

Color Printing Solutions

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Oki Data established “OKI Printing Solutions” as the business printing solutions brand in April 2005. Since then our activities as the business printing solutions specialist have been focusing on providing optimum printing solutions for the various business situations of our customers.

An overview of the concept model for printing solutions at Oki Data is described in this paper followed by the introduction of various specific examples of media, print on demand, security and open solutions, on which the efforts of Oki Data are focused.

Concept model of solutions

The concept model of color printing solutions at Oki Data is shown in Fig. 1.

The color printing solutions at Oki Data have been conceived in an attempt to resolve various issues facing our customers and to contribute to the creation of their new businesses, thereby gaining customer satisfaction by fusing together a diverse range of hardware and software technologies relating to color printing.

The platform technologies that are the nucleus of the promotion activities relating to color printing solutions at Oki Data are as follows:

① Engine platform

This is a high-speed, high-resolution color printer engine incorporating high definition LED printheads and the tandem system, single-pass flat paper path, as well as an incidental control technology.

② Controller platform

This high-speed controller technology involves ASIC for image processing, hardware packaging technologies, firmware technologies and color management technologies.

③ Network platform

High-speed LAN, wireless LAN, high-speed USB and other various network technologies connecting client personal computers, server personal computers and printers.

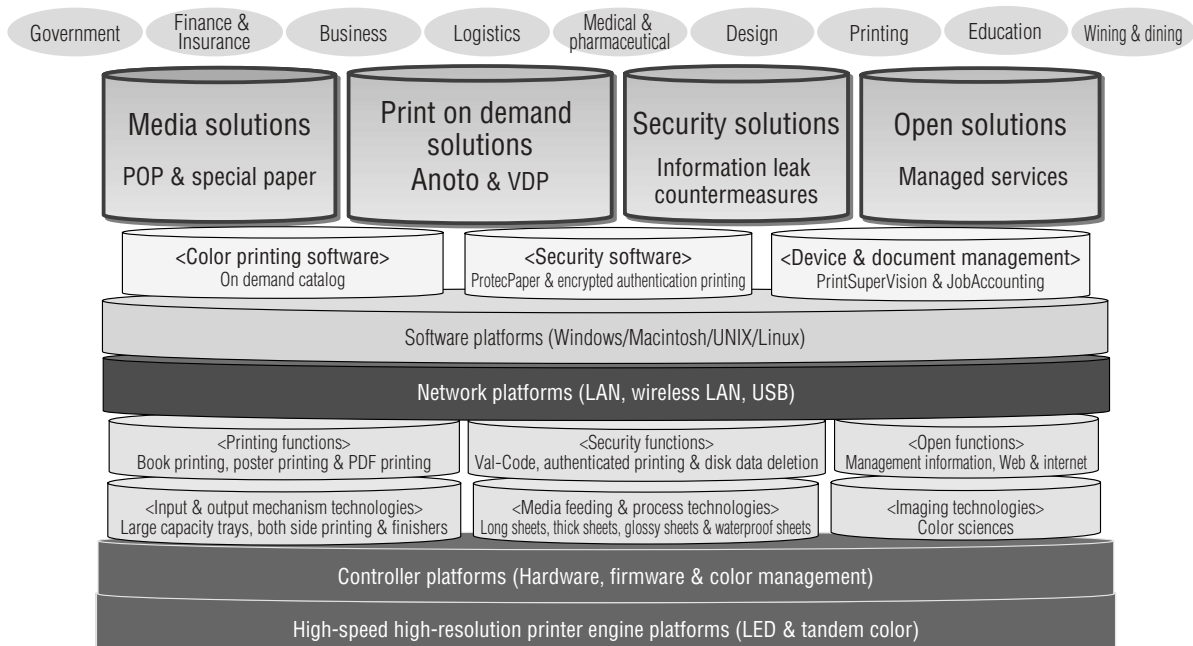


Fig. 1 Concept model for color printing solutions

④ Software platform

This includes printer driver software technologies and various utility software technologies that are compatible with multiple platform environments, including Windows®¹⁾, Macintosh®²⁾, UNIX®³⁾ or Linux.

The efforts of Oki Data are concentrated on the development of the following functional technologies in order to enhance the added value of their products.

- ⑤ A diverse range of paper feeding and ejecting mechanism units, including large capacity paper tray units, both side printing units and finisher units.
- ⑥ Paper feeding technologies that can accommodate diverse and varying media, such as long sheets, thick sheets, glossy sheets and waterproof sheets, as well as electronic photo processing technologies and control technologies.
- ⑦ Color image information processing¹⁾ backed by sophisticated color science research relating to favorable color reproductions.
- ⑧ Multifunctional printing technologies, such as book printing and PDF file printing, as well as the electronic file conversion of scanned documents.
- ⑨ Security technologies²⁾, such as disk data deletion, encrypted authentication printing or watermark printing.
- ⑩ Management applications using web technologies.

At Oki Data these platforms and functional technologies are fused to offer various solutions to customers, based on four basic concepts, “Media Solutions”, “Print on Demand Solutions”, “Security Solutions” and “Open Solutions”.

- “Media Solutions” are solutions that support POP and various types of paper through the utilization of features of Oki Data's color printer engines.
- “Print on Demand Solutions” are solutions that provide inhouse on demand printing that rivals commercial printing.
- “Security Solutions” are various security related solutions that deal with printing data and paper documents.
- “Open Solutions” are various device management solutions provided on open platforms, such as web servers.

Media Solutions

A high demand exists for the use of color printers to print POP or catalogs on various types of papers. The details of representative examples relating to various media solutions that take advantage of Oki Data's color printers are herein described (Fig. 2).

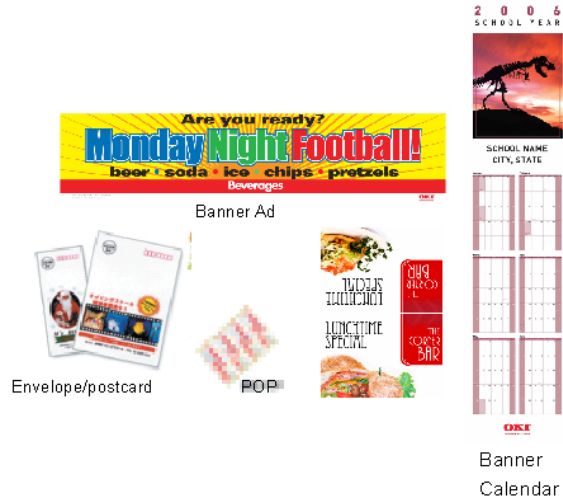


Fig. 2 Media solution examples

(1) Envelope printing solution

Oki Data offers an envelope printing solution that makes it possible to easily print on original full color envelopes, as a means to meet the needs of expanding services at on demand print shops or direct marketing production services for businesses and schools.

The main features are as follows:

- Full color and high quality printing
Printing for photographs and illustrations in full color.
- Low cost and small lot runs
Also for small lot orders, such as the printing of various envelopes in small quantities.
- Easy print settings

A dedicated kit is available for easily setting the types and sizes of envelopes, accommodating a variety of envelopes available on the market.

- Recommended envelopes
Commercially available envelopes, independently evaluated by Oki Data, are recommended on the Oki Data web site.
- Accommodation of various envelope sizes

The envelope sizes supported include Long forms 3 and 4, Landscape forms 0 and 4, as well as Rectangular forms 2 and 38.

(2) Excellent gloss

“Excellent Gloss” is a glossy paper optimally suited to printing simulations inhouse in the on demand printing and design fields, demands for which have increased in recent years. This special paper can be used with Oki Data printers to produce high quality printouts that are adequate not only as a test print but as the final product.

The “Excellent Gloss” paper incorporates a technology for reducing adhesion between the sheets,

*1) Windows is a registered trademark or trademark of Microsoft Corporation in the United States and other countries.
 *2) Macintosh is a registered trademark or trademark of Apple Computer Inc., in the United States and other countries.
 *3) UNIX is a registered trademark of the Open Group.

thereby improving some issues, such as multiple paper feeding or paper jams. A technology for optimizing the electrical resistance has also been adopted to improve the reduction in image density and irregular tints, resulting in an extremely high level of printing quality.

By combining "Excellent Gloss" with Oki Data printers, the tools required for high quality, which had in the past been produced by offset printing, such as catalogs, pamphlets and posters, can now be produced by on demand printing and in the office. Furthermore, costs can be reduced and the speed of business transactions accelerated in a wide range of business lines and fields, such as making it possible to simulate high quality printed matter on a site where production work, such as design and DTP, take place.

(3) Excellent Soft

"Excellent Soft" is unwoven paper commercialized for the first time as a printer paper, through collaboration with a paper manufacturer.

A high demand existed for printing on bonded fabric materials to bring out the unique texture and feeling of Japanese rice paper. Printing these papers using ordinary color printers, however, caused thin spots and paper jams, making them unsuitable for on demand printing needs. By taking advantage of the superior capacity of the printer engine to accommodate various media and by optimizing the fusing temperature control and toner transfer rates, Oki Data succeeded in developing paper with a practical printing quality.

By combining "Excellent Soft" with Oki Data's color printers, not only is it possible to produce printed matter that has a composed ambience with the texture of Japanese paper, but it is also possible to utilize the paper for various applications, such as high quality calendars, wrapping papers or place mats, while taking advantage of the features of the light-weight and flexible material.

Note: Unwoven paper is created by combining fabrics in a variety of ways, without weaving or plaiting.

Print on Demand Solutions

A strong demand exists for reducing expenses by using color printers to print catalogs and special forms inhouse using on demand printing.

This segment provides detailed descriptions of a solution that uses the Anoto^{®4)} digital pen, as an example of various print on demand solutions provided by Oki Data.

(1) Anoto watermark printing solution

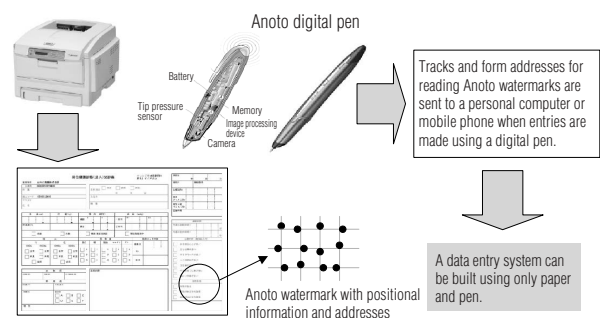
Oki Data collaborated with the Anoto Group AB of Sweden (hereinafter referred to as "Anoto Group") in the field of manual entry solutions using digital pens and formulated a conformity standard, "Anoto Qualified Printer", for the printing of special paper that supports the Anoto^{®4)} function, using color page printers for office use. Oki Data's color printers were the first printers in the world to be certified as conforming printers.

Special papers supporting Anoto functions, which had to be printed by offset printing in the past, can now be

printed using printers from Oki Data, with a high-definition printing technology featured by the LED head and stable printing quality forged through the service to the design and DTP fields. Oki Data offers conforming printers for A4 and A3 size papers, enabling on demand printing of several hundred to several thousand sheets, as well as small lot printing.

The Anoto watermark printing solution is shown in Fig. 3. Microscopic dots (Anoto watermarks) are printed over the entire surface of the paper that supports the Anoto function. When a digital pen is used to write characters or draw figures on the forms that have these Anoto watermarks printed, the digital pen reads the watermark pattern, digitizes and converts the track of the pen into data. In this manner it is possible to build a simplified data entry system, since data can be entered, saved and sent without using a keyboard.

Oki Data provides the Anoto function application developers with software for automatically adding printer properties for selecting paper feeding methods or double sided printing, as well as a color adjusting technology to match the printed colors of the original form and special form, which supports the Anoto function. Application developers use and embed this software from Oki Data in their products to make it possible to print with special paper, supported by the Anoto function, which are flexible and offer superior color reproductions.



Digital watermark printed in black, whereas the form is printed in cyan, magenta and yellow.

Fig. 3 Anoto watermark printing solution

Security Solutions

Steps to prevent information leaks are becoming essential for businesses. Identifying the source of leaks with printed documents had previously been difficult.

Oki Data provides a wide range of security solutions for printing data and paper, however, two such examples are described in detail in this segment.

(1) Logon information compulsive printing solution

This solution is comprised of printers from Oki Data and a printer driver for users, as well as utility software for administrators. This solution inhibits the leaking of information by forcibly overprinting additional data, such as logon information for logging onto a personal computer or the time of printout, in character strings, over printing the data.

Additional information can be printed from printer

*4) Anoto is a registered trademark of the Anoto Group AB.

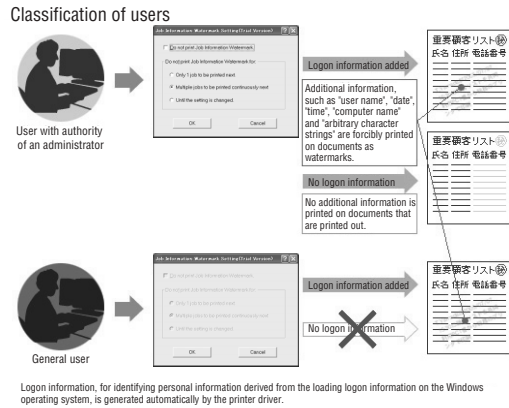


Fig. 4 Logon information compulsive printing solution

drivers dedicated to logon information compulsive printing, as shown in Fig. 4. It is also possible to set the printer driver to not print additional information on some documents, such as those that are submitted to customers.

It is possible to print all the printable added information, to add only the necessary information or to rearrange the information. Furthermore, administrators can use the setup utility to define added character strings, the printing format and administrator users.

(2) ProtecPaper printing solution

This solution, shown in Fig. 5, is comprised of a printer with built-in ProtecPrint³⁾, as well as management software and scanning software. ProtecPrint³⁾ is a printing software of ProtecPaper^{®5)} Standard Edition, a package software developed by Oki Electric.

Source information, such as a personal computer description or user identification, is printed automatically as a watermark using Val-Code^{®5)} by the printer with built-in ProtecPrint. Since the source information is added to the entire surface of the document as a watermark that is difficult to eliminate, it keeps check on and provides an inhibiting effect against sloppy management of documents or the removal of documents. Inhibiting effects for leaking information from printed documents can be expected.

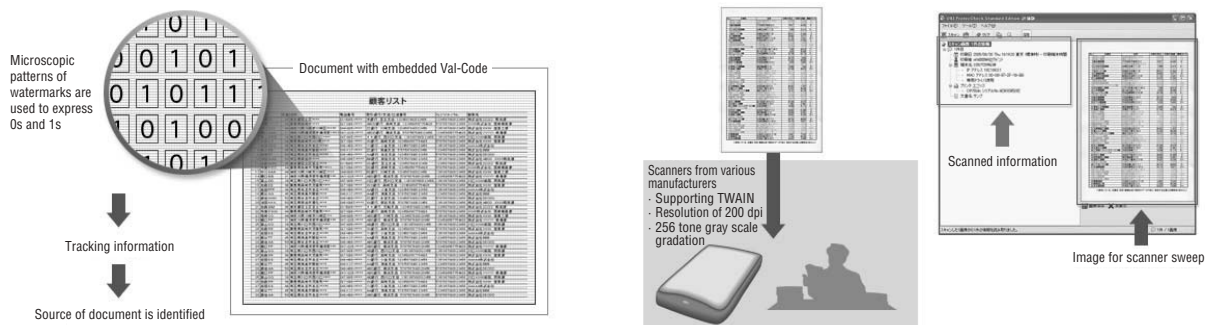


Fig. 5 ProtecPaper printing solution

*5) ProtecPaper and Val-Code are registered trademarks of Oki Electric Industry Co., Ltd.

Printers with built-in ProtecPrint are not only able to print color documents and color watermarks, but the load on the network is reduced and the speed of the overall processing is increased due to fact the watermarks are being created by the printer. Documents with watermarks printed can be scanned using software to identify the source of an information leak, which makes it possible to quickly implement steps to prevent a recurrence.

The major features are outlined below:

- Loads on the network are reduced because the watermarks are generated by the printers.
- Since the watermarks are uniform the appearance of the document does not deteriorate and, furthermore, these watermarks are difficult to delete.
- Printing is possible from various applications.
- The source of the information is automatically embedded in conventional printing procedures.
- The color of watermarks can be selected from black, cyan or magenta.
- It is possible to configure a corporate name or logo into the watermark.

Open Solutions

Various solutions provided by Oki Data are for the management of devices, such as printers and MFPs (Multi-Function Printers), as well as the management of documents for open platforms. This segment provides detailed descriptions of the managed services that handle all printer and MFP assets, as well as the operational management, all together and various application packages.

(1) Managed service solution

An increasing load of printer and MFP assets and operational management is placed on the business operations of corporate organizations in charge of IT systems, as printers and MFPs are linked further with corporate internal information systems and network systems. Oki Data provides a printer management system that brings about results for reducing the TCO (Total Cost of Ownership) for businesses by taking charge of the entire string of the business operation flow, such as the "Printer and MFP asset survey" and "Printer and MFP optimized allocation consultation" to "Printer and MFP management".

A summary of the managed service solution is provided below:

- Consultations on surveys and the optimization of printers and MFP assets are provided.
- Customized services of periodical maintenance and the relocation of printers and MFPs at call centers are provided.
- Through the use of device management applications the status of the devices is monitored constantly via the internet to enable consumable items to be replenished within short periods of time.

Oki Data provides customers with combinations of the applications described below in order to realize managed service solutions.

(2) PrintSuperVision ME

This application is a web-based device management application software that operates on multiple platforms, running not only on Windows but also other platforms, such as Linux. Through the use of this application it is possible to manage all printers and MFPs from the headquarters of the entire corporation or on all levels of a corporate organization, including those in branch offices at remote locations (Fig. 6).

This software offers the following features:

- Printers and MFPs are mapped onto floor plans and layout diagrams to enable the status of the installed devices to be grasped at a glance.
- The remaining consumable items for printers and MFPs, as well as the anticipated replacement days for the consumable items and the status of printed sheet counts are all together available for verification.
- The administrator is automatically notified by email whenever a printer or MFP runs out of toner.
- Printing data files can be broadcast to multiple printers.

(3) Print Job Accounting

This application is software for placing meticulously detailed restrictions on printing for individual users and printers, as well as for obtaining the information of printing jobs as a log and tabulating such information.

This software offers the following features:

- Limits the number of sheets that can be printed and limits the use of the equipment

Users, as well as printers and MFPs are divided into multiple groups and settings, such as enabling or disabling printing, as well as placing a ceiling on the number of sheets that can be printed. It is also possible to lock the operation panel of the devices.

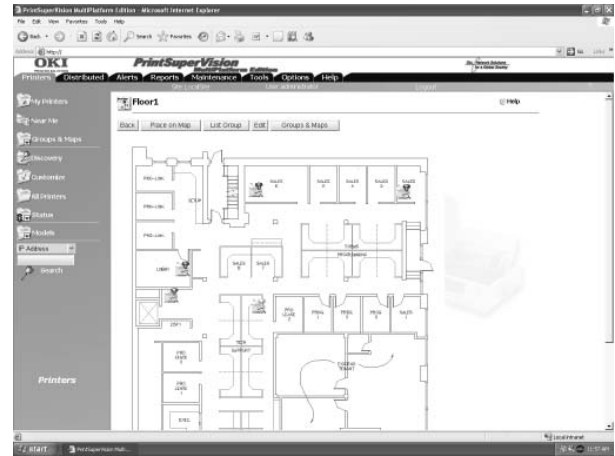


Fig. 6 PrintSuperVision software

- Charges can be issued to users and groups for printing costs

Charges for printing costs can be setup in terms of the number of printed sheets and paper sizes. It is possible to set varying charges for each printer or MFP.

- Taking and tabulating logs

Information on the date of printing, as well as the user name, number of printed sheets and paper sizes, can be obtained as a log and tabulated. Logs can be exported in the CSV (Comma Separated Values) format, making it possible to utilize the information on spreadsheet applications that are available on the market (Fig. 7).

Log No.	Account ID	User	Document Name	Total Sheets	Pages	Status	Paper Size	Duplex	Sheets
1	2054	Mike	Microsoft Word - Specification.doc	4	7	Printed	A4	Duplex	3
2	3130	David	October.xls	1	1	Printed	A4	Simplex	1
3	4550	Peter	Microsoft Word - Invitation.doc	2	2	Printed	A4	Simplex	2
4	2054	Mike	fax01.pdf	1	1	Printed	A4	Simplex	1
5	3389	Susan	Readme.txt	1	1	Printed	A4	Simplex	1
6	1092	Kevin	October.xls	1	1	Printed	A4	Simplex	1
7	4867	Thomas	Microsoft Word - Invitation.doc	1	2	Printed	A4	Duplex	1
8	4550	Peter	Book1	2	2	Printed	A4	Simplex	2
9	3247	Carol	fax01.pdf	1	1	Printed	A4	Simplex	1
10	1009	Ralf	Microsoft PowerPoint - Development Plan.ppt	8	8	Printed	A4	Simplex	8
11	3334	Caren	Test Page	1	1	Printed	A4	Simplex	1
12	4876	Robert	SampleImage.jpg	1	1	Printed	A4	Simplex	1
13	1754	Dave	http://www.msn.com/home.htm	1	1	Printed	A4	Simplex	1
14	2789	Nadia	Microsoft Word - Invitation.doc	2	2	Printed	A4	Simplex	2
15	4550	Peter	fax01.pdf	1	1	Printed	A4	Simplex	1
16	1009	Richard	Microsoft Word - Invitation.doc	1	1	Printed	A4	Simplex	1
17	1010	Richard	October.xls	1	1	Printed	A4	Simplex	1

Fig. 7 Log information of Print Job Accounting

(4) Web Driver Installer

This application is a web-based software that is able to reduce the burden on IT administrators by simplifying the updating of printer drivers and distributing printer drivers for newly implemented printers and MFPs.

This software offers the following features:

- Hierarchical management of the printers, MFPs and users is possible in the units of corporate organizations and floors.
- Printer drivers that are intended for use by users can be centrally managed.
- The administrator can distribute the relevant printer drivers to users by email whenever a new printer is implemented or a printer driver is updated.

- Users are able to install a printer driver by preparing a web page for the installation of the new printer driver and for distributing an email outlining the address of such a web site to users (Fig. 8).

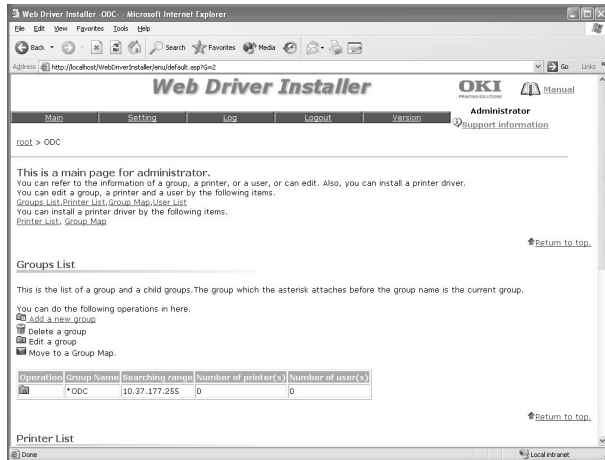


Fig. 8 Web Driver Installer

Conclusion

Color printing solutions at Oki Data have been described in this paper, including a summary of solution concepts, as well as descriptions with practical examples on four areas of solutions; the media solutions, on demand printing solutions, security solutions and open solutions.

In the future, Oki Data intends to take on and resolve the various issues of customers by developing solutions that focus on security, device management and document management intended not only for color printers but also for MFPs.

References

- 1) Nobuhito Matsushiro: "Processing Colour Image Information", pp. 64-67, Oki Technical Review, Issue 194, Volume 70, Number 2, April 2003.
- 2) Yoshitaka Nishiyama et al: "Security for Printing Data and Printed Materials", pp. 40-43, Oki Technical Review, Issue 205, Vol. 73, No. 1, January 2006.
- 3) Toshio Hikima: "ProtecPaper (R), Software for Preventing Information Leaks from Paper Media", pp. 44-47, Oki Technical Review, Issue 205, Vol. 73, No. 1, January 2006.

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