The Seal Imprint Verification System: Cases of Introduction in Financial Institutions

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At a time of drastic change in the environment surrounding financial institutions, administrative work centralization aimed at reducing the workload of the back office has propelled the introduction of cost-effective image processing systems geared toward centralized operations. Further, in an effort to prevent forgery, more and more institutions have done away with duplicate seals and are introducing seal referencing systems which use a digitized image of the customer's registered seal. Nevertheless, in business systems related to operations which require seal imprint verification, such as bill management and the receipt of fund transfer requests, seal imprint verification has remained outside the scope of systemization.

In the past, seal imprints were verified by visually comparing the customer's registered seal displayed on a special seal referencing machine with the seal imprinted on the actual form, or by sending the actual form to a branch office and visually comparing the seal with the customer's registered seal in a signature book. Our seal imprint verification system is designed to streamline the mountain of seal imprint verification work represented by the bills, checks and fund transfer requests handled at a financial institution's central operations department. Introduction of our system makes it possible to extract the seal imprints from both the form image data acquired by the institution's business system and the customer registered seal image data registered in the seal referencing system and compare the two using image processing, thereby enabling institutions to complete the seal imprint verification work accumulated in the central operations department.

System overview

Our seal imprint verification system is designed to facilitate the processing of seal imprint verification work routinely encountered in operations such as bill management or fund transfer administration, using a single system.

Taking into account the desire to link business systems used for bill management, fund transfer administration and the like, we created a system which comprises a system interface (for the exchange of form image data and verification results) that uses File Transfer Protocol and supports the various gray scales and resolutions of image data, thereby minimizing the impact on our customer's business system and making simple system construction possible.
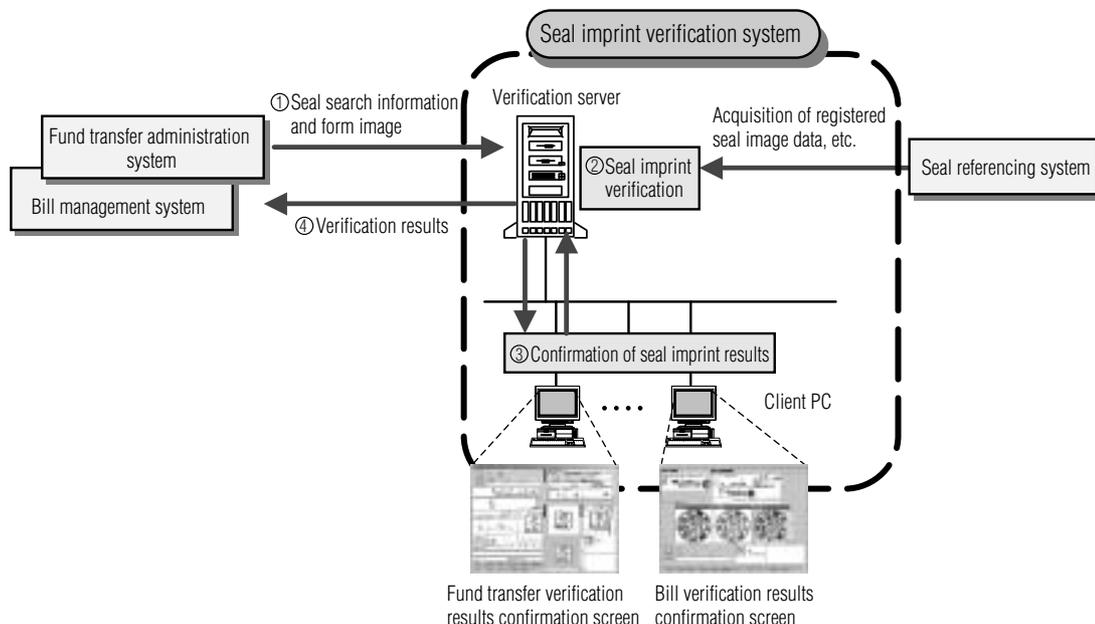

Fig. 1   System schematic

Image of form seal imprint and registered seal imprint superimposed with background removed

(Matching rate using extracted seal imprints only = Highly accurate matching rate)

Images outside seal border removed

Form seal imprint

Registered seal imprint

Image of cut-out registered seal imprint and form seal imprint superimposed

(Matching rate, including the background such as the ruled lines outside the seal imprints, calculated)
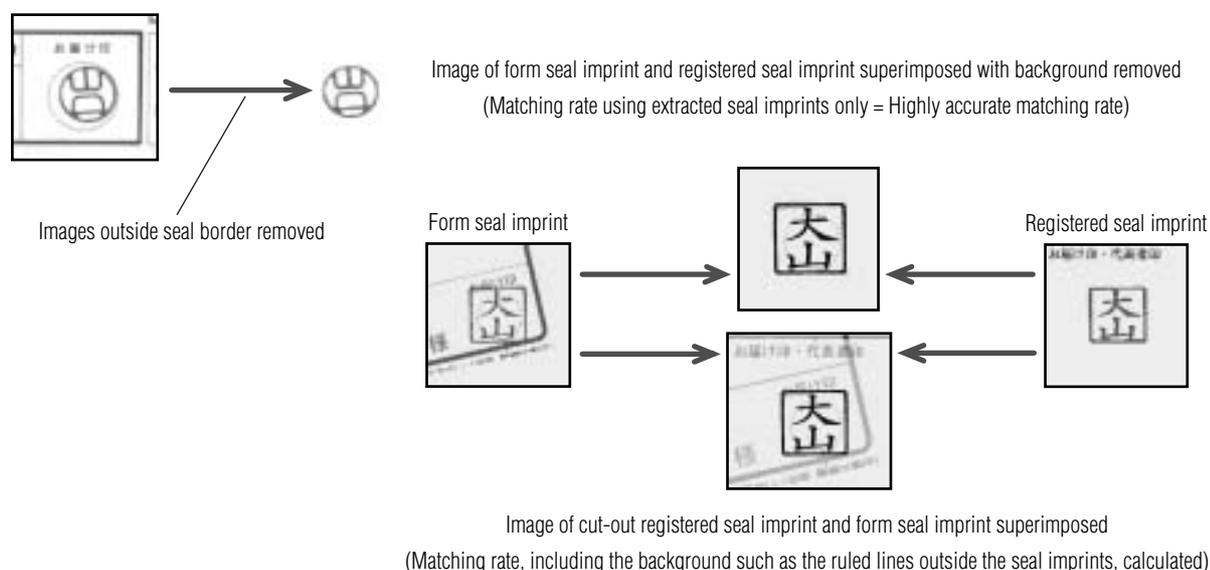
Fig. 2 Background removal

Our seal imprint verification system is based on a verification server computing method. We constructed the system using the verification server and client PC configuration illustrated in Figure 1 and the system flow described below:

① **Verification request**

The registered seal search information and form image data received from the business system via file transfer are downloaded.

② **Seal imprint verification**

The verification server superimposes the registered seal imprint onto the form seal imprint and calculates the matching rate.

③ **Confirmation of verification results**

Using the client PC, the operator checks the seal imprint verification results and ultimately determines if the imprints are the same or if there is a discrepancy.

④ **Return of verification results**

The evaluation results are sent to the business system.

We decided to use the verification server computing method since the method enables the operator to check verification results without the wait time experienced when executing seal imprint verification one seal at a time from a client. Much emphasis was placed on allowing the operator to check results one after the other using a client PC without the accumulation of stress.

The special features of our seal imprint verification system are its seal imprint search feature and background removal feature.

(1) Seal imprint search feature

The seal imprint search feature automatically extracts the seal imprint resembling the registered seal imprint from the form image. This feature eliminates the need to manually specify the seal imprint location on the form image as a preparatory step, thereby automating all processes prior to verification results confirmation.

(2) Background removal feature

The background removal feature extracts the seal imprint portion only from the registered seal imprint and the seal imprint that was cut out from the form image, removing any imagery that lies outside the seal imprint border. This feature displays on the client verification results display only the seal imprint portion of loaded images, making it possible to display an image that is easy on the eyes for operator evaluation. The technology used to extract the seal imprint portion alone made it possible to perform matching rate calculations with high accuracy (Fig. 2).

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Introduction case - 1

Bank A introduced our seal imprint verification system at the same time it replaced its seal referencing system, and constructed a seal imprint verification system by linking the system with the existing fund transfer administration system (Company B) (Fig. 3).

The bank operations subject to seal imprint verification included the processing of 3,000-5,000 fund transfer requests received by the center office from businesses each day.

Prior to introducing our seal imprint verification system, the bank would enter each request in the fund transfer administration system, send the form to the applicable branch and manually compare the seal imprint with that in the signature book. This process required three days to one week to complete.

After introducing our seal imprint verification system, the bank would receive via file transfer the data entered in the fund transfer administration system the previous

day, and then execute the seal imprint verification process. The bank used 10 client PCs to check verification results, thereby completing the operation in one to two hours. The new system greatly reduced the amount of time spent on seal imprint verification tasks and curtailed the amount of work at branch offices. In addition, because the new system standardized the criteria used to check verification results, the system was smoothly introduced by having officers and persons of higher rank implement the task of checking verification results by simply giving guidance to general operators.
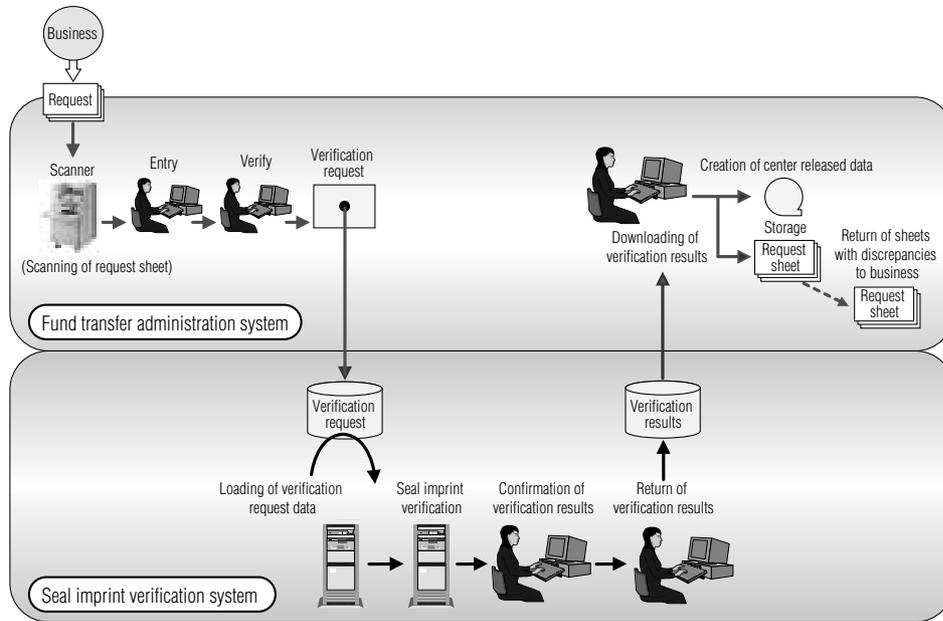
Fig. 3 Overview of fund transfer system and seal imprint verification system linkage
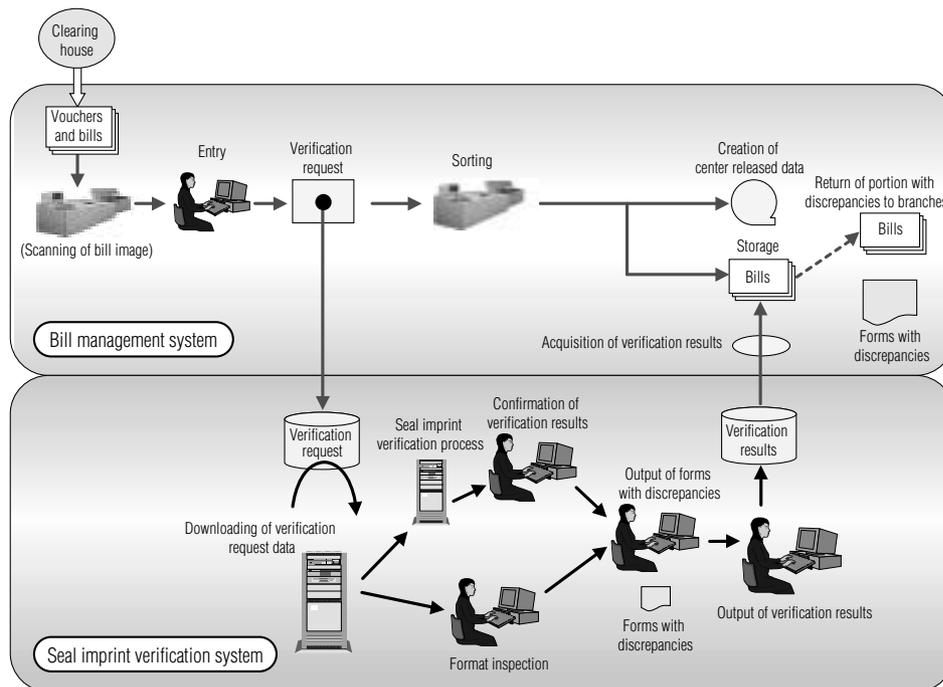
Fig. 4 Overview of bill management system and seal imprint verification system linkage

At present, Bank A has incorporated a method by which discrepancy identification is automatically handled by the seal imprint verification system based on the account and seal information (such as cancellation) registered in the system, and has partially automated the evaluation process.

Introduction case - 2

Bank C introduced our seal imprint verification system at the same time it introduced an image processing system for bills (Company D) (Fig. 4).

The items subject to seal imprint verification were the bank checks related to bills subject to maturity control and clearing, which meant the processing of 10,000-16,000 bank checks per day.

In the course of system introduction, we proceeded with collaborative research and development through client sharing with Company D - the bill management system vendor - and realized the image processing of bill operations, including seal imprint verification. This development eliminated the labor required for controlling spot commodities such as bills and checks and, without the unnecessary downtime resulting from the division of bill operation processes between operators, made bill operations allocatable, thereby contributing to the improvement of work efficiency.

In the future, we have plans with Bank C to comprehensively enhance the application of the image format inspection feature, which is an optional feature of the seal imprint verification system (used to display on a client the image of a bill or check to verify required contents), and thus improve operation efficiency even further.

Conclusion

In the light of recent trends toward the adoption of image processing systems designed to support centralized administrative work and the introduction of seal referencing systems, an environment has developed which has made it possible for us to realize a seal imprint verification system in the interests of enhancing work efficiency and security. Furthermore, with the future trending toward check truncation (the act of processing clearing operations electronically), the demand for our seal imprint verification system will continue to grow in the years to come.

In the future, our aim is to automate the evaluation (same seal / different seal) of verification results and offer image processing for the verification of signatures checked during seal imprint verification, such as signature verification targeting corporate stamps used on bills, checks and the like.

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