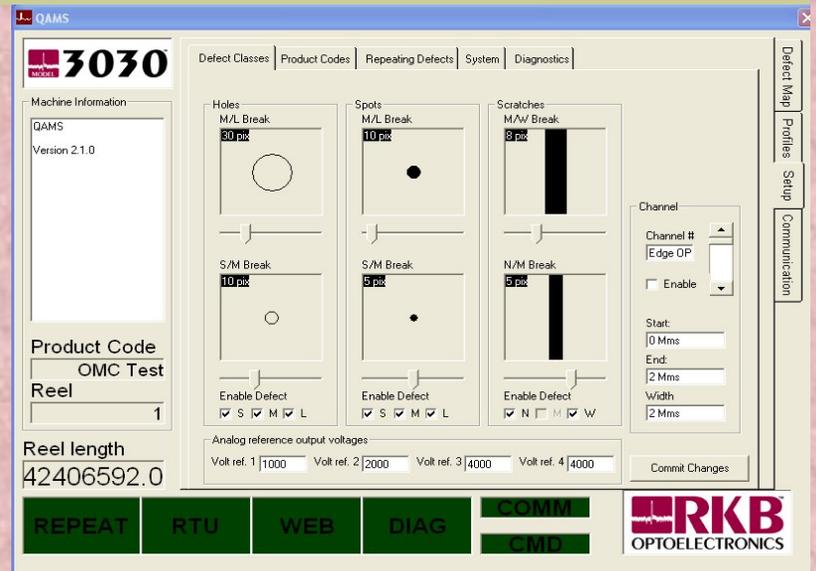


# QAMS™ (Quality Assurance Management System)

*Where the science of quality assurance is still an art!*



The RKB Quality Assurance Management System (herein referred as QAMS™) is the data and information collection process for all defects, events, diagnostics and other processes that occur within the inspection technology as well as the material web process. QAMS receives the data information from hardware circuitry and processes the information into usable parameters that the operational and managerial staff can manipulate. This information can be the type of defect, size of defect, location of defect in both machine and cross machine direction, how many defects, defect sizes, footage counts, start and stop times of defects, etc. Other information such as paper machine diagnostics, i.e., repeating defects, intervals they occur at, where and probable cause (i.e., dryer, felt, wire, etc.), inspection machine diagnostics (i.e., power supplies, sensors, lamps, blowers, etc.), and a variety of other information can be received and processed by the QAMS. Since the data is stored in, and based on Microsoft® Access® (\*.mdb format), the data can be simply converted into other database formats to include by not limited to (\*.xl, \*.xls, \*.xla, \*.prn, \*.txt, \*.csv, \*.dbf, \*.xlm, \*.xlc, \*.xll, \*.xlb, \*.slk, \*.dif, \*.html). User data sources utilized but not limited to dBASE, EXCEL, FoxPro, VISUAL FoxPro, MQIS, SQL, and Text.

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# System Features and Test Conditions

## Distributed Control System (DCS)

The RKB Distributed Control System (DCS) is also called QAMS® (Quality Assurance Management System). In this system, the QAMS receives the data information from hardware circuitry and processes the information into usable parameters that the operational and managerial staff can manipulate. This information can be the type of defect, size of defect, location of defect in both machine and cross machine direction, how many defects, defect sizes, footage counts, start and stop times of defects, etc. Other information such as paper machine diagnostics, i.e., repeating defects, intervals they occur at, where and probable cause (i.e., dryer, felt, wire, etc.), inspection machine diagnostics (i.e., power supplies, sensors, lamps, blowers, etc.), and a variety of other information can be received and processed by the QAMS. This information can be manipulated by the staff and can be transferred to other process stations or systems like Bailey, Honeywell, etc.... Via RS232, RS422 and Ethernet. Since the data is stored in and based on Microsoft® Access® (\*.mdb format), the data can be simply converted into other database formats to include by not limited to (\*.xl, \*.xls, \*.xla, \*.prn, \*.txt, \*.csv, \*.dbf, \*.xlm, \*.xlc, \*.xll, \*.xlb, \*.slk, \*.dif, \*.html). User data sources utilized but not limited to dBASE, EXCEL, FoxPro, VISUAL FoxPro, MQIS, SQL, and Text. RKB refers to its QAMS as its DCS as it is really a distributed control system for on-line quality assurance and control inspection.

Some examples of RKB's QAMS operational displays are as follows:

**Defect Size Setup Parameter**

Product Code	Description	Reel Weight
SR50GT90	Cover	150
SR70GT90	SCF	50
SR70GT99	LwC	80
SR80GT90	Board	300

**Product Code Selection Parameter**

Length	Description
1700	Felt #1
1800	Felt #2
1950	Wire #1
2100	Felt #3
2130	Wire #2
3000	Dryer #1
3000	Dryer #2
4000	Coating Station #1
4000	Coating Station #2
76.2	Calendar Stack Roll

**Repeating Defect Diag Selection Parameter**

**QAMS System Information Display**

**3030**  
Machine Information  
Intake: Version 1.3.8  
Product Code: SR50GT90  
Reel: 4  
Reel length: 001102.4

Events:  
414 Web Break: 6:34:36 PM 02/25/2002  
643 Web Break: 6:35:33 PM 02/25/2002  
931 Web Break: 6:36:48 PM 02/25/2002  
1387 Reel Turn Up: 6:37:29 PM 02/25/2002  
124 Web Break: 6:38:16 PM 02/25/2002  
532 Web Break: 6:38:16 PM 02/25/2002  
766  
837  
686  
638  
689  
1102 Web Break: 6:41:00 PM 02/25/2002

Scratch Details:  
Index | Reel | Ch. | Start | End | Total | Dns

REPEAT RTU **WEB** DIAG COMM  
Demo RKB OPTOELECTRONICS

Defect Mapping Display (real time)

**3030**  
Machine Information  
Intake: Version 1.3.8  
Product Code: SR50GT90  
Reel: 6  
Reel length: 000517.6

Current Hole Counts:  
This Reel: S 0 M 0 L 0 This Product: S 2 M 8 L 6

Current Spot Counts:  
This Reel: S 0 M 0 L 0 This Product: S 4 M 4 L 4

Current Scratch Counts:  
This Reel: N 0 M 0 L 0 This Product: N 0 M 0 L 0

Counts | Holes | Spots | Scratches

REPEAT RTU WEB DIAG COMM  
Demo RKB OPTOELECTRONICS

Defect Count Display (reel/prod)

**3030**  
Machine Information  
Intake: Version 1.3.8  
Product Code: SR50GT90  
Reel: 6  
Reel length: 001127.5

Hole Profiles:  
Holes / Reel  
Holes / Product

Counts | Holes | Spots | Scratches

REPEAT RTU WEB DIAG COMM  
Demo RKB OPTOELECTRONICS

Hole Defect Profile Display (reel/prod)

**3030**  
Machine Information  
Intake: Version 1.3.8  
Product Code: SR50GT90  
Reel: 6  
Reel length: 001354.3

Spot Profiles:  
Spots / Reel  
Spots / Product

Counts | Holes | Spots | Scratches

REPEAT RTU WEB DIAG COMM  
Demo RKB OPTOELECTRONICS

Spot Defect Profile Display (reel/prod)

**3030**  
Machine Information  
Intake: Version 1.3.8  
Product Code: SR50GT90  
Reel: 7  
Reel length: 000475.4

Scratch Profiles:  
Scratches / Reel  
Scratches / Product

Counts | Holes | Spots | Scratches

REPEAT RTU WEB DIAG COMM  
Demo RKB OPTOELECTRONICS

Streak Defect Profile Display (reel/prod)

**3030**  
Machine Information  
Intake: Version 1.3.0  
Product Code: SR50GT90  
Reel: 8  
Reel length: 000139.1

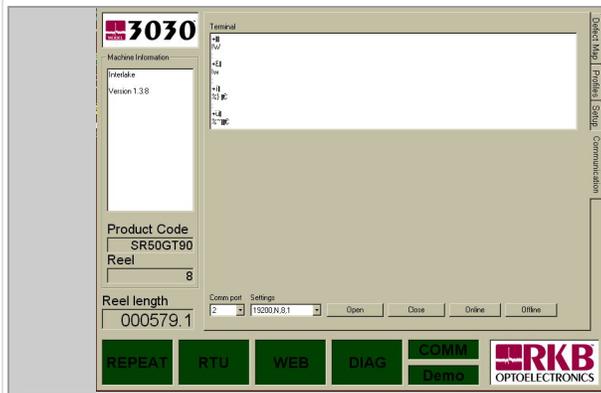
Defect Classes | Product Codes | Repeating Defects | System

Reel counter: 1 Counter  
Meter: Read / Reset  
Return to Reporting Delay: 50 seconds  
CDMM Buffer Max: 1024 bytes  
 Convert to Inches

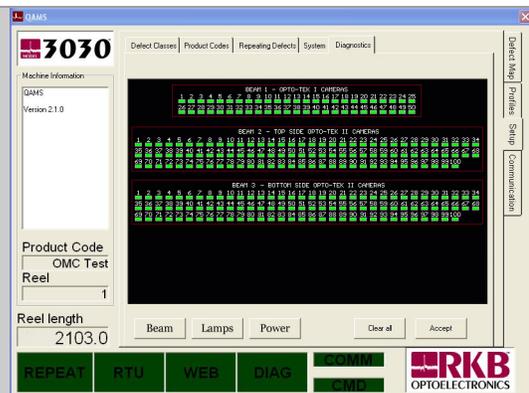
Clear Reel Report  
Print Reel Report  
 Show Details in Reel Report  
Exit

REPEAT **RTU** WEB DIAG COMM  
Demo RKB OPTOELECTRONICS

QAMS System Setup Display

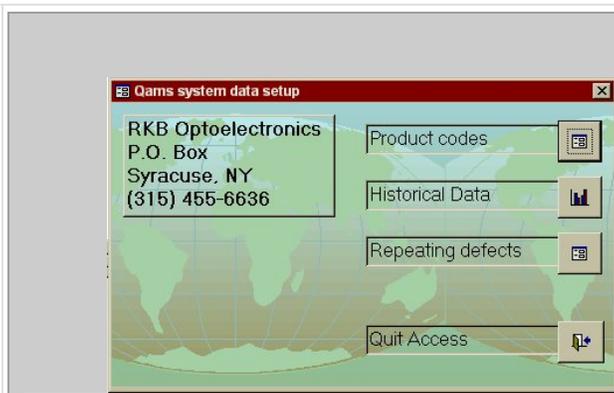


**QAMS Communication Display**



**QAMS System Integrity Diagnostics**

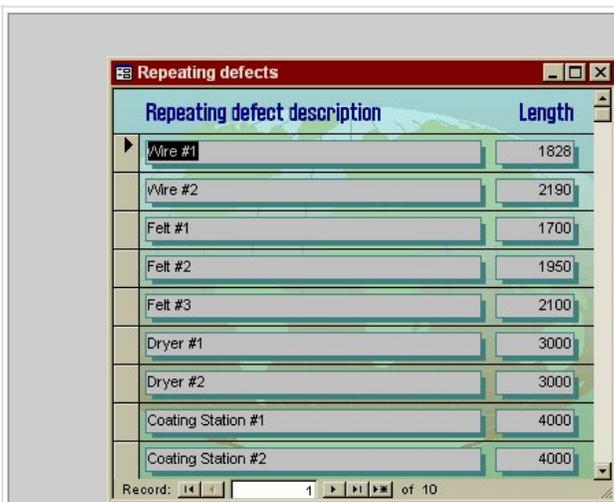
Some examples of RKB's QAMS managerial displays are as follows:



**QAMS Data Setup Parameter**



**QAMS Product Code Setup Parameter**



**QAMS Repeating Defect Setup Parameter**



**Historical Information Archive**

Some examples of RKB's QAMS Historical Information Reporting Functions are as follows:

### Alarm events

Date by Month	Product	Reel	Description	Time
Tuesday, January 28, 2002				
	SR50GT90			
		1	Re-init IO controller	4:04:06 PM
			QAMS Powerup	4:04:06 PM
			QAMS Powerup	4:06:10 PM
			Re-init IO controller	4:06:10 PM
			QAMS Powerup	4:14:35 PM
			Re-init IO controller	4:14:35 PM
			QAMS Powerup	4:16:55 PM
			Re-init IO controller	4:16:55 PM
			Re-init IO controller	4:20:17 PM
			QAMS Powerup	4:20:17 PM
			Re-init IO controller	4:21:28 PM
			QAMS Powerup	4:21:28 PM
			Defect classes updated	4:07:23 PM
			Repairing defect: 399	4:08:11 PM
Wednesday, January 30, 2002				
	SR50GT90			
		1	QAMS Powerup	7:33:21 AM

### Web-break event

Date by Month	Product	Reel	Meter	Time
Tuesday, January 28, 2002				
	SR50GT90			
		1	52	4:21:43 PM
			516	4:17:52 PM
Wednesday, January 30, 2002				
	SR50GT90			
		1	414	7:35:08 AM
			429	8:48:34 AM
			638	8:49:29 AM
			952	7:37:26 AM
			1036	7:36:33 AM
		2	629	7:40:54 AM
			1123	8:54:52 AM
		3	320	7:44:22 AM
			426	8:29:42 AM

System Diagnostics Report

Web Break Report

### Reel turn-up event

Date by Month	Product	Reel	Meter	Time
Tuesday, January 28, 2002				
	SR50GT90			
		1	1386	4:10:48 PM
Wednesday, January 30, 2002				
	SR50GT90			
		1	1365	7:38:05 AM
		2	1362	7:42:54 AM
		3	1362	7:47:42 AM
		4	1363	7:52:23 AM
		5	1364	7:56:52 AM
		6	1364	8:01:21 AM
		7	1366	8:06:00 AM
		8	1365	8:10:45 AM
		9	1363	8:15:25 AM
		10	1360	8:20:07 AM
		11	1363	8:24:46 AM
		12	1369	8:29:31 AM
		13	1365	8:34:03 AM
		14	1365	8:38:39 AM

### Defect events

Date by Month	Product	Reel	Meter	Ch.	Type	Time
Tuesday, January 28, 2002						
	SR50GT90					
		1				
			84	1	Holes large	4:17:15 PM
			407	1	Holes medium	4:07:51 PM
			697	1	Spots small	4:09:06 PM
			775	1	Spots medium	4:08:11 PM
			823	1	Holes medium	4:08:26 PM
			952	1	Spots large	4:10:12 PM
			1378	1	Spots small	4:10:46 PM
Wednesday, January 30, 2002						
	SR50GT90					
		1				
			30	1	Holes medium	8:46:47 AM
			57	1	Holes small	8:46:53 AM
			74	1	Spots small	7:33:40 AM
			89	1	Spots medium	7:33:44 AM
			115	1	Holes small	7:33:51 AM
			341	1	Holes medium	8:48:09 AM

Reel Turn Up Report

Defect Event Report

Some examples of RKB's QAMS Diagnostics Alarm Indicators are as follows:

REPEAT

RTU

WEB

DIAG

COMM

Demo

System Diagnostic Alarm Indicators (show all systems go)

REPEAT

RTU

WEB

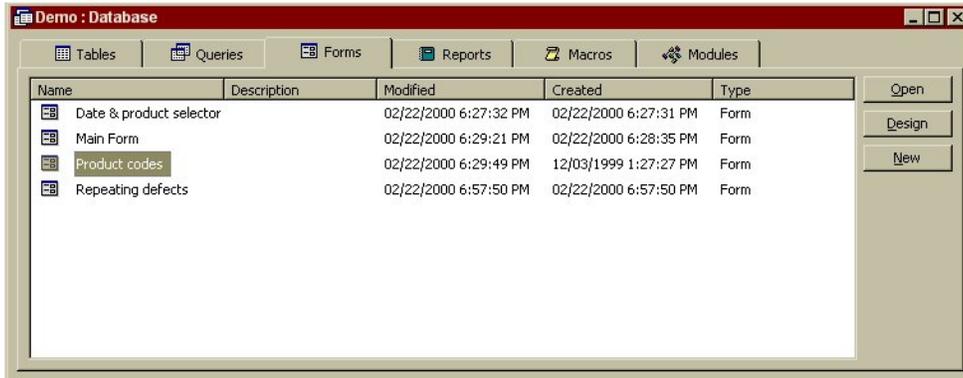
DIAG

COMM

Demo

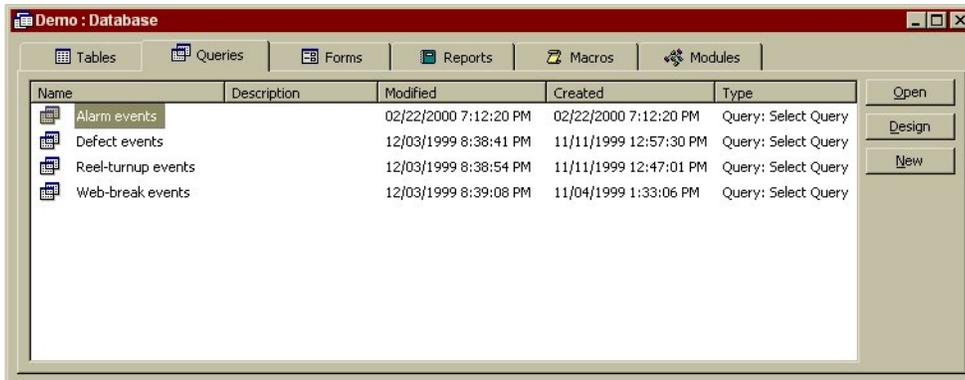
System Diagnostics Alarm Indicators (show reel turn up alarm indication)

Some examples of RKB's QAMS Simplified Database Formatting for easy manipulation are as follows:



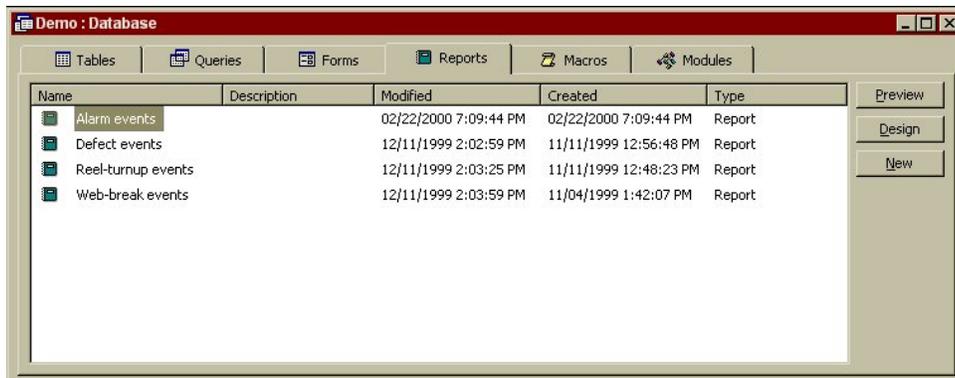
Name	Description	Modified	Created	Type
Date & product selector		02/22/2000 6:27:32 PM	02/22/2000 6:27:31 PM	Form
Main Form		02/22/2000 6:29:21 PM	02/22/2000 6:28:35 PM	Form
Product codes		02/22/2000 6:29:49 PM	12/03/1999 1:27:27 PM	Form
Repeating defects		02/22/2000 6:57:50 PM	02/22/2000 6:57:50 PM	Form

**Forms Database Information**



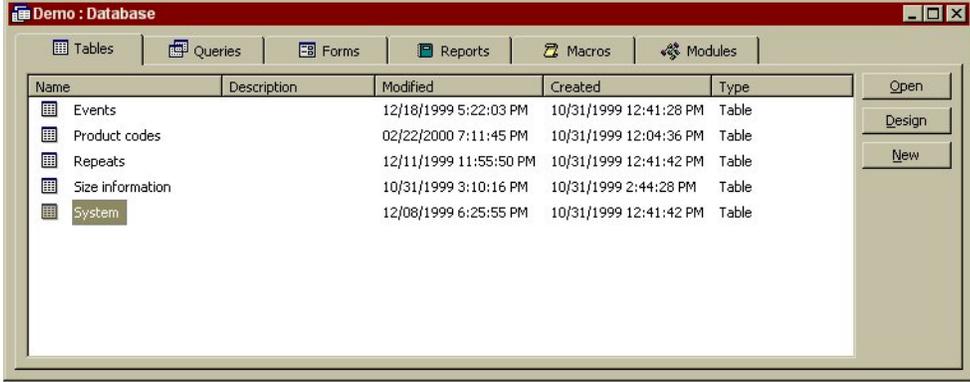
Name	Description	Modified	Created	Type
Alarm events		02/22/2000 7:12:20 PM	02/22/2000 7:12:20 PM	Query: Select Query
Defect events		12/03/1999 8:38:41 PM	11/11/1999 12:57:30 PM	Query: Select Query
Reel-turnup events		12/03/1999 8:38:54 PM	11/11/1999 12:47:01 PM	Query: Select Query
Web-break events		12/03/1999 8:39:08 PM	11/04/1999 1:33:06 PM	Query: Select Query

**Queries Database Information**



Name	Description	Modified	Created	Type
Alarm events		02/22/2000 7:09:44 PM	02/22/2000 7:09:44 PM	Report
Defect events		12/11/1999 2:02:59 PM	11/11/1999 12:56:48 PM	Report
Reel-turnup events		12/11/1999 2:03:25 PM	11/11/1999 12:48:23 PM	Report
Web-break events		12/11/1999 2:03:59 PM	11/04/1999 1:42:07 PM	Report

**Report Database Information**



Name	Description	Modified	Created	Type
Events		12/18/1999 5:22:03 PM	10/31/1999 12:41:28 PM	Table
Product codes		02/22/2000 7:11:45 PM	10/31/1999 12:04:36 PM	Table
Repeats		12/11/1999 11:55:50 PM	10/31/1999 12:41:42 PM	Table
Size information		10/31/1999 3:10:16 PM	10/31/1999 2:44:28 PM	Table
System		12/08/1999 6:25:55 PM	10/31/1999 12:41:42 PM	Table

**Table Database Information**

### Displaced Symbols and Colors for Defect Fault Detection

RKB follows the guidelines set forth in the TAPPI test methods T437 (*refer to appendix C*) for determination of dirt in paper and paperboard. In this test method dirt sizes are given in mm<sup>2</sup> based on the formula for defining area of a circle ( $\pi r^2$ ). Therefore, in the RKB Model 3030 CCD Camera-based Video Web Inspection System, the symbol used for holes and spots are circles with spots having a dark circle and holes a white circle. The spot circle can be made of a black spot or grey spot, depending on the severity of the spot. The hole symbol is a white circle as the main difference among various holes is in size not appearance. Both holes and spots have a rectangular symbol that surrounds the circle symbol. This rectangular symbol is color-coded in three main colors that are red, blue and green. These colors represent the sizing threshold changes (i.e., blue represents small defects, green represents medium defects and red represents large defects). These sizes are operationally adjustable on the fly or can be preset via the product code setup parameter by managerial staff prior to production depending on what product or grade will be produced. In this evaluation, small holes were set at 0 to 4 mm, medium holes were set at 4.1 to 8 mm and large defects were set at 8.1 mm or larger. If additional size categories are required, they can be implemented with additional color schemes. Additional information provided is the location of the defect in the cross machine and machine direction, total defect count per reel and product run, profiles of holes and spots, historical information, and possible fault causing area in the material production equipment (i.e., felt, wire, dryer, etc...). Additional information can be applied and is generally formulated with each client on a user basis.

Symbols as well as text represent the coating streak defects. The streak defect symbols are lines that vary in width depending on the defect size. Wide lines represent true coating streaks and thin lines represent coating scratches. The lines are color-coded similar to the hole and spot defects for easy identification. Blue lines represent scratches, green lines represent scratch/streak and red lines represent streaks. Below these symbols is a text window that provides operational and managerial staff with precise defect location. Each line of text represents a streak or scratch and includes the channel the defect is located in, the start footage of the defect, end footage of the defect, total footage of the defect, location of the defect in the cross machine and machine direction, severity of the defect (i.e., scratch or streak), and possible fault causing location in the paper machine and/or coating machine (i.e., coater station, dryer section, etc.) Additional information can be implemented and it generally formulated with each client on a user basis prior to system implementation.

## Defect Location Marking

RKB offers, in addition to its full web inspection technology, defect-marking technology that can be applied to most web material for the identification and location of defects that require additional process control. Called the Model 1280® Multicolor Spray Marking System, the defect marking technology marks the edges of the web material with various color-coded water-based inks. The marks themselves, are made by spraying suitable marking fluids on to the sheet edge such that when reeled up, the marks are visible as concentric, colored rings on the end of the reel. The spray marker may be employed with various types of automatic web inspection systems, or process control equipment to place marks at the sheet edge whenever a defect fault is identified in the web or when a process unit has failed to perform its application to a web. The multicolor markers provide a red, blue, green, black or orange spray for various defect types or cross machine identification. These enables the colors to be used to indicate defect fault location in the cross machine direction, defect fault classification and type or which process unit such as a coater or treater may have failed. Operational staff can then use these marks to slow down and stop additional processes such as winders for corrective action (i.e., patching, splicing out, etc.). Additionally, RKB can provide sensors to automatically locate such marks and automate the speed control and machine stop time for corrective action processes.

All marks are applied by means of a spray nozzle that projects a controllable jet of fluid at the web edge. The spray system is operated under pneumatic pressure, with spray intensity adjustments available. The marker assembly is equipped with a web follower system and, when operating in its automatic mode, will position the movable carriage of the assembly accurately over the edge of the web. A fine adjustment is provided to ensure that the spray is directed onto a narrow band at the web edge when the carriage is positioned. All ink and spare parts are supplied through RKB for proper operation and maintenance of the Model 1280 multicolor spray marker. It is requested that the customer use manufactured supplied water base ink and parts. Should alternative parts or ink be desired, RKB asks that the client inform RKB for verification of performance prior to use. With specific regards to ink, viscosity, acidity and other factors may affect operation and the life of the marker.

The Model 1280 consists of three major sub-assemblies. These assemblies are the control enclosure, marker assembly and over spray collection system. The control enclosure is a wall mounted NEMA rated enclosure containing all marker controls, electronics, power supplies, CMOS digital control boards, solid state relays and sheet break and marker test stations. The marker assembly contains all mechanisms required to mark the sheet and follow any web drift if required. The marker assembly consists of two major sub-assemblies, the head of the marker and body. The marker head contains the ink applicator and web guide systems. The body contains all of the color valves, inkwells, and associated components to deliver the ink to the marker head. The body also incorporates the mechanism to allow for movement of the unit in a forward and reverse mode. Finally the over spray collection system mounts around the web guides on the spray head. The over spray collection system is a reservoir which collects unused ink from the marking applicator or nozzle. Because the ink is atomized when leaving the nozzle, it is strongly recommended that the over spray collection system be installed at all times. Custom designed collection systems can be supplied by RKB if physical restraints prevent reliable installation of the standard unit.

Additional colors can be added to the spray marking technology depending on the overall application and are formulated with each client on a user basis.