	
53	-15	-22	-7	-17	5800	1800	-200	3800	-0.2	789k	-0070	
52	-16	-23	-8	-18	5700	1700	-300	3700	-0.3	779k	-0080	
51	-17	-24	-9	-19	5600	1600	-400	3600	-0.4	769k	-0090	
50	-18	-25	-10	-20	5500	1500	-500	3500	-0.5	759k	-0100	
49	-19	-26	-11	-21	5400	1400	-600	3400	-0.6	749k	-0110	
48	-20	-27	-12	-22	5300	1300	-700	3300	-0.7	739k	-0120	
47	-21	-28	-13	-23	5200	1200	-800	3200	-0.8	729k	-0130	
46	-22	-29	-14	-24	5100	1100	-900	3100	-0.9	719k	-0140	
45	-23	-30	-15	-25	5000	1000	-1000	3000	-1.0	709k	-0150	
44	-24	-31	-16	-26	4900	900	-1100	2900	-1.1	699k	-0160	
43	-25	-32	-17	-27	4800	800	-1200	2800	-1.2	689k	-0170	
42	-26	-33	-18	-28	4700	700	-1300	2700	-1.3	679k	-0180	
41	-27	-34	-19	-29	4600	600	-1400	2600	-1.4	669k	-0190	
40	-28	-35	-20	-30	4500	500	-1500	2500	-1.5	659k	-0200	
39	-29	-36	-21	-31	4400	400	-1600	2400	-1.6	649k	-0210	
38	-30	-37	-22	-32	4300	300	-1700	2300	-1.7	639k	-0220	
37	-31	-38	-23	-33	4200	200	-1800	2200	-1.8	629k	-0230	
36	-32	-39	-24	-34	4100	100	-1900	2100	-1.9	619k	-0240	
35	-33	-40	-25	-35	4000	0	-2000	2000	-2.0	609k	-0250	
34	-34	-41	-26	-36	3900	-100	-2100	1900	-2.1	599k	-0260	
33	-35	-42	-27	-37	3800	-200	-2200	1800	-2.2	589k	-0270	
32	-36	-43	-28	-38	3700	-300	-2300	1700	-2.3	579k	-0280	
31	-37	-44	-29	-39	3600	-400	-2400	1600	-2.4	569k	-0290	
30	-38	-45	-30	-40	3500	-500	-2500	1500	-2.5	559k	-0300	
29	-39	-46	-31	-41	3400	-600	-2600	1400	-2.6	549k	-0310	
28	-40	-47	-32	-42	3300	-700	-2700	1300	-2.7	539k	-0320	
27	-41	-48	-33	-43	3200	-800	-2800	1200	-2.8	529k	-0330	
26	-42	-49	-34	-44	3100	-900	-2900	1100	-2.9	519k	-0340	
25	-43	-50	-35	-45	3000	-1000	-3000	1000	-3.0	509k	-0350	
24	-44	-51	-36	-46	2900	-1100	-3100	900	-3.1	499k	-0360	
23	-45	-52	-37	-47	2800	-1200	-3200	800	-3.2	489k	-0370	
22	-46	-53	-38	-48	2700	-1300	-3300	700	-3.3	479k	-0380	
21	-47	-54	-39	-49	2600	-1400	-3400	600	-3.4	469k	-0390	
20	-48	-55	-40	-50	2500	-1500	-3500	500	-3.5	459k	-0400	
19	-49	-56	-41	-51	2400	-1600	-3600	400	-3.6	449k	-0410	
18	-50	-57	-42	-52	2300	-1700	-3700	300	-3.7	439k	-0420	
17	-51	-58	-43	-53	2200	-1800	-3800	200	-3.8	429k	-0430	
16	-52	-59	-44	-54	2100	-1900	-3900	100	-3.9	419k	-0440	
15	-53	-60	-45	-55	2000	-2000	-4000	0	-4.0	409k	-0450	
14	-54	-61	-46	-56	1900	-2100	-4100	-100	-4.1	399k	-0460	
13	-55	-62	-47	-57	1800	-2200	-4200	-200	-4.2	389k	-0470	
12	-56	-63	-48	-58	1700	-2300	-4300	-300	-4.3	379k	-0480	
11	-57	-64	-49	-59	1600	-2400	-4400	-400	-4.4	369k	-0490	
10	-58	-65	-5									

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