

# Pinelope

PIN Mailer Application

Administrator & Operator Guide

Version 3.8

### **Important Notices**

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The content of this manual may be subject to change without prior notice. Check the web page on [www.verisec.com](http://www.verisec.com) for the latest release.

### **Trademarks**

All products mentioned in this document are trademarks or registered trademarks of their respective companies or organisations.

### **Product Evaluation**

Evaluation versions of Pinelope are available to qualifying organisations. Contact Verisec for details.

The documentation of this software is available prior to purchase for download on [www.verisec.com](http://www.verisec.com).

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# Preface

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Continued interest in the Pinelope product and the manual has prompted a number of upgrades to the software and consequently an upgraded manual.

We are now in version 3.8 with a new GUI and a number of new functions that have been added.

One of the main functionality changes has been the addition of the data provider plugin interface to support external data sources. Using this interface option allows for integration with databases and/or hardware encryption units for decrypting the PIN codes from a source file. In addition new functionality has been added to simplify the formatting for printing the PIN in conjunction with security film, as well as full duplex printing and additional settings for text fields, such as colour, alignment, line spacing and the use of dynamic fields within static ones.

We hope the manual will be a useful guide when starting up your PIN printing production. As always we greatly appreciate any feedback on errors or additions to the manual. We strive for a high degree of accuracy, but to err is human...

# Introducing Pinelope

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## Introduction

Thank you for purchasing this copy of Pinelope<sup>1</sup>. Pinelope was designed to create and administer PIN envelope production.

Pinelope is a standalone application but can also be used together with the Athena Security Logistics Software from Verisec. See [www.verisec.com](http://www.verisec.com) for more information.

This guide covers installation and use of Pinelope. The intended audience for the guide are administrators and users of Pinelope.

**Chapter 1:** Covers basic functionality of Pinelope as well as general information about PIN envelopes. This chapter also covers the terms used in this guide and a short section on return on investment for PIN envelope production. A description of a real production facility has also been included in this section.

**Chapter 2:** Covers technical requirements and the installation procedure.

**Chapter 3:** Is a guide for administrators setting up the system and creating templates and for operators responsible for PIN envelope printing. A section on encryption is also included, as is one about data providers.

**Chapter 4:** Is primarily intended for security officers and administrators. The chapter presents a non-exhaustive list of options that can be added to the PIN producing process in order to tighten security.

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<sup>1</sup> Why the name Pinelope? Pinelope is a play on the words PIN and Envelope. Together they became Pinelope, which in turn can be associated with Penelope in Greek Mythology. Penelope was the wife of Odysseus who waited for 20 years for her husband's return from the Trojan War. For this reason Penelope is associated with faithfulness or trust.

## What you can do with Pinelope

Pinelope is designed to assist in the creation of PIN envelopes using a laser<sup>2</sup> printer. Pinelope manages the formatting template and the PIN code source file in order to merge and print PIN envelopes. The software allows the user to create and manage multiple formatting templates for use with different recipients. Pinelope was also built to manage a number of exceptions (errors) due to printer or pressure sealer jams.

Encryption can optionally be used with Pinelope and is supported through two different methods. Pinelope can decrypt PIN fields in the source file assuming these have been encrypted with one of the two supported methods. Due to the added complexity of handling encryption we provide test vectors on-demand. An alternative to using the built in methods is to use the IPinelopePlugin interface (or the expanded IPinelopePlugin2) to implement a customised data source and/or encryption.

Pinelope was constructed to allow logging both from a security and a financial standpoint. Security requires logging in order to track number of envelopes created, number of exceptions, user etc. Combined with physical security measures discussed in Chapter 4, the creation of PIN envelopes can be handled with a high degree of security even in a regular office environment.

Version 3.8 of Pinelope supports printing of Z-folded PIN envelopes, where the PIN is printed on the front page.

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<sup>2</sup> When the world was younger PIN envelopes were typically created using dot-matrix printers and special forms with carbon paper that were tractor (pin) fed. This method of creating PIN envelopes is slowly being replaced in favour of laser printed forms.

## ROI and PIN mailers

Like all investments, creation and production of PIN mailers is associated with costs and revenue. Costs can in turn be divided into investment and production related costs. A summary of the main cost drivers and revenue sources are listed below:

### Investments costs

- Total number of hours spent on setting up production
- Production facility (e.g. alarm, locks etc.)
- Pressure sealer
- Printer
- Computer
- Hardware Security Modules (HSM) if applicable
- Optional equipment such as bar code reader and/or paper shredder

### Production related costs

- Machine maintenance costs
- Time spent in production
- PIN envelope paper (including extra paper due to errors)
- Printer toner and service (if using toner sealing cost for toner will increase)

Time and number of envelopes produced is logged by Pinelope and can be used for calculating relevant pricing.

### Revenue

Revenue is usually calculated as number of envelopes produced \* price per envelope.

## Typographical conventions

***Bold italic text*** indicates text that you enter verbatim

TIP!

Sections that address specific problems or issues in real life production.

## Terms used in this guide

**Back page:** Is the reverse side from the front page. See example in Picture 1 below.



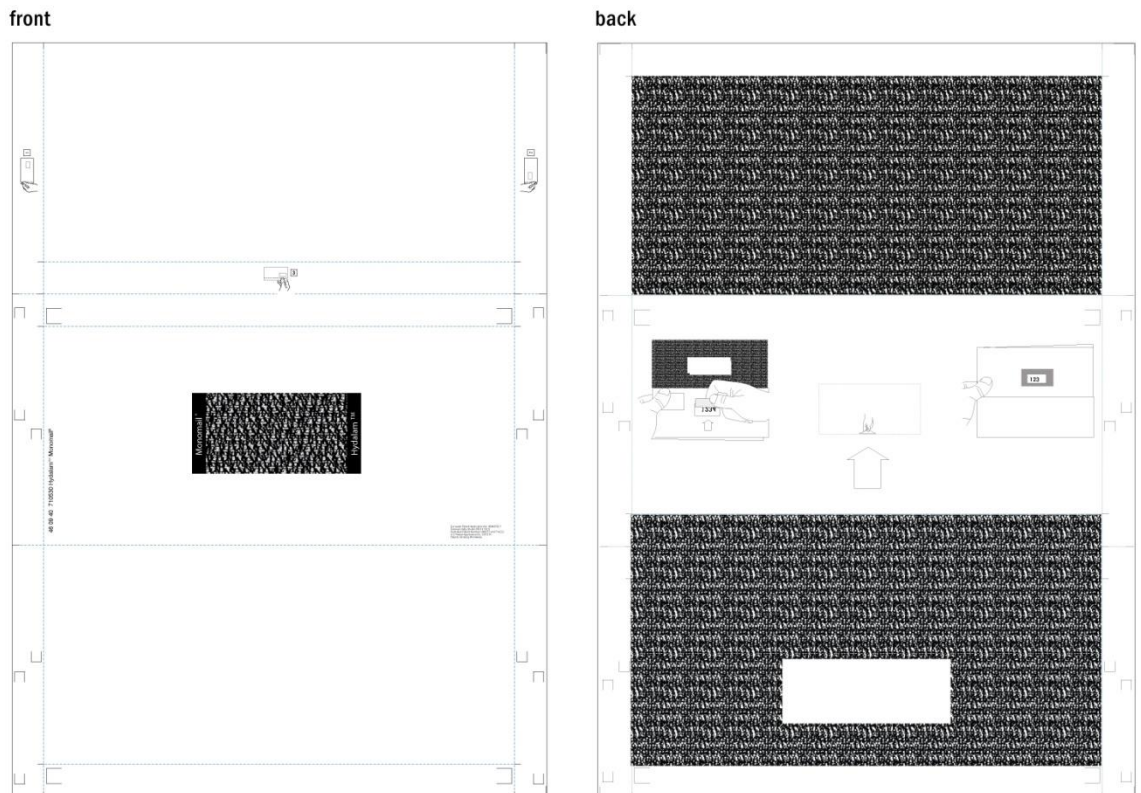
**Bundle:** Refers to the physical bundle of PIN envelopes. A bundle may contain any whole number of PIN envelopes. A bundle may contain a Bundle Cover Page. Formatting templates are applied per bundle. One or more bundles make up a Batch.

**Bundle cover page:** Refers to the optional cover page that can be printed after each bundle has been processed. The cover page includes information about the serial number range (from; to) in the bundle.

**Batch:** A defined number of PIN envelopes printed in sequence or total number of envelopes to be produced in a given period of time or for a specific customer (e.g. total number to be produced = 1.000 envelopes to be packaged in bundles of 50. In this case the batch size would be 1.000 and the bundle size would be 50).

**DLL:** Dynamic Link Library.

**Front page:** Front page in this document is defined as the side of the paper on which the PIN code will be printed. See example in Picture 1 below.



Picture 1. Example of front side and back side. The picture shows a PIN paper with a Hydalum™ film attached. The PIN is printed on the PIN area with a masking pattern in the left hand picture. When the tab (see back side, arrow pointing to tab) is removed the PIN code can be read on the transparent film below.

**Masking pattern:** A pattern printed in order to make reading information through the paper difficult or impossible. PIN envelopes are usually pre-printed with a masking pattern.

**Parcel:** A parcel is defined as the number of envelopes packaged in a box for shipping. Parcel size is used such that a shipping slip is created for each parcel.

**PIN:** Personal Identification Number, usually 4-6 digits in length. PIN codes are used for ATM machines, debit cards or the like.

**PIN source file:** The file used by Pinelope that contains information about serial number, PIN code, address information etc. Encryption supported by Pinelope relates to the PIN field. See Appendix B for sample source files formats.

**Serial number:** Each PIN envelope is unique. In order to track an individual envelope and to associate it with a specific individual, the envelope needs a unique ID. This unique ID is referred to as the serial number. Each row in the PIN source file needs to have a serial number. Only numeric serial numbers are supported<sup>3</sup>.

## Introduction to PIN envelopes

### General

Sealed envelopes are used to protect sensitive information such as passwords, PIN codes, Income statements etc. from being read by unauthorised persons. Pinelope was created to assist in the creation of PIN envelopes.

A PIN envelope<sup>4</sup> is basically a sheet of paper that has been folded and sealed in order to hide the PIN or password inside. The paper may be pre-printed with masking patterns, logos, instructions or any other type of information. An example of a front and back page is illustrated in Picture 1. The pre-printed paper is then used to print

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<sup>3</sup> Actually, a serial number is only a unique identifier for a record in the PIN source file. As such, non-numeric serial numbers are supported and can be printed. However, if processing is to be done on the serial number, the requirement is that they are numeric.

<sup>4</sup> Envelope is by definition a container or an enclosing covering. However many banking institutions print PIN codes on paper with special protective films such as Hydalam™, ICS V3™ or PIN-TAB™. In these cases the paper is not always folded. With Pinelope you can choose to fold or not to fold the printed paper.

the PIN code and any other personalised information such as name, address, serial numbers or the like. When the paper is complete, it is folded and sealed in a pressure or heat sealer. At this point the envelope is ready for distribution.

The finished product is in summary a combination of

- Paper and pre-printed information
- Printing (PIN and other dynamic information)
- Folding & Sealing (optional)

There are infinite combinations of the above that can result in a product called PIN envelope. Since this is a finite manual, we will shortly describe the areas above to illustrate the decisions that you will be faced with.

TIP!

At this point you may want to consider:

- How do I want my end product to look (colour, weight, size, etc.)?
- Do I need to consider pre-printing postal information (such as Port Payé)?
- Level of security. Am I subject to restrictions or recommendations placed by standardization organizations?\*

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\* For example, in the UK the organization APACS has tested and approved certain security film vendors and

## Paper and pre-printed information

Paper will form the foundation of the finished product, and to a large extent be a cost driver. In the simplest case you could use a blank white paper, print the information and seal using a laser toner frame that is printed on-demand<sup>5</sup> (see section on sealer).

In most cases white printer paper will not be an option, and hence you will be faced with a myriad of options.

### Pre-Printing

In the simplest case the paper is regular paper that can be used in printers or faxes. For more advanced applications, paper can be in large sheets or rolls that are subsequently cut down to an appropriate size. These advanced applications are not

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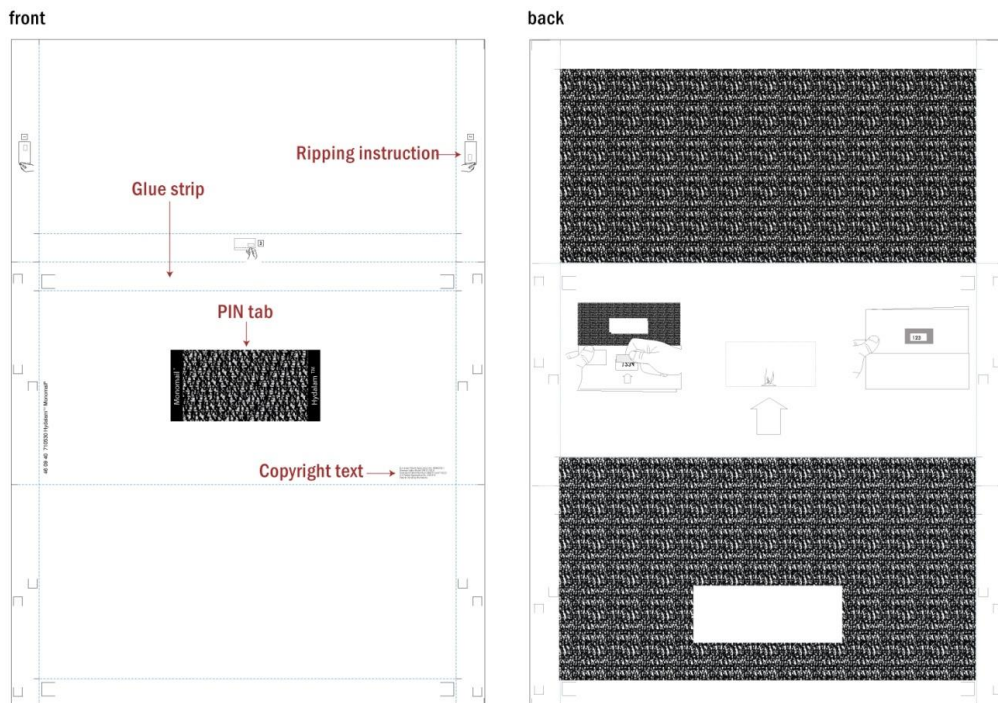
<sup>5</sup> Resulting in an insecure and rather dull product.

covered in this section, and are only relevant for very large scale production environments.

The paper needed for creating PIN envelopes is readily available in most countries from local medium to large printers. A printer will be able to answer questions regarding types of paper qualities, glues that can be applied, and so on.

A pre-printed paper should include all static graphics and information (i.e. that will not change for each individual envelope). Maximising the amount of pre-printed material is usually the most cost-efficient method (as opposed to printing in-house). Typical information that can be pre-printed is masking patterns, logos, standardised text and opening (ripping) instructions.

As you can see in Picture 2 below, the front has been pre-printed with the ripping instructions on the perforated edges and a copyright text. In addition you can see the glue strips that have been put on the paper. On the back, the paper has been pre-printed with a masking pattern as well as opening instructions.



Picture 2: Example of a pre-printed front page (left) and back page of the envelope with pre-printed masking pattern and opening instructions (right.)

Masking patterns or rasters are usually available from a local printer, or can be created in-house. Ripping instructions may also be available from a printer.

Instead of printing a standard masking pattern, you can create your own, or if you wish put a picture or graphic in its place. A consideration, however, may be how this will affect the level of security of the finished product.

**TIP!**

A number of companies market and sell “patented security” papers. In most cases this is snake oil. Unless the paper has undergone testing by a certified testing centre or includes documented security features\* you should be wary. The price for the illusion of security is not worth paying. Designing your own paper with the help of a local printer will allow more freedom in controlling the end-user experience, probably at a lower price, without having to compromise security.

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\* such as the Hydalam™ film ICS V3™ from Page International or Bastione PIN-TAB™

**TIP!**

When you receive a batch of new paper from the printer make sure to:

1. Do a visual inspection of the paper and the pre-printed material. For example, if the paper is bent due to humidity (see picture below) this may affect your entire production by increasing printer or pressure sealer jams. If they are bent, you may want to run a test. You will, in many cases, be forced to send them back.
2. Do a sizeable test run. Despite the cost of having to discard the test paper you will probably find that paper, machines, environmental variables such as humidity will affect your production. By testing a batch of say 300-500 sheets you will identify possible errors and eliminate these before the actual production.
3. Once the test run is complete, save a number of envelopes 6-12 hours (for the glue to dry) and then test the strength of the glued edges. You should not be able to open a PIN envelope without leaving traces of tampering. Important to note is also that glue strips (and therefore the entire paper) may have a “best-before” date. Silicone based glue will typically only stay fresh for 6-12 months depending on storage conditions. Consult with your local printer for details.



The choice of folding will also affect the placing of text and choice of what to be printed (e.g. instructions). In Picture 1 the intended fold is a Z-fold. Depending on the choice of folding, it becomes obvious where certain information can be printed. Pinelope only supports Z-folding in Version 3.5.X.

In Picture 2 the page is divided into 3 panes that correspond to the three sections of a Z-fold. See Chapter 3 for more detailed information and Appendix A for illustration.

**TIP!**

In order to limit the paper options you may find it useful to talk to the sealer vendors in your territory. We provide a short non-exhaustive list of manufacturers in appendix D\*. Most sealer vendors will have experience with local paper vendors since they are a necessary component in order for them to sell their sealer. Questions you should get answered by the sealer vendors are:

- Supported paper size
- Supported paper weight
- Supported paper thickness
- Types of glues that their sealers work with (e.g. silicone based, laser toner frames, etc.)

In general, you should strive to pre-print as much information as possible, the reason being price and quality. Despite the quality of modern laser printers, a printing house will almost always be cheaper, faster and of higher quality.

**A short digression on paper quality**

Paper may not seem like rocket science, but be wary. Paper is a very absorbent material and when humidity strikes, the paper may bend in different directions depending on the direction of the fibres. In a normal office environment with laser printers this may not be a big problem. However, when sending a large number of pages to a folder/pressure sealer that needs the page to be fed within very tight margins in order to fold and seal correctly you may suddenly get large increases in paper jams.

For the same reason that you want to check on the paper delivered by your supplier, you should also consider the atmosphere in storage and production environment. Your paper supplier should be able to recommend how the paper should be stored, and the lifetime of the glue. The better the quality of the paper going into production the less errors and lower costs will ensure.

## Printing (PIN and other dynamic information)

Most laser printers will be able to solve the problem of printing PIN codes, address information etc. Important factors in your choice of printer will be:

- **Printing speed.** Most sealers will have a higher capacity than the printer, so you will probably want a high-speed laser printer. If you need to print information in colour (logo or certain text) you will need a printer for this.
- **On-line requirement.** If you wish the printer and sealer to form a continuous production line (see Picture 4) you may be limited to the printers supported by the sealer manufacturer.
- **Support.** If the printer breaks down, production will stop. Delivery of new or replacement unit will be critical.

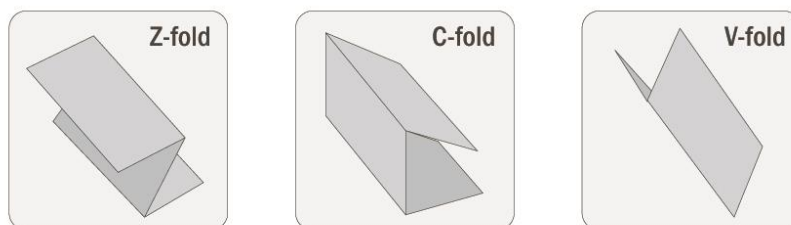
If you are intending to use a special security film such as Hydalam™ or PIN-TAB™ you will probably want to adapt the font used when printing the PIN code (see section on PIN Font in chapter 3). This should not be an issue with most modern laser printers.

## Folding & sealing (optional)

In our definition of PIN envelope we assume a degree of folding and sealing in order to call the finished product a PIN envelope. Due to the appearance of various security film vendors such as Hydalam™ or PIN-TAB™ a number of companies have chosen to dispense with the folding and sealing. The reason for not folding may, for instance, be that the page is to be included in a larger package that is not folded. Irrespective of the reason, if you feel that the page does not need folding you may safely jump on to the next section.

### Folding

We define a PIN envelope as a sheet of paper folded in a particular fashion. The basic folds (that may come in different variations) are: Z-fold, C-fold and V-fold.



Picture 3: Basic folds

Decision parameters for the choice of folding will typically be:

**End-user experience:** How will the end-user experience the envelope? Is the envelope intuitive to open? How will the envelope look once opened? Are the instructions clear and concise? See appendix C for some examples of folding and how the envelope will look once opened.

**Security considerations:** Ceteris Paribus<sup>6</sup>, a V-folded envelope is less secure than a Z-, or C-fold. Should you choose to have additional security features<sup>7</sup> some folds will disqualify themselves for this reason.

**Logistical considerations:** If the PIN envelope will be a part of an entire package, the sizing may be relevant (e.g. if the PIN envelope is to be put in another package that places sizing restrictions on the envelope).

**Design/marketing aspects:** If a marketing department, art director or equivalent is involved in the decision making process they may have an opinion on the fold best suited for the target audience.

## Sealing

In this section we will briefly deal with two types of sealers:

- Pressure Sealer
- Combination Heat & pressure

### Pressure Sealer

Pressure sealers work on the principle that the paper is folded and subsequently put under pressure. The pressure activates the glue (e.g. Silicone based) and hence seals the envelope. An example of a pressure sealer that works according to this principle is the Postmate III (see section on production example).

### Combination Heat & Pressure

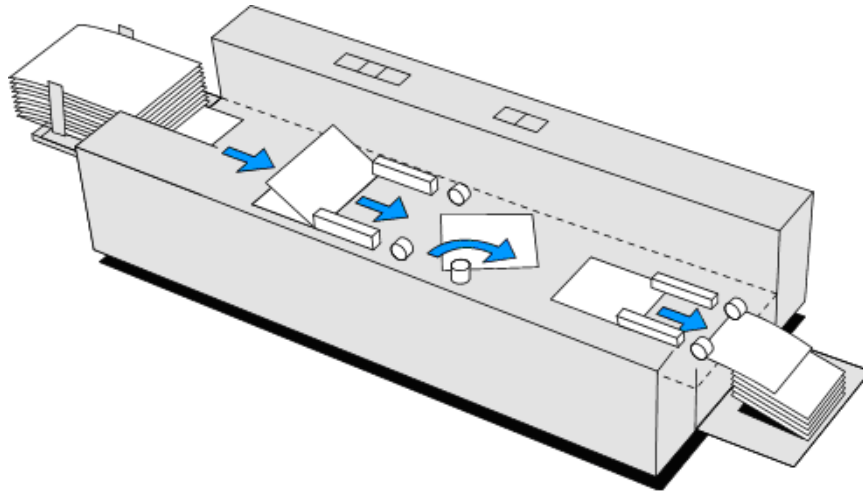
The paper or form is firstly sealed by passing heaters and directly afterwards by running under pressure-wheels. This process may then be repeated in order to complete the process. An example of a sealer that works according to this principle is the Böwe Sealer 100.

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<sup>6</sup> Latin for: "all other things being equal"

<sup>7</sup> Such as Hydalam™ or ICS V3™ film





Picture 4: BÖWE Sealer100

Most sealers come with a host of additional options such as Bar code readers, Stacking tables and perforation blades. These options are assumed outside the scope of this manual, but each hardware vendor will surely<sup>8</sup> provide more detailed information.

### **Paper choice and sealers**

What sealing technique you choose to adopt will affect the choice of paper that goes into production. In general terms we can identify two main categories:

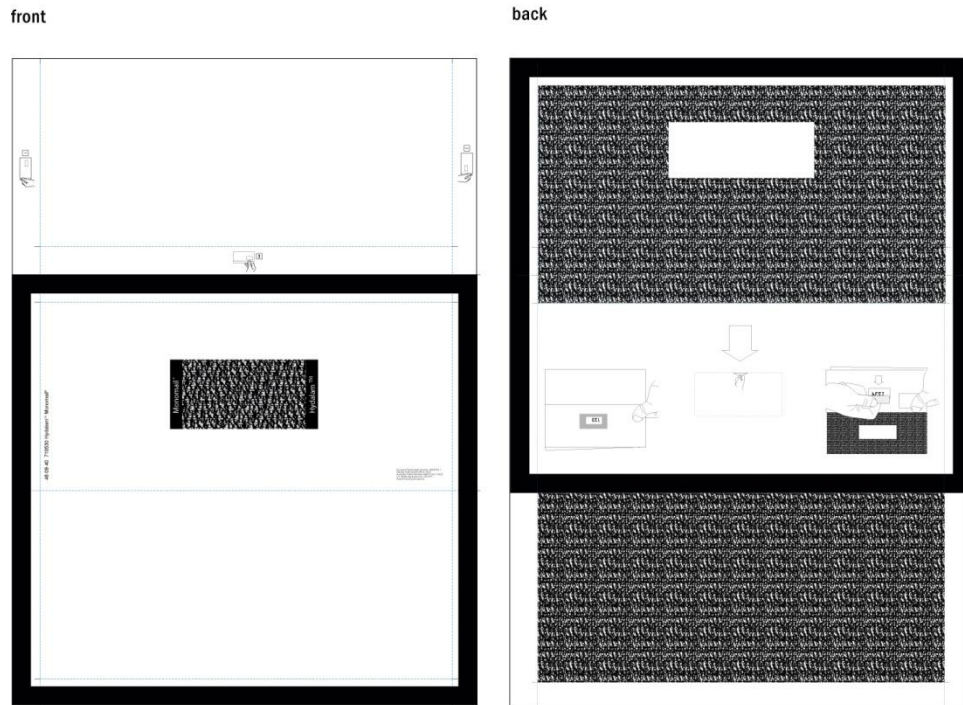
**Pre-glued forms:** These forms have glue strips placed depending on your folding needs. The most practical approach is to contact printers or form suppliers in your region in order to ask whether they have the technology. There are also international organisations such as <http://www.eforma.com> (mainly Europe) where you can find forms providers in your local territory. If you have difficulty finding a provider of forms we would also suggest you start by contacting local vendors of sealer technology since it is in their best interest to keep track of forms providers.

**Toner Sealing:** A toner frame (see example of Z-fold in Picture 5) is printed according to your sealing/folding needs. When the paper is folded and

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<sup>8</sup> Assuming they are interested in selling a product to you.

heat/pressure is applied the toner will act like the “glue”. The toner frame should be around 4-5 mm in width. When printing a toner frame you should observe that toner consumption will increase.



Picture 5: Toner sealing

**TIP!**

As has been mentioned before, all paper is not the same and we recommend you to test the paper that you intend to use in your sealer of choice

**Others.** There are other types of sealing techniques on the market such as special patented coated forms. One such vendor is Drescher GmbH in Germany. Since the author of this document has little information or experience with this type of paper, this manual will not delve deeper in this area<sup>9</sup>.

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<sup>9</sup> If the reader has any other suggestions, please forward these to [info@verisec.se](mailto:info@verisec.se) and we will try to find out more information for coming releases of the manual.

## Production example

There is a host of different hardware options for printing and folding PIN envelopes.

The following equipment could be used together in a production environment. This example is based on the following assumptions:

- Production per day = 1.000 – 5.000 sheets
- No redundancy in equipment
- Use with Hydalam™ Monomail® security film
- Black & White printing only
- Production to be in both on-line and off-line modes<sup>10</sup>

Equipment list:

- HP LaserJet 4350N
- Postmate III Pressure Sealer
- A computer with Windows XP connected to printer with Pinelope installed
- PIN mailer paper (form)

The choice of printer and pressure sealer in this case is because these two machines easily can be attached to each other to enable on-line production (i.e. printer sends directly to pressure sealer). The picture below shows a typical setup in on-line mode.

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<sup>10</sup> On-line refers to the printer and pressure sealer being connected such that the paper automatically transfers from the printer to the pressure sealer. The advantage of on-line production is that the operator has less opportunity to inspect the individual sheets being printed. In combination with Hydalam™ paper this is not entirely necessary, since the security tab makes reading the PIN code virtually impossible if the appropriate font is used. Off-line refers to printing all sheets and then running them through a pressure sealer as a batch job.



Picture 6: Typical printer and pressure sealer configuration in on-line mode.

## Environmental considerations

As with any production it will impact the environment in one way or the other. Increasingly, PIN envelope customers have become aware of the environmental factors regarding PIN mailer production. In some cases this results in requirements set forward in RFQ/RFP's or in specific certification requirements. Eco- labelling an entire envelope is not without challenge since it's a product intersecting with many disciplines.

In the specific case of PIN mailers a number of environmental aspects can be identified:

**Paper production:** Paper production in itself has an impact on the environment. In most countries or economic areas there will be different eco-labelling and environmental certification schemes that can apply to paper. Since these schemes vary to a large extent, it is important that you consult the paper vendor to assure that the paper you choose lives up to the requirements in your area. In some cases the eco-label can be used as a marketing tool and be something you want to print on the PIN envelope to display your corporation's commitment to the environment.

**Glue:** In order to seal the PIN envelope glue will be necessary. This glue can consist of printer toner or a specific combination of chemicals that react to combinations of pressure or temperature. By consulting your local paper or forms provider, you should be able to get information on the type of glue used, and if this lives up to any specific label or certification in your area.

**Printing house:** The printing house that you will choose for pre-printing may have an environmental certification such as ISO 14001. The certification should cover their production environment including inks and waste disposal.

**Toner:** For your own production environment you will have toner disposal to handle. Most large vendors like HP will have a service to collect used toner cartridges.

**Paper recycling:** In your own production facility you will probably have paper that can be recycled.

# Technical Requirements & Installation

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## Technical requirements

- Intel® Pentium® III or later processor
- Windows XP Professional; Windows 2003 Server, Windows Vista (32-Bit), Windows 7 32/64 bit.
- 128MB of RAM (256MB recommended for complex forms or large documents)
- 20MB of available hard-disk space
- .Net framework 2.0 or above
- Any laser printer with a Windows driver
- Screen resolution not less than 800\*600 (recommended at least 1024\*768)

### Optional but recommended equipment:

- **Bar code reader:** When producing any larger volume of PIN envelopes, there can be a number of printer or pressure sealer errors (such as paper jams). In these cases you will need to restart production from the last successfully printed envelope, which means entering the serial number from which you wish to restart. If you use the option of printing serial numbers as bar codes, the last envelope can easily be scanned. The main reasons for using the bar code reader are accuracy and speed. The bar code reader should support Code 128 type Bar Codes.
- **Paper shredder:** In production a number of envelopes will need to be destroyed due to errors in printing or folding. Since these may contain information of a sensitive nature a shredder in proximity to the printing station may be advisable from a security point of view.

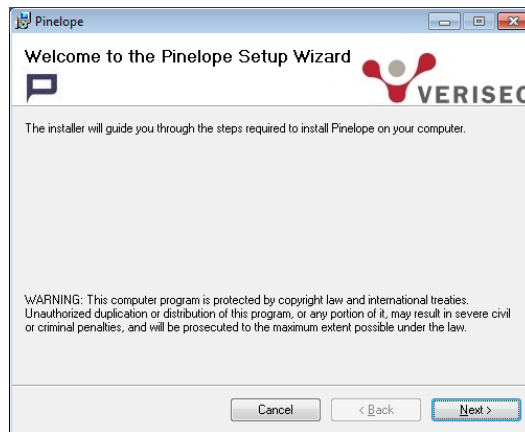
## Limitations

Pinelope currently only supports Z-folded PIN mailers or PIN mailers that are not folded (see chapter 1). Support for other folds will be available on demand, and made available in future releases. Please visit [www.verisec.com](http://www.verisec.com) for the latest release information.

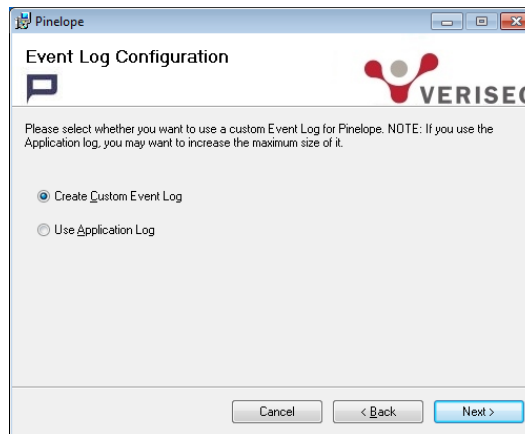
# Installation

In order to install the software you may need to have administrative rights to the PC. This will depend on the restrictions set in place by the administrator. For instructions regarding encryption support setup see section on Encryption below.

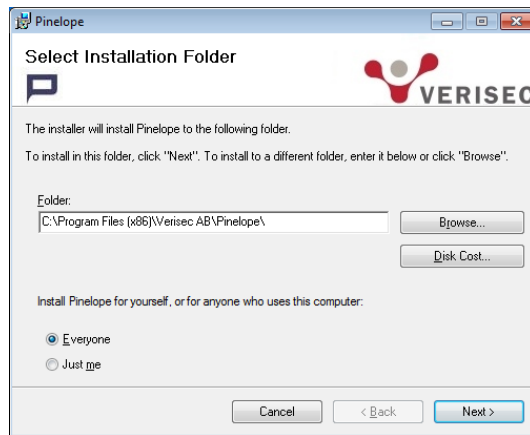
1. Insert the software CD. Run the setup program; the setup wizard should launch.



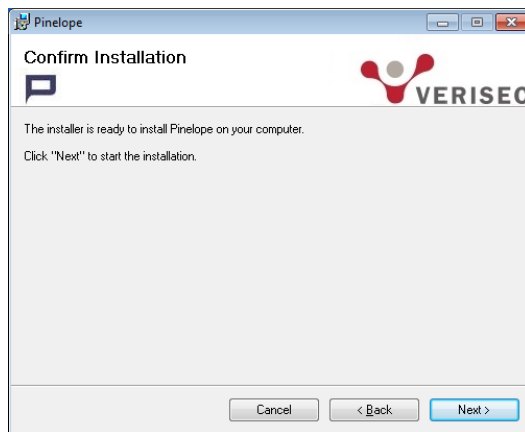
2. In order to continue press Next.



3. Choose logging option. Continue with the Next button.

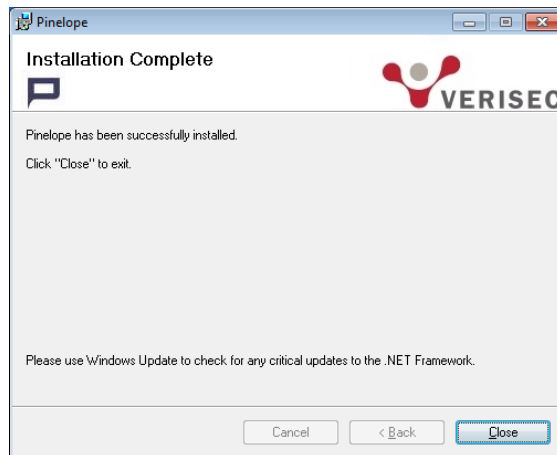


4. Choose the appropriate installation folder, and choose whether everyone using the computer should have access to Pinelope or only the user currently logged in. After making the choices press Next.



5. Confirm the installation procedure by pressing Next.





6. When the installation is complete the “Installation Complete” screen will be displayed.

## Registering Pinelope

Pinelope can be registered by sending an email to [register@verisec.com](mailto:register@verisec.com). Registering the copy of Pinelope is a pre-requisite for support and new releases.

# Production Environment

This chapter elaborates further upon Pinelope's role in PIN mailer production and describes a typical use case.

Having given some thought to the type of paper, security film, folding and sealing, etc., you are now at a point where you need to consider how PIN data should be retrieved, processed and, finally, printed. For instance, your security policy may require the use of encryption, or PIN data might need to be fetched in a specific way. While the printing of PIN data is managed in Pinelope independently, file retrieving and decryption are a matter of communication with external entities, as shown in the

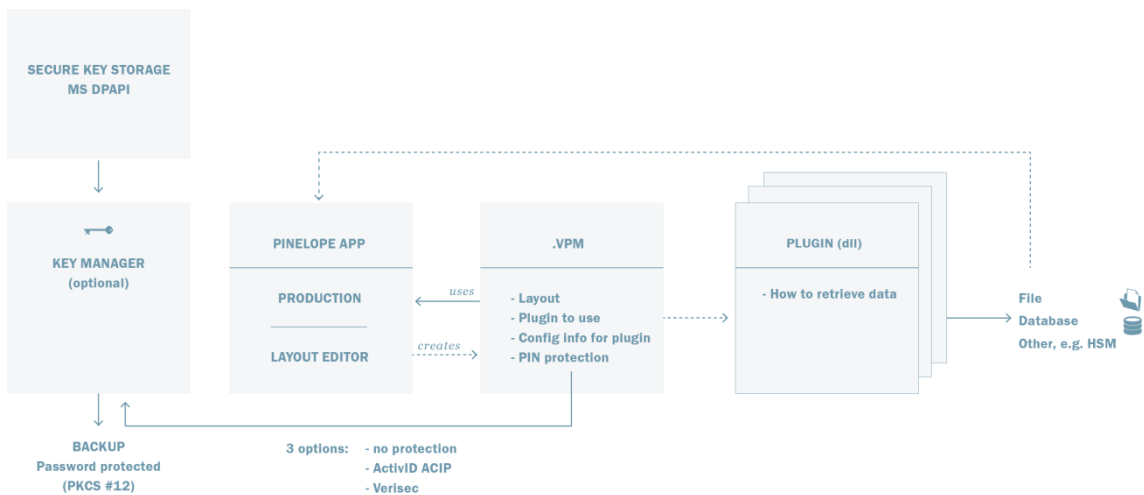


diagram below.

Picture 7: the architecture of Pinelope

The application itself is used to produce PIN mailers and to create layout templates – combinations of settings applied per PIN envelope bundle, saved in the form of a \*.VPM file. In addition to other layout a settings, a template contains the information how PIN data is to be retrieved (which may require different plugins) and what protection method, if any, should be used to decrypt this data. Keys used for PIN decryption can be managed in the Key Manager application shipped with Pinelope, in which they are protected with Microsoft's Data Protection API (DPAPI).

The use of encryption in conjunction with Pinelope is described in the next section. For more information about fetching PIN data in different formats and/or using encryption mechanisms other than the built-in ones, please refer to the section Data Providers below. If you do not require any additional options and plan to use

Pinelope's built-in functions only, you may move on directly to the section PIN Envelope Production, which treats all other processing and printing settings.

## Encryption

### General Information

Pinelope can optionally be configured to decrypt PIN source files before printing. A Key Manager application is provided alongside Pinelope to handle basic key-related operations. If your security policy and processes allow the usage of clear text PIN's, please skip to PIN Envelope Production.

This section covers two supported mechanisms for decrypting the PIN in an iPIN file. Pinelope does not include the functionality for encrypting the PIN field as this is assumed to exist in the application providing the source file to Pinelope.

For an example of the file format, please refer to Appendix B. Verisec provides a specification of how the fields should be encrypted in the text below, as well as text files with test vectors to be used for development<sup>11</sup>.

### Encryption methods

The following section describes the two encryption methods that are currently supported in Pinelope. Additional methods could be added if required, please contact [info@verisec.se](mailto:info@verisec.se) for more information.

**ACIP:** This is the method used by ActivIdentity Corporation to protect PIN codes. Each PIN code (typically 4-5 digits), is padded to the right with "F" characters up to 8 bytes, then 3DES encrypted in ECB (Electronic Code Book) mode and Hex coded resulting in 16 chars PIN field. (In this case any two identical PIN codes will result in the same encrypted text.)

**WRAP:** The PIN code is padded to the right with spaces up to 16 bytes<sup>12</sup>, then AES encrypted using CBC mode with the serial number (padded to the right with space characters) as Initial Vector (IV). The result is a Base64-coded 24 char PIN field.

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<sup>11</sup> Verisec can also provide encryption utilities for specific customer requirements. In order to provide the best possible service Verisec will require sample files.

<sup>12</sup> If the serial number is longer than 16 bytes the 16 rightmost bytes will be used.

## Key Management

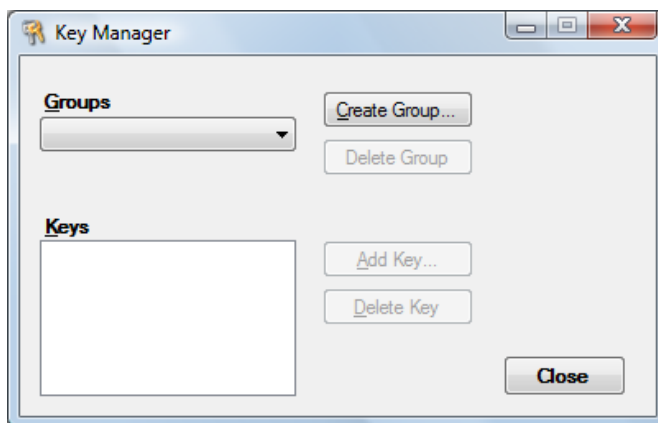
In order for Pinelope to access a key for decryption of the PIN field the Key Management Utility needs to be used to store PIN encryption keys.

Keys are persisted in the Windows registry, protected with Microsoft's Data Protection API (DPAPI). They can only be retrieved on the same computer system on which they have been stored and by the same user. Further, the key is protected by a password set in the Key Manager application. The password needs to be entered when a batch of PIN envelopes is produced using encrypted PIN fields.

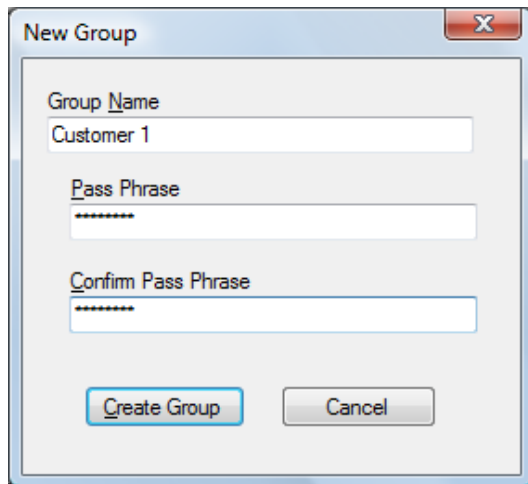
In order to minimize the risk of leaking encryption keys, the key is also protected in RAM during PIN mailer production using DPAPI in-memory methods and only accessible by the Pinelope process. Consequently the key is only potentially exposed during the actual decryption of the PIN field.

## Installation

The Key manager is automatically installed when the Pinelope application is installed on the computer, although an administrator will only need to use the key manager if you plan to use PIN encryption. To start the Key Manager, click icon on start, choose All Programs, Pinelope, and then Key Manager.



All Keys stored in a given group will share the same user defined password. Keys in a group constitute a Key Vault. In our own production we use a new group for each customer. In order to define a new Group click Create Group.



Group Name. Enter the Group name

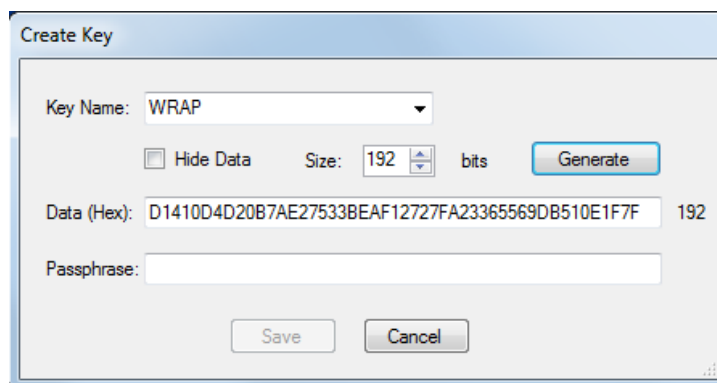
Pass Phrase. Enter a pass phrase

Confirm pass phrase

**TIP!**

Please observe that the pass phrase is **not** stored and can therefore not be recreated. Should you lose this pass phrase, all keys in the group will be permanently lost. We strongly recommend the pass phrase be stored in a safe.

When you have created the group/groups you can assign Keys to these groups by clicking the Add Key... button.



Name: Choose the method of protection that is used in the PIN file. The default supported types are ACIP and WRAP. Though it is possible to type a new name in the name field and generate an associated key, it is not advisable. A user defined

name will not appear in the Pinelope interface by default and therefore cannot be used.

Note that key names must be unique. In effect, this means that only two keys that Pinelope will recognize, one WRAP and one ACIP, can be set for any one group.

**Generate Button:** If you wish Pinelope to generate the Key you can use this button. Key generation is done using the Microsoft Crypto API predefined function for Key generation.

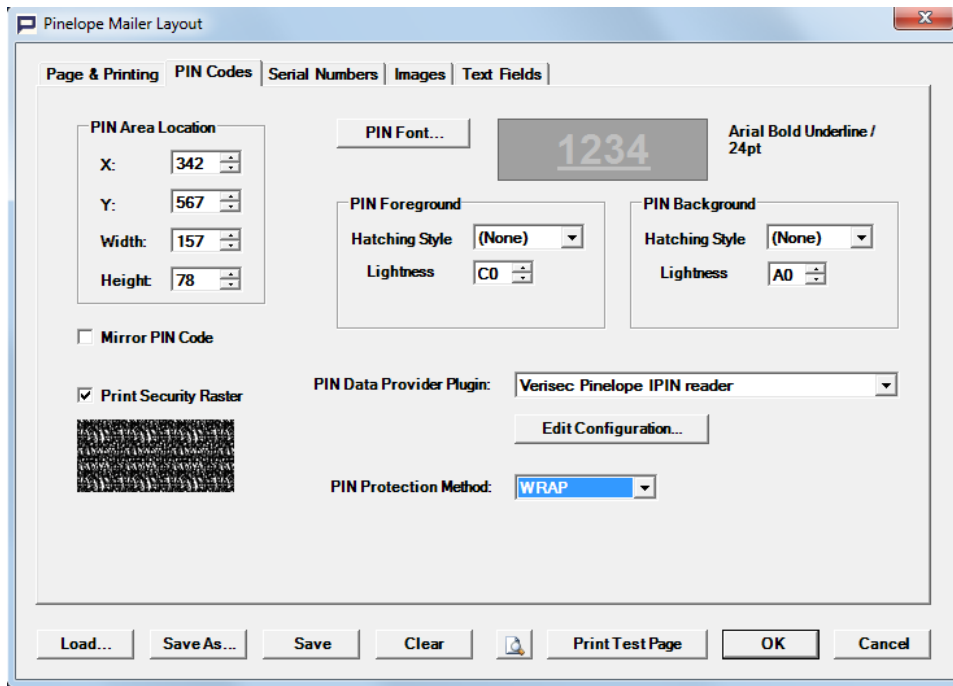
**Size:** Before generating a key, specify the key length in bits.

You can show or hide the characters of the key by checking or unchecking the Hide Data checkbox.

**Passphrase.** When creating a key a passphrase is required. This passphrase will be needed when using the key.

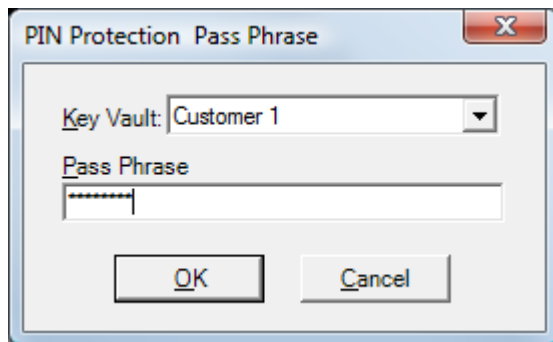
When you have configured the Groups and associated Keys you can click the Close button in order to commit the changes.

One of the two predefined decryption methods can be selected in Pinelope as a part of a template. The creation of a \*.vpm file, i.e. template file, is described in the section PIN Envelope Production later in this manual. You can choose the PIN protection method in the Layout dialog, PIN Codes Tab (see example in Picture 8).



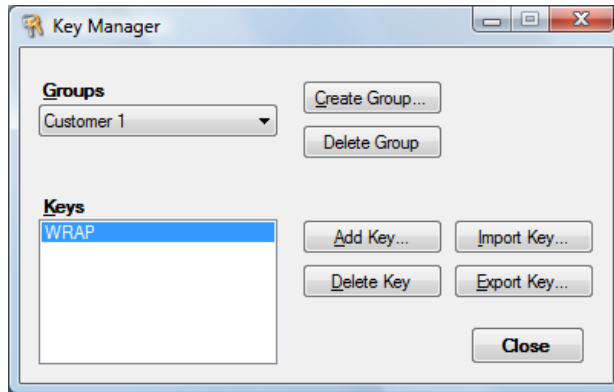
Picture 8. Layout dialog, PIN Codes Tab

When proceeding to the actual printing of the PIN envelopes, the operator will be prompted for the Key Vault that was defined in the Key Manager as well as the Pass Phrase to the vault. In the example above, the WRAP key will be selected for use with the Pin source file from the Customer1 key vault.



**TIP!**

In some cases an administrator may want to import or export keys from the key manager to avoid having to write long strings on a piece of paper. If you need to access this functionality hold the ALT key pressed down when starting the Key Manager application. The key management interface will then look as follows:



Like magic two new buttons have appeared that will allow for import and export of encrypted key files using a password. You will be prompted to set the password the first time you carry out an import or export.

## Data Providers

### General Information

Fetching and decrypting PIN data (serial numbers, PIN codes, and dynamic data) may need to be done differently in different environments. For example, your organization may require the use of an HSM or other encryption/decryption mechanisms where the PIN source files are in a non-standard format. Alternatively, PIN data may need to be retrieved from a database.

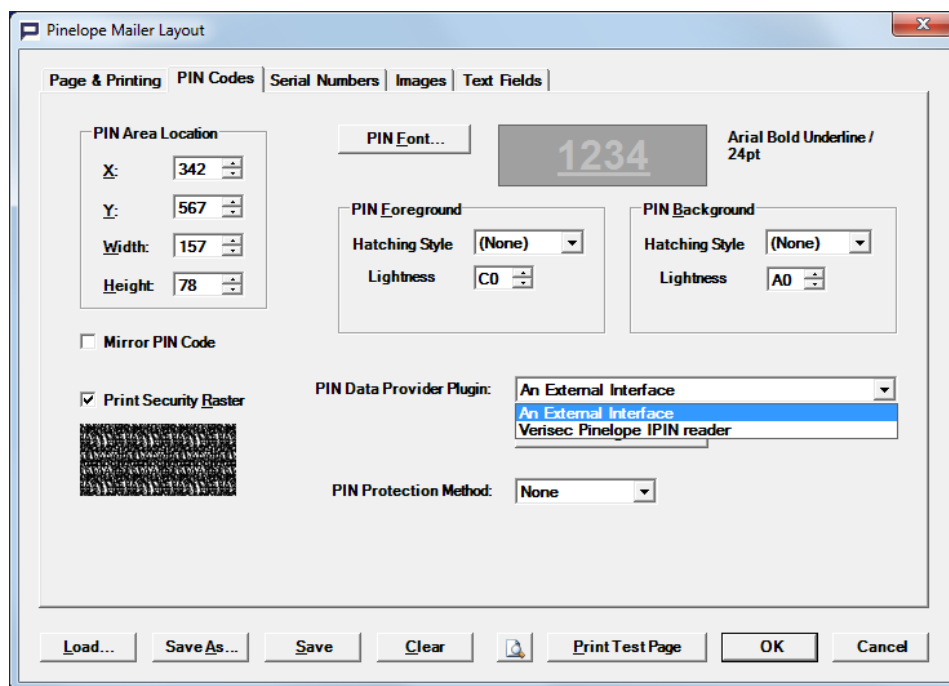
With that in mind, in Pinelope these operations are performed through a plugin, which can be replaced by a custom one if need be. When Pinelope is delivered the standard IPIN file format is configured as the default, built-in plugin, with which the two built-in decryption methods can be used. Should you wish to develop one or more plugins of your own, there are a few things you need to take into consideration.



Pinelope is delivered with two Data Provider plugin interfaces. A plugin should be a CLR assembly that satisfies one of the two interfaces<sup>13</sup> and has a public constructor.

The assembly (.DLL) may contain one or more implementations of the interface IPinelopePlugin or IPinelopePlugin2. It is installed by dropping the assembly DLL and any associated files in the subdirectory Plugin in the installation directory of Pinelope.

If Pinelope is running at the time of plugin installation, it should be restarted. After this the plugin becomes visible in Pinelope next to the default one and can be selected as an element of the layout template, as shown in Picture 9 below.



Picture 9: Layout window, PIN Codes Pane with a custom plugin selected

The Version and Company attributes of the assembly are used as version for the contained plugin(s), and can be examined in Pinelope's About box. The Name attribute of the IPinelopePlugin interface identifies the actual plugin in the .VPM files.

---

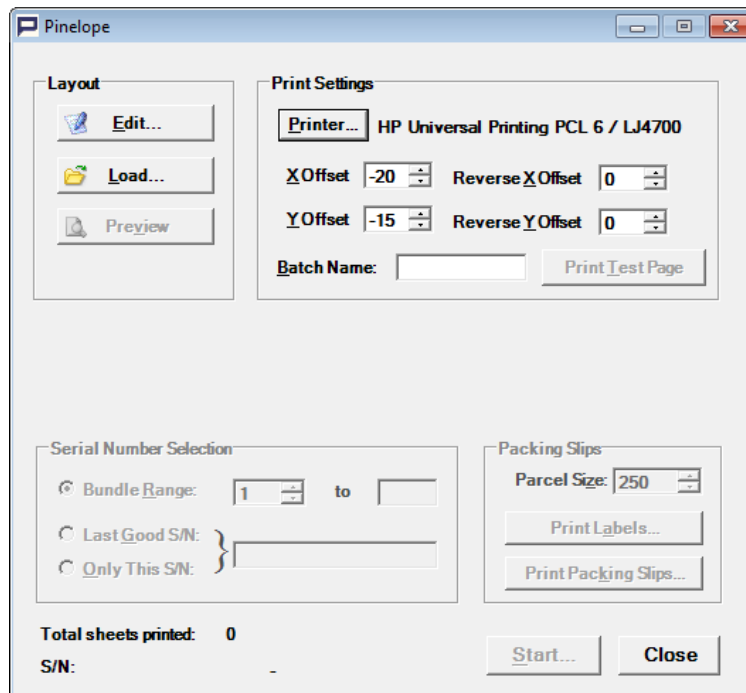
<sup>13</sup> Contact [info@verisec.com](mailto:info@verisec.com) for an example of the interfaces or any other additional information. Note that the term 'interface' in this context refers to a concept quite different from the one that users normally interact with: it is essentially a set of formal requirements that the plugin must fulfil in order to be able to connect with Pinelope.

## PIN Envelope Production

The processing and printing of PIN data is managed in Pinelope at the level of a layout template which can be applied to a set (that is, a bundle) of PIN envelopes. A template covers the configuration of the whole page, the settings for printing PIN codes and serial numbers, as well as images and text common to all PIN mailers produced using the template. After creating a template, you can proceed to configuring printer settings and printing PIN mailers.

## Creating a template

Start Pinelope by clicking on the application icon and you will be presented by the Main window shown in Picture 10.



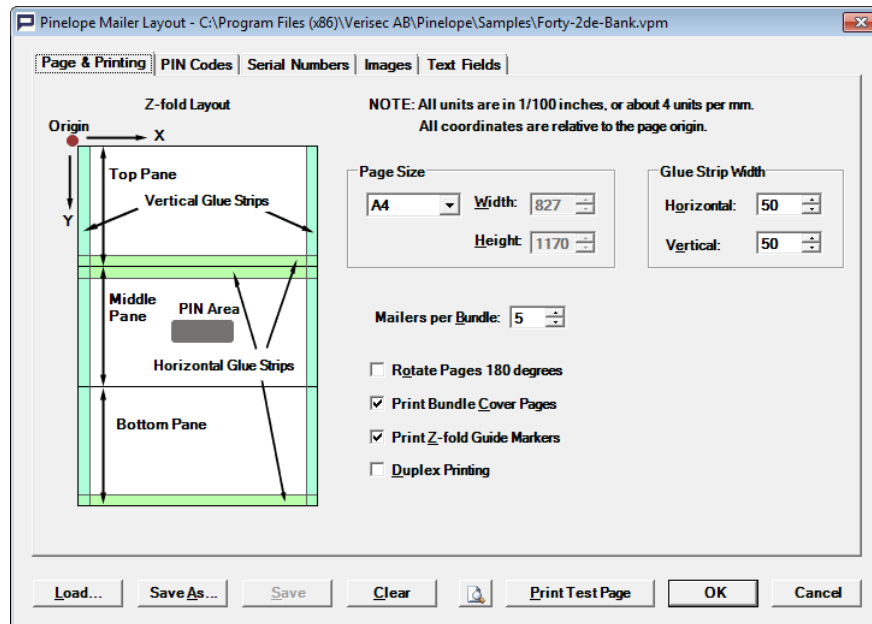
Picture 10: Main Window

The picture shows the main window as it is displayed before a template file has been loaded. At this point, it is not possible to select a PIN source file yet, or to modify any of the settings that relate to the bundle or parcel - these parameters become available only after loading a template layout file.

**TIP!**

In the installation directory you will find a sample template document called Forty-2de-Bank.VPM. This sample is for a fictional bank that wishes to provide PIN codes to its users. It may be useful to experiment with this template when reading this section.

In order to create a new template, press the Edit button in the Layout box. The Layout Window in Picture 11 will be displayed.



Picture 11: Layout Window, Page & Printing Pane

The row of buttons at the bottom of the screen applies to the layout dialog (including all tabs) as a whole.

- **Load:** loads a layout file.
- **Save As...:** saves the layout that you have created to a \*.VPM file.
- **Save:** Saves changes using the current file name as displayed in the title bar.
- **Clear:** clears the entire template dialog and resets all values to their defaults.
- **Print Preview:** displays a print preview window on screen.
- **Print Test Page:** prints a sample page on the printer.
- **OK:** takes you back to the Main window. If the template has not been previously saved, the application will ask if you wish to save the current template.
- **Cancel:** takes you back to the main menu without saving changes.

## Page & Printing

This tab contains general settings related to the entire page. Please observe that all measurement units are in 1/100 of an inch or 0,254 mm. Coordinates are relative to the page origin.

### Page size

Select the page size from the drop-down list. Pinelope comes with two predefined page formats, A4 and Letter. If you select Custom you can specify the desired width and height in the respective fields. (Note that the Height and Width fields are greyed out if a page size other than Custom is selected.)

### Glue strip width

In this setting you set the Width of the horizontal and vertical glue strips (see Appendix A for reference).

### Mailers per Bundle

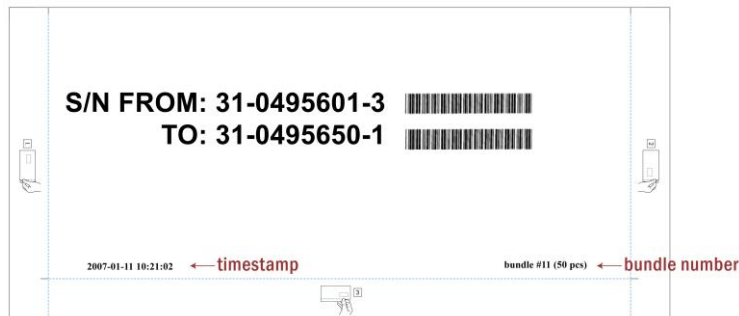
Select the number of PIN mailer in each bundle. A bundle may contain any whole number of PIN envelopes. Optionally, it may contain a Bundle Cover Page, which is printed after the mailers that make up the bundle. One or more bundles make up a Batch. In principle the bundle size may be set to the total volume of envelopes that need to be printed in a specific instance - bundles are only a tool to divide the production into manageable units that may be of interest for the customer.

### Print Bundle Cover Pages

Check this box if you wish Pinelope to print a summary page on top of each bundle. The cover page is, in effect, a PIN envelope which instead of a PIN contains the serial number range of all envelopes in the bundle. Each cover page also contains a time stamp indicating when the page was printed, as well as a bundle number and the total number of envelopes in the bundle.

#### TIP!

The cover page serves to make it easier to identify the physical bundle in which a specific serial number is located. In order for the bundle cover pages to make sense the input file should be sorted with serial numbers in ascending order.



Picture 12: A sample bundle cover page

The bar codes (which refer to the serial numbers printed in human readable form) can be used to read the number range into a tracking system.

### Print Z-Fold Guide Markers

If this option is checked, the application will print small guide markers for the Z folding. This checkbox is only recommended to be used for the initial template configuration, for testing and when using a new printer.

### Duplex Printing

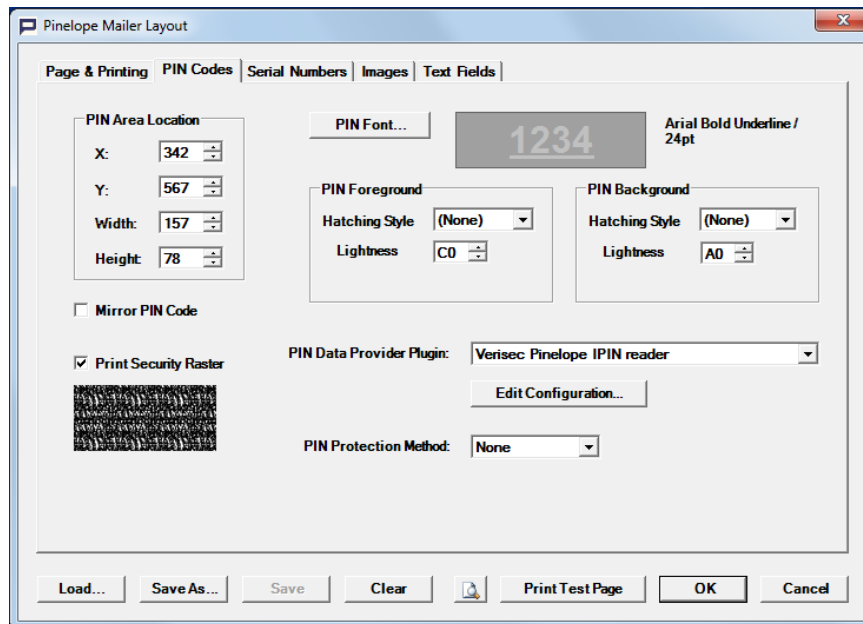
Check this box if you wish Pinelope to print on the reverse side of each page. If duplex printing is enabled, images and static text fields can be placed on the reverse side by checking a related check box in the Image or Text field tabs.

### Rotate Pages 180 degrees

Check this box if you wish Pinelope to rotate each page after printing. This may be necessary if the PIN envelopes are printed in on-line mode (i.e. the pages are printed and then directly folded in the pressure sealer) to ensure that they will be folded correctly in the pressure sealer. We recommend that you test how your specific printer and pressure sealer equipment behaves before printing the actual PIN mailers.

### PIN Codes

This tab contains settings related to retrieval and processing of PIN codes, PIN data provider and PIN protection.



Picture 13: Layout Window, PIN Codes Pane

## PIN Area Location

Adjust the physical placement of the PIN Area.

- X: Refers to the X coordinate for the top left part of the PIN area
- Y: Refers to the Y coordinate for the top left part of the PIN area
- Width: Refers to the width of the PIN area
- Height: Refers to the height of the PIN area

## PIN Font

The settings available in this menu enable the administrator to set an appropriate font and adjust foreground and background settings for an optimal balance between readability and security.

PIN envelopes typically contain a masking pattern printed in such a way to make reading the PIN code by holding an unopened envelope up to a light difficult or impossible. The choice of font and contrasts between foreground and background may affect the level of difficulty to a greater or lesser extent, depending on the type of paper. Different printers and manufacturers will use different types of printed masking patterns. In many conventional PIN envelope constructions, the choice of font, raster style and grey scale is only marginally significant from a security perspective. Unless you are using specific security film, please feel free to skip to the section related to Lightness Adjustment.

The PIN code as it will be printed in the envelope is previewed in the PIN Preview Box (see Picture 13 above). Please note that the rendering on screen is not 100% accurate (due to solution and individual printer differences), so physical samples are recommended.

### Lightness and Hatching

Pinelope allows for two different types of adjustments related to the rendering of the PIN:

- *Lightness Adjustment*: Gives basic contrast adjustments whereby the foreground and background has just one setting each. This is the default mode.
- *Hatching<sup>14</sup> Style Adjustment*: Allows more granular settings for foreground (the characters) and the background. Settings include the hatch style, foreground and background.

**TIP!**

Different types of security paper require different settings for how the PIN should be printed on the security film in order to achieve the best balance between security and readability. To complicate matters further, the specific printer used for manufacturing the end product may render settings a bit differently. Testing different settings on the actual production environment is critical for a good end result.

Note for Hydalam™ users: For Hydalam™ users we would recommend using the following Hatching settings as a starting point:

- PIN Foreground: Foreground *Light Grey*, Background *White* Hatching *10%*
- PIN Background: Foreground *White*, Background *Light Grey* Hatching *25%*

Note for ICS3 users: ICS3 is a security film from Page International. Our recommendation is to use Lightness Settings for both foreground and background and to avoid Hatching.

The reason for such complexity in PIN rendering settings is to allow maximum freedom in the choice of paper and security film without compromising security. From experience with using Pinelope internally, Verisec has drawn the conclusion that depending on the “glossiness” of the security film, certain PIN rendering settings may not be optimal from a security point of view.

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<sup>14</sup> For more information about Hatching see <http://en.wikipedia.org/wiki/Hatching>

## Lightness Adjustment

Picture 13 above shows the default dialog that displays the PIN Codes tab when Hatch Style is set to (None). In this case the Lightness drop boxes are visible.

Lightness adjustment allows setting for greyscale for the foreground and background of the PIN field. The numeric scroll specifies lightness as a hexadecimal value with 0 being black and FF being white. Lightness can be adjusted for both foreground (characters) and background.

## Hatching Style Adjustment

In Picture 14 below, the Hatching Style Adjustment drop down boxes are displayed. If Hatching Style is set to any value besides (*None*), the Foreground and Background drop boxes are displayed.

Hatching is adjusted separately for PIN Background and PIN Foreground. PIN Foreground refers to the alphanumeric characters that make up the actual PIN code, whereas PIN Background refers to the field on which they are printed – the same as when using Lightness settings. However, when hatching is used, both the characters and the field behind them are treated as having their own foreground and background, and different colours and styles can be specified for each.

Let us assume that you wish to configure hatching for the PIN characters first. This is done in the PIN Foreground submenu. The colour of foreground and background within the characters can be set to white, light gray, gray, dark gray or black. The hatching style refers to the percentage of the character that is to be considered foreground.<sup>15</sup>

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<sup>15</sup> If you think that using "foreground" and "background" to mean different things is confusing- so does the author of this manual. If any reader can come up with a good alternative, changes will be made in the manual and software without hesitation. For the time being we ask for your patience. Play around with the settings, and the functionality will become more obvious.



Example 1: In this example the PIN Foreground\* (i.e. the characters) has been set to:

Foreground: Black

Background: White

Hatching Style: 5% (i.e. the percent of the character considered to be Foreground and therefore printed in black is 5%)

The resulting PIN will look as follows:



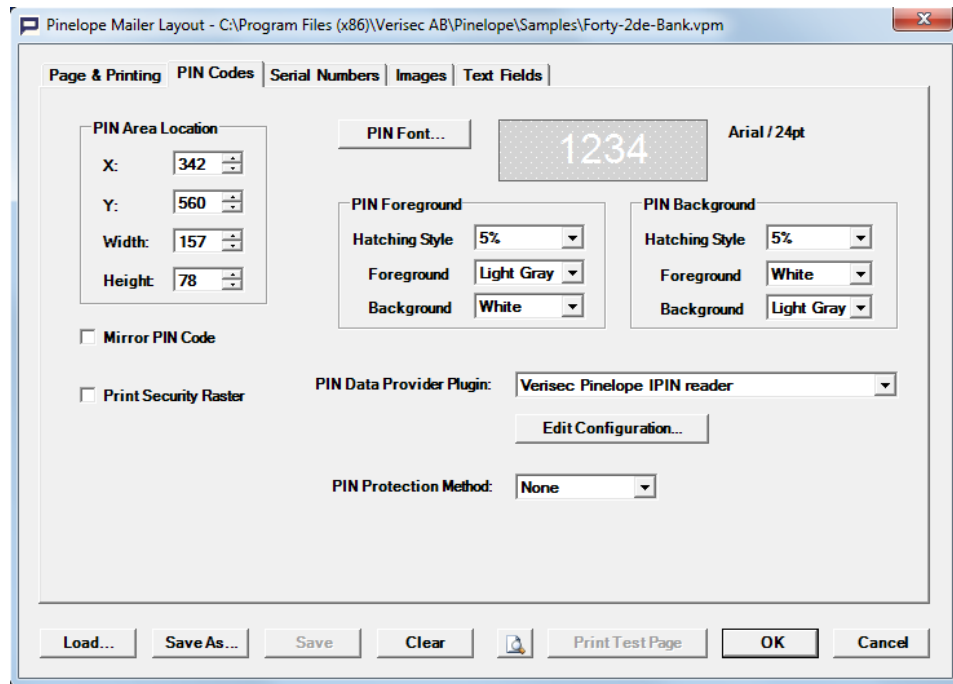
-----  
\* in this case we have left the PIN Background at default settings, i.e. Foreground = White, Background=Light Grey, Hatch=25%

Example 2: In this case we have taken the same settings as in example 1 and changed the Hatching style from 5% to 50%.

In this case the resulting PIN will look as follows:



The same can be done for PIN Background (i.e. the field on which the characters are printed) in the second submenu. In the example below the chosen hatching style is also 5%, but background is set to light gray, while foreground is white. As a result, 5% of the background is white, and the remaining 95% is light gray.



Picture 14: Sample PIN Codes tab dialog with Hatching Style options

Changing the PIN Foreground, Background and hatching style settings is a balance act between readability (i.e. making the PIN readable for the intended audience) and security. Testing a number of different settings will give you a good feeling of what is a reasonable level from a readability perspective.

### Mirror PIN

Check this box if the PIN should be printed as a mirror image. This function is primarily intended for use together with security films whose construction makes it a requirement. An example of this type of film is ICS V3 from Page International.

### Print PIN Raster

The PIN Raster checkbox is used to place a protective raster the position of which will mirror<sup>16</sup> the placing of the PIN Area. This additional raster is intended to increase security, since it is printed with the same printer as used for the PIN. The lack of

<sup>16</sup> The raster area will be placed such that it covers the PIN area when the mailer is folded and sealed.

colour difference between the ink in the raster and the PIN makes image processing attacks<sup>17</sup> more difficult.

### **PIN Data Provider**

In the standard installation of Pinelope the only available data provider is the “Verisec Pinelope IPIN reader” option. If any non-standard decryption methods and/or file formats are used, a custom plugin will be required to process the PIN data. After it has been written and dropped in the plugin directory of the installation, the custom plugin appears in this drop down menu next to the built-in one. Though more than one can be developed and installed, only one plugin may be selected for a layout template and is unique for each \*.VPM file.

### **Edit Configuration**

Edits the configuration of the selected plugin by setting name-value pairs that a PIN source file must contain in order for the plugin to process it. Only files that match these criteria will be visible when the template is applied. In a situation where multiple VPM files and source data files exist in the same environment, this is a way to make production easier and minimize human errors.

### **Service ID**

The service ID field is basically a unique name associated with the specific VPM file, and is only applicable to the built in data source. The purpose of a Service ID is to make sure that the appropriate VPM file is used for the matching data file.

If a name is given in the Service ID field this must match the ID in the first row of the Source data file. The first row in the source data file must then be set to:

**###PINELOPE SERVICE ID### Service ID** (see Appendix B for more details).

By using the operator **File=** in the Service ID field a part of the file name can be entered such that windows explorer will display files that match the string. An example would be **File=pattern** When a source file is opened in the main menu screen the explorer filename field will be opened with *pattern\** filled in. This function is intended for convenience when manufacturing PIN envelopes using many source files that may share a common name.

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<sup>17</sup> Image processing attack is a term used in “Laser-Printed PIN Mailer Vulnerability Report”; Mike Bond, Steven J. Murdoch, and Jolyon Clulow; Computer Laboratory, University of Cambridge. This report is recommended reading and gives a good introduction to weaknesses in PIN Mailers.

## **PIN Protection**

If the PINs to which the template is intended are going to be encrypted, select one of the built-in protection methods (ACIP or WRAP) from the drop down box. As was previously noted, this is the method used to decrypt PIN data in the source file. The protection method is unique for the \*.VPM file. For Pinelope users manufacturing PIN mailers for multiple customers, a \*.VPM file will typically be defined per customer or user group.

See the description of the Key Manager on page 28 for more detailed information regarding the PIN protection

## **Serial Numbers**

This tab contains settings relevant to the processing and printing of serial numbers. If you have no need for processing serial numbers, please skip to the next section.

### **Process serial numbers**

Check this box to allow the serial number field in the source data file to be processed. If this parameter is left unchecked, Pinelope will print serial numbers as presented in the PIN file. The following processing options can be set if the checkbox is checked:

### **Serial Number Prefix**

Enter a number that will be added as a prefix to serial numbers from the input PIN file. When a number is entered, the Prefix Length box will be greyed out and indicate the number of characters typed in the Prefix field. For example, if the prefix is entered as 23 then the Prefix Length will show a "2" and be greyed out.

### **Prefix Length**

Automatically calculated when a value is entered in the Prefix field. If the Prefix field is left empty, the prefix length can be adjusted such that the application will place a hyphen after the number of characters given by the prefix length. In other words, the given portion of the serial number itself will be treated as a prefix. For example: If the serial number is 123456789, where 12 is a prefix that for display purposes needs to be separated, and the prefix length is set to 2, Pinelope will automatically enter a hyphen after the two first digits. The serial number is then printed as 12-3456789.

### **Append Check Digit**

If this option is checked, Pinelope will calculate and append a check digit for each serial number, separated from the serial number by a hyphen when printed. Pinelope supports the Modulus 10 check digit (also known as the Luhn algorithm).

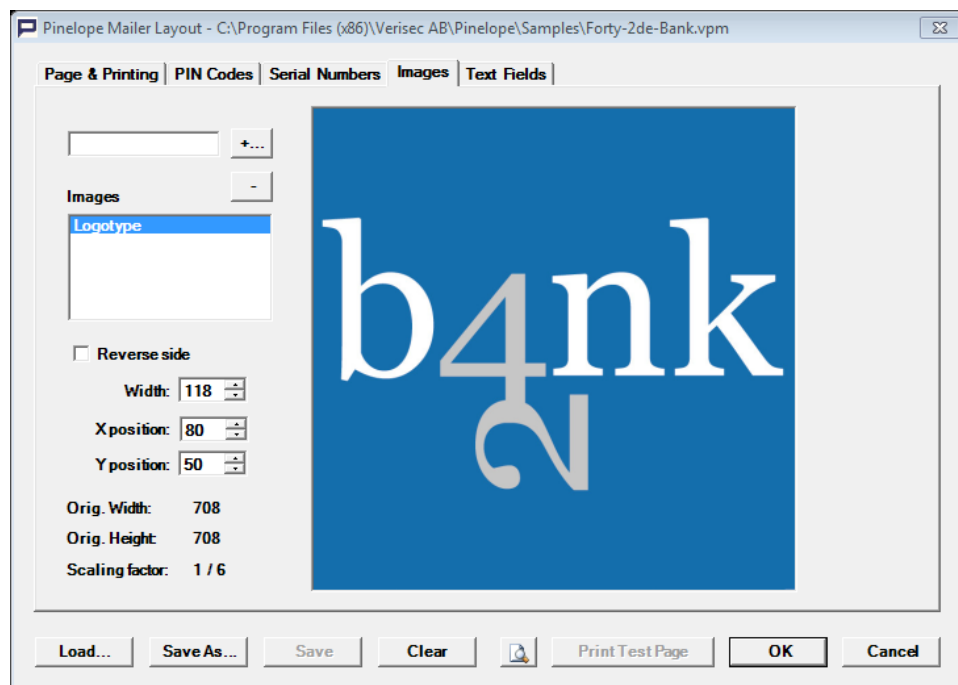
## Print Serial No as Barcode

If checked, the serial number in the source file is printed as a barcode (Code 128). The following options can be specified for the barcode:

- X: Refers to the X coordinate for the centre of the Barcode area
- Y: Refers to the Y coordinate for the top of the Barcode area
- Weight: The width of the narrowest bar element in the barcode.
- Height: The height of the barcode strip
- Rotation: The rotation of the barcode in units of 90 degrees, around the top centre of the barcode.

## Images

This tab is used to manage images or graphics to be displayed on the page. A sample dialog can be seen in Picture 15.



Picture 15: Images Tab

In order to create an image, enter a name in the text field above the list and click the +... button to the right. This will launch a file select dialog to select an image file. Select a file and click Open. The name given to the image will appear in the list of image names. Supported graphics formats are GIF, JPG and BMP. If you need to remove an image, select its name in the Images box and click the – button. The properties of the image you can modify are as follows:

**Width**

The width of the image as printed on the page.

**X Position**

The x-coordinate of the top left corner of the image.

**Y Position**

The y-coordinate of the top left corner of the image.

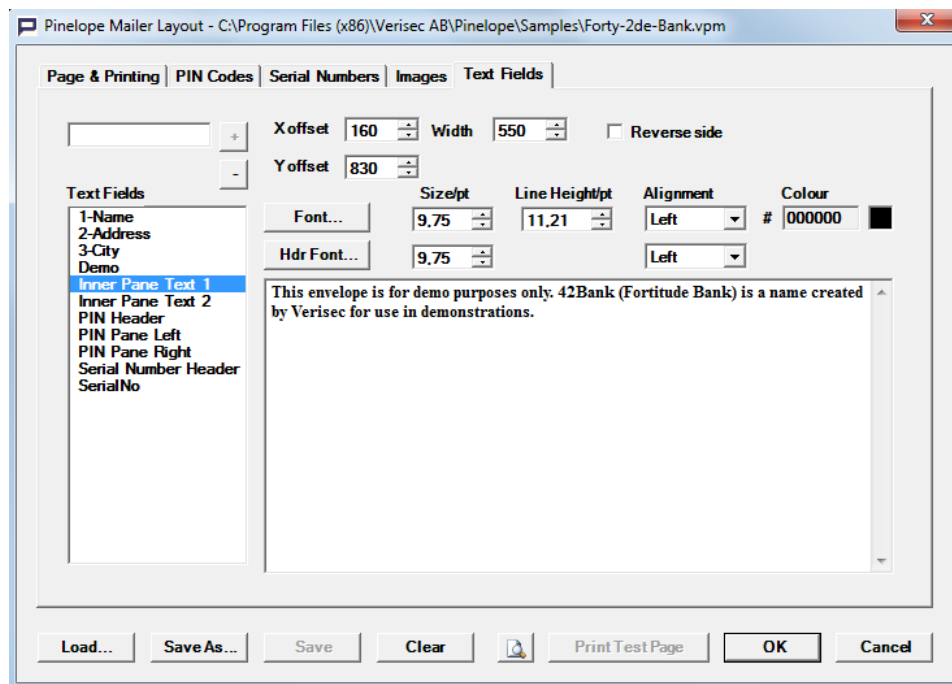
**Reverse Side**

If checked, the image will be placed on the reverse side of the page (visible only if **Duplex Printing** on the **Page & Printing** tab is checked).

The original dimensions of the image (in pixels) are shown below, as well as the scaling factor that will be used. In some cases it may be desirable to scale the image such that a pixel in the original images scales exactly to an integer number of pixels on the printer. Since laser printers typically have a resolution which is a multiple of the Pinelope's display units of 100dpi, having an integer scaling factor helps ensure the optimal quality of the printed image.

**Text Fields**

This tab is used to manage all text, both static and dynamic, which is to be printed on the PIN mailer. A sample dialog can be seen in Picture 16a.



Picture 16a: Text Fields Tab

Add new text fields by typing in a name in the Name field and clicking the + button. If you wish to remove a text field, select its name and click the – button. Should you wish to create a field with the same settings as an existing one, select the name of the field in the list before entering the name of the new one.

The properties of the text fields you can modify are as follows:

### Positioning

The text that should appear can be entered into the textbox, and its position adjusted using X and Y coordinates. The default values are zero, but you can clone this and other settings from any existing field by selecting it before you add the new one. Use the Preview icon to check the exact position of each field in the final product.

### Font

Adjust the font that will be used in printing this text using the Font... button. If the text is not uniform and another font (or Bold/ Italic etc.) is required for certain lines within the field, this can be solved using the Hdr Font... button. In order for Pinelope to know which text is to be formatted using the Hdr... format, the text in the textbox needs to be delimited using the equals (=) sign.

For example: If you wish the text to look as follows:

In the window to your right you can find the **PIN** code.

The text entered into the text box showed look as follows:

In the window to your right you can find the =PIN= code.

Note that the **Hdr font...** button and the use of this format are only available if the maximum value of the field is set to a value other than zero.

### **Width and alignment**

Specify the maximum width of the text field by entering the value in the Width field. The position of the text inside the field can be selected in the Alignment menu.

### **Line height**

If the text in the field consists of more than one line, this parameter effectively specifies the line spacing.

### **Colour**

You can select the colour either by entering the corresponding value in the field or clicking on the icon.

### **Reverse side**

If this option is checked, the image will be placed on the reverse side of the page (only if **Duplex Printing** on the **Page & Printing** tab is enabled).

### **Serial Number**

Referring to the actual Serial Number, this is the only predefined text field. At printing time the string <<<s>>> will be substituted for the actual serial number. Text can be added before or after the serial number by entering text in a field named, for example, Serial Number Header, and positioning the field using the X,Y coordinates.

Note that if the serial number needs to be processed in any way (e.g. printed as a barcode), these settings can be adjusted in the Serial numbers tab.



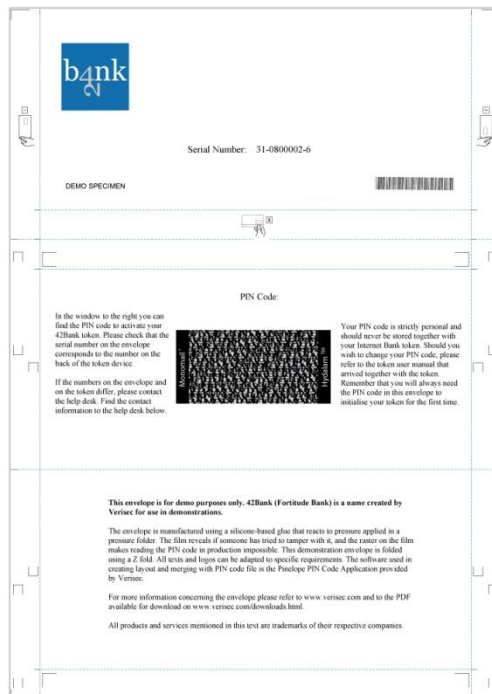
## Dynamic Fields

If the iPIN.log file includes dynamic fields (see section on iPIN.log file) these can be created both independently and within static fields. In order to add a dynamic field enter the name of the field in the Name field and press the + button, similarly to creating static fields. The first name that is added will correspond to the column 11111 in the iPIN.log file. The second name entered will correspond to the column 22222 and so on. Dynamic fields are replaced by placeholders (from <<<1>>> to <<<9>>>) until printing time. The positioning, font and other settings can be configured in the same manner as with static fields.

### TIP!

The serial number string <<<s>>> can be created using Ctrl-S when the cursor is positioned in the text field. Other dynamic fields can be created using Ctrl + the number of the column that the field should correspond to.

A sample PIN envelope page can be seen in Picture 16b.



Picture 16b: Sample PIN envelope page

# Print Settings

## Printer

To select the printer to use for printing PIN mailers, click this button. Once you have selected a printer, its name will be displayed to next to the button. All commands related to printing PIN mailers will use this printer until another one is selected.

## X Offset & Y Offset

Ideally, what we see when we click Print Preview should be an accurate representation of the printer output. Sadly, however, not all printers were created equal and paper is physically fed into the printer with different offsets. The paper is slightly removed from where the printer “expects” it to be, and the placing of the paper and the printed content is not a complete match. This does not normally cause problems when printing a document or presentation. However, due to the specific characteristics of PIN envelopes with glue strips and pre-perforation, a fine tuning is required for each printer used in PIN envelope production. These settings are stored per printer.

To understand the concept of offset, imagine a white paper with an origin (reference point) in the top left hand corner (see Appendix A). If we imagine printing a small dot in the origin, the perfect printer would place this dot exactly in the origin point, i.e. in the corner.

In reality, however, the printer will typically place this point somewhere else - above or below - to the left or to the right of the reference point. If anything else was printed on the page, the same would apply: supposing the origin point is printed above and to the left of the actual corner, the rest of the page content would also be printed above and to the left of its intended location. Being a property of a specific printer, this will occur with every page that is printed.

The offset variable is used to correct these peculiarities of an individual printer. The X and Y refer to the Cartesian coordinates - i.e. X is horizontal placement, and Y is vertical. Origin is the reference point that decides whether the adjustment is positive or negative.

- X Offset: The X offset is to make horizontal adjustments. X values are positive when adjusting to the right and negative when adjusting to the left.
- Y Offset: The Y offset is used for making vertical adjustments. When adjusting downward on a paper the offset is positive, when adjusting upward the offset is negative.

**TIP!**

In reality an origin placed exactly in the corner would be impossible to see, since by definition the point should be infinitely small and located exactly on the corner. In practice the software will print guides (See Appendix A). These guides should correspond to the pre-perforated lines on the paper. By adjusting the X and Y offsets accordingly, the printed guide should align with the perforation in the paper (as closely as possible).

**Print Test Page**

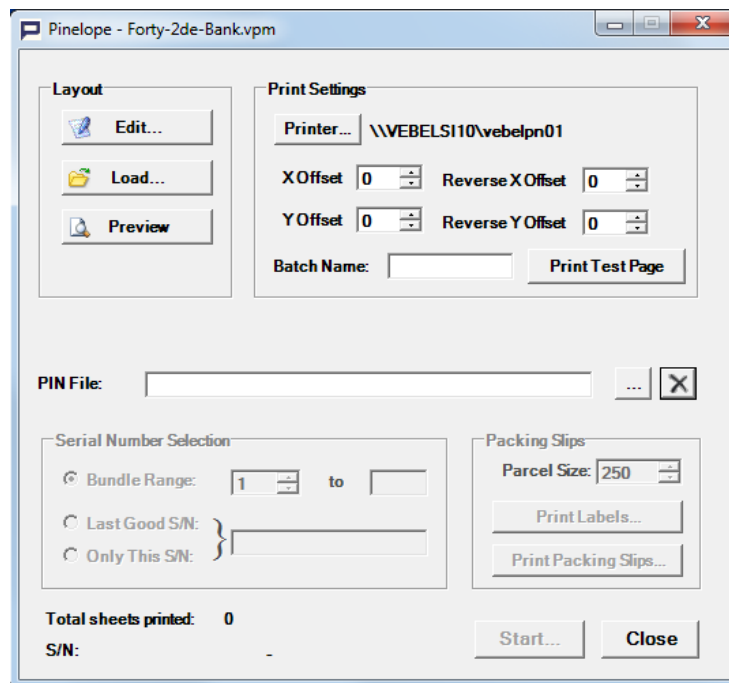
Click this button to print a sample page with the print guides using the defined X and Y offset.

**Batch Name**

The operator can supply a short Batch Name. This name will be included on each bundle cover page as well as the package labels and packing slips

**PIN File**

When a template file has been selected, either by creating it from scratch or loaded from a file, a PIN file can be selected (see Picture 17 below). Select an IPIN file by clicking the ... button, which launches Windows explorer.



Picture 17. Main menu window when a template file has been created/ loaded. Once the PIN File has been selected the greyed out areas will be enabled.

The PIN file refers to the PIN source file (i.e. the file in which the PIN codes are located). Pinelope supports the IPIN file format. Examples of these file formats are located in Appendix B. In addition a sample file has been included in the installation procedure. This file is called sample-iPin.log and is located in the installation directory (default is C:\Program Files\Verisec\Pinelope).

**TIP!**

For practical reasons you may want to make sure that the input file is sorted with serial numbers in ascending order.

Once the PIN file has been selected, the Serial Number Selection and Packing Slip menu options are enabled.

## Serial Number Selection

### Bundle Range

If this box is checked the application will print the bundle range given in the input fields. If the second input field (to) is left empty the input file will print until EOF (end-of-file). The application will break at the end of each bundle and await confirmation from the operator to continue.

### Last Good S/N

In case of a printer or pressure sealer jam the currently printed batch needs to be continued from a certain serial number (equivalent to a position in the PIN text file). The Last Good S/N can be entered by the user in case of a jam. The serial number should be that of the last envelope that was created without disturbance, i.e. the Last Good S/N.

**TIP!**

If the envelope that was folded or printed incorrectly was the bundle cover page you will need to use the Last Good S/N function and enter the last serial number in the preceding

**TIP!**

If the envelope that was folded or printed incorrectly was the first envelope in a bundle you will need to use the Bundle Range function and enter the bundle number in the first (from) input field.

### **Only This S/N**

In case of a specific envelope being incorrectly folded the operator may need to print just this specific envelope again. By entering the appropriate serial number in this field, only this specific envelope will be printed.

### **Packing Slips**

#### **Parcel Size**

The number of sheets per parcel can be entered in this field. If packing slips are used, they will be printed after the last envelope in the parcel run. The packing slip is intended for use when shipping the production run to a different location. The packing slip includes the following information: bundles in the current parcel, serial number range (to; from) and total quantity.

If you wish to print packing slips, click on the Print Packing Slips button and select a printer when prompted.

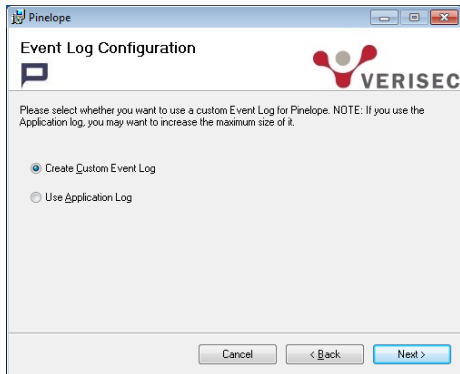
#### **Print Labels**

Select if you wish to define a device to print labels (stickers) for each parcel using a Zebra TLP 2844 Printer with 7\*5 cm stickers. For the time being, this function is only useful with the defined printer and the template is fixed. In future releases this function may be extended.

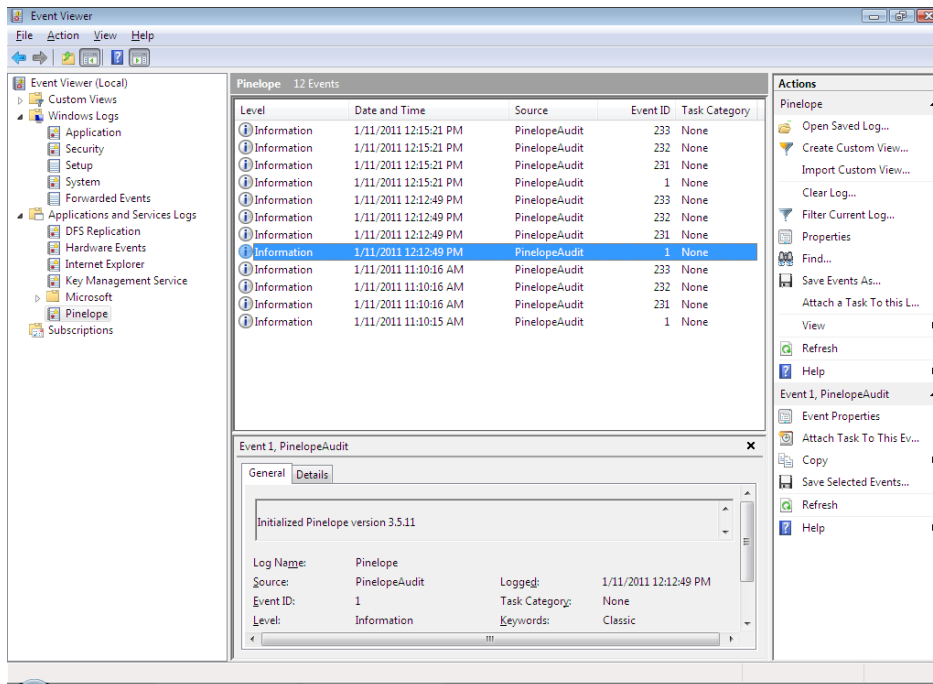
If you wish to print labels, click the Print Labels button and in the presented dialog select the device to print them, enter the number of pages and click Print to print the labels or Cancel to return to the main window.

## **Logging**

All logging is done through the Microsoft Windows Event Log. In the installation procedure there is a choice of using a custom event log or the application log.



By default Pinelope will suggest creating a custom event log that will appear in the Applications and Services Logs folder of the event viewer (see Picture 18 below). This log is set to 32 MB maximum size and is named “Pinelope”.



Picture 18. Event Viewer looking at Pinelope logs in the Application and Services Logs

If the application log is used on installation the logs will appear in the Windows Logs instead.

The following Event ID’s are logged:

<b>Event ID</b>	<b>Type and meaning</b>
1	Information. Start of a new bundle. Contains information about which printer is used.
2	Information. A Pin envelope has been printed. The serial number is displayed in the description field
3	Warning or Error. An error has occurred in reading the next line of the Pin source file.
4	Warning or Error. An error has occurred when printing.
5	Warning or Error. An error has occurred when preparing the document for printing.
6	Warning or Error. An error has occurred when quitting a print job.
10	Outputs the LogEntry field defined in the Data Source Plugin

From the event log all serial numbers that have been printed can be retrieved as well as information on duplicates and possible missing serial numbers.

**TIP!**

When using the Application Log option please be aware that in a standard Windows installation the log size for Windows Logs is set to 20 MB. This disk space allocation is typically too small for producing a larger quantity of PIN envelopes<sup>1</sup>. By right clicking on the log you can adjust the size.

In the case of the default Custom Event log the size set exclusively for Pinelope is 32 MB.

# Additional Security Considerations

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Security as related to PIN mailers is a function of the stationery, printing technique (font, raster, printer), and the process surrounding the production. If any of these links are weak, security for the finished product may be compromised.

This chapter includes a non-exhaustive list of security aspects that may need to be considered when setting up a production facility. By addressing the issues below, PIN printing may be done in a secure way even in regular office environments. Security measures should always reflect the value of the product (PIN) and the potential cost incurred if the PIN codes are exposed to a third party.

## Validity

An aspect of security that overlaps with quality assurance is the validity of the finished product. The term validity in this instance refers to the finished product matching the intended product. Since the finished product is sealed you may wish to implement a quality assurance procedure whereby a given number of envelopes are selected from the completed batch, opened, inspected, destroyed and replacement envelopes are created. Using the function of printing only a specific serial number, described on page 53, replacement envelopes can be created.

## PIN code file

The PIN code file is extremely sensitive. For this reason, any handling or exposure to the PIN file should be logged. A minimum number of people should have access to this file, and at the end of the production cycle the file should be permanently removed from the production computer.

One way of protecting the PIN file is by encrypting the sensitive PIN's in the file. When going for encryption it will be essential to consider the handling/exposure of Key information. Typically you may want to have dual control (i.e. multiple individuals) over cryptographic keys thereby making it difficult for any single person to compromise the security of key handling. In addition, considerations around physical logs related to checking in/ checking out of keys may be taken into account as well.



Using the new interface in Pinelope, hardware encryption units (HSM's) can be used for the actual decryption of the PIN's located in the source file. An advantage of this setup is that the key for decrypting PIN's is located within the boundaries of the HSM and thus never exposed in unencrypted form.

## Logging paper consumption

Security paper typically used for printing PIN envelopes should be considered valuable in itself and therefore stored in a secure, locked storage. Before production is started, a number of sheets should be checked out from a locked space. A security officer, or the like, should check the number and sign a log for each checkout.

When production is completed, the remaining sheets should be counted together with any discarded sheets. The total number of PIN envelopes produced + remaining sheets + discarded = Total Checked out. Each respective subtotal should be logged and inspected by a security officer.

The reason for logging is to avoid rogue operators making duplicate PIN envelopes.

## Network environment

The computer and printer should not be on the same<sup>18</sup> network as the rest of the organisation. PIN files are generally not encrypted, and will be stored on the production computer during the production cycle. Consequently, network access should be limited by physically separated networks, or by an internal firewall configuration.

## Physical security

Depending on the value of the PIN mailer product to be produced the production facility in itself may need to be secured using reinforced walls and/or windows, additional alarms, camera surveillance etc. Requirements such as these may vary from customer to customer, but a base level should be maintained such that entry into production is monitored (see section on access control).

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<sup>18</sup> Or at least isolated from general access

## Access control

Physical access is always a consideration that needs to be addressed when producing sensitive documents such as PIN envelopes. Logging entry into the room is a minimum requirement in order to be able to track which envelope was created by which operator, and who else was in the room at the same time.

## Logging

As mentioned in previous sections of this chapter, logging is a necessary component in any security architecture. Logging is mainly used for tracking a chain of events or generating statistics. It should be set up in such a fashion that each completed PIN envelope can be tracked back through production to the time and operator that produced the envelope. In fact, each envelope should be traceable back to the original work order.

Some printers may allow logging and reporting. These reports may or may not be 100% accurate depending on the printer errors that may have occurred during production.

As described in Chapter 3 above, the logging is managed through the Windows event log. Together with physical access logs, and access logs to the PIN file, this will give a good level of traceability.

## Paper shredding

Due to paper jams in the printer and/or pressure sealer a number of erroneous envelopes are created that may include sensitive information. These envelopes should be logged and thereafter destroyed. A number of shredders are available on the market ranging from low security to high security cross cutters. Depending on the sensitivity and value of the information contained in the envelopes an appropriate shredder can be purchased.

# Reference Guide

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## Main window

When Pinelope is started, the first window you can access displays all layout and printing options.

### Layout box

<b>Edit</b>	Launches the Layout window and starts the Editing procedure for the currently loaded template file (*.VPM). A blank file is created if no VPM file is loaded.
<b>Load</b>	Opens an explorer window and prompts the user to select a layout template file in the *.VPM format.
<b>Preview</b>	Displays a print preview of the currently loaded layout template file. It is possible to print a test page in print preview as well, but we recommend using the Print test page button in Pinelope for more reliable results.

### Print settings

<b>Printer</b>	Selects the printer to use for printing PIN mailers. Once a printer is selected, its name will be displayed to next to the button.
<b>X Offset</b>	Used to make horizontal adjustments. X values are positive when adjusting to the right and negative when adjusting to the left.
<b>Y Offset</b>	Used to make vertical adjustments. When adjusting downward on a paper the offset is positive, when adjusting upward the offset is negative.
<b>Print Test Page</b>	Prints a sample page with the print guides, using the previously defined X and Y offset.
<b>Batch name</b>	Name of the batch that the bundle of PIN mailers belongs to. If supplied, Batch name will be included on each bundle cover page as well as the package labels and packing slips.
<b>PIN file</b>	PIN source file that contains PN data to be printed. This

	field is only available after a layout template file (.VPM file) has been loaded.
<b>Config file</b>	Plugins other than the built-in one may require a configuration file to be uploaded. This field is only visible if the plugin selected in the .VPM file requires it.

#### Serial number selection

<b>Bundle Range</b>	The range of serial numbers to be printed. If the second input field (to) is left empty the input file will print until the end.
<b>Last Good S/N</b>	The serial number within the batch from which printing will be resumed. Used in case of a printer or pressure sealer jam.
<b>Only This S/N</b>	The serial number of a specific envelope to be printed. Used case of a specific envelope being incorrectly printed or folded.

#### Packing slips

<b>Parcel Size</b>	The number of sheets per parcel.
<b>Print Labels</b>	Used to print labels (stickers) for each parcel using a Zebra TLP 2844 Printer with 7*5 cm stickers.
<b>Print Packing Slips</b>	Used to initiate the printing of packing slips.

Located at the bottom of the window, **Start** button initializes printing, while **Close** closes the application. While printing is in progress, the number of printed sheets and the serial number of the envelope currently being printed are displayed in the bottom left corner of the window.

## Layout window

At the bottom of each tab in this window there is a row of buttons which apply to the layout dialog (including all tabs) as a whole.

<b>Load</b>	Loads a layout file.
<b>Save As...</b>	Saves the layout that you have created to a *.VPM file.
<b>Save</b>	Saves changes using the current file name as displayed in the title bar.

<b>Clear</b>	Clears the entire template dialog and resets all values to their defaults.
<b>Print Preview</b>	Displays a print preview window on screen.
<b>Print Test Page</b>	Prints a sample page on the printer.
<b>OK</b>	Takes you back to the Main window. If the template has not been previously saved, the application will ask if you wish to save the current template.
<b>Cancel</b>	Takes you back to the main menu without saving any changes.

The Layout Window consists of five tabs:

Page & Printing  
 PIN Codes  
 Serial Numbers  
 Images  
 Text Fields

### **Page & Printing**

General settings for the entire page. Also contains printer related settings (bundles and duplex).

<b>Page Size</b>	Page size of PIN mailers. The predefined options are A4 and Letter. A custom size can also be entered.
<b>Glue Strip Width</b>	The width of the horizontal and vertical glue strips on the page.
<b>Mailers per Bundle</b>	The number of PIN mailers contained in each bundle. This value can be set to any whole number.
<b>Print Bundle Cover Pages</b>	If checked, Pinelope will print a summary page with the serial number range of envelopes on top of each bundle.
<b>Print Z-Fold Guide Markers</b>	If this option is checked, the application will print small guide markers for the Z folding.
<b>Rotate Pages 180 degrees</b>	If this option is checked, the application will rotate each page after printing.

## PIN codes

This tab is used to configure the printing and retrieving of the PIN code itself, as well as plugin related settings and PIN protection method if one is used.

**TIP!**

As previously noted, plugins determine the way Pinelope retrieves PIN codes. A PIN source file can be imported in different ways – in a file, from a database, decrypted in a specialized hardware module (HSM), etc. The type of file that can be fetched using a template depends on the selection of the data provider plugin. Consequently, only files in a format compatible with the plugin will be visible when the template is used. Pinelope is shipped with one built-in plugin that uses text files (IPIN format).

<b>PIN Area Location</b>	The placement and size of the PIN Area on the page.
<b>PIN Font</b>	The font used to print PIN codes.
<b>Lightness Adjustment</b>	Gives basic contrast adjustments whereby the foreground and background have just one setting each.
<b>Hatching Style Adjustment</b>	Allows more granular settings for foreground and background.
<b>Mirror PIN</b>	If this option is checked, PIN codes will be printed as a mirror image.
<b>Print PIN Raster</b>	Used to place a protective raster the position of which will match the placing of the PIN Area.
<b>PIN Data Provider</b>	The plugin used to fetch PIN data. In the standard installation of Pinelope the only available data provider is the “Verisec Pinelope IPIN reader”. If any custom plugins are developed and installed, they appear in the drop-down list next to the built-in one.
<b>Edit Configuration</b>	Edits the configuration of the selected plugin by specifying name-value pairs that a source file must contain in order to be processed by the plugin.
<b>PIN Protection</b>	The method of encryption used to protect PIN data.

## Serial numbers

This tab is used to configure how serial numbers are processed and printed (e.g. with or without a prefix, as barcodes or human-readable).

<b>Process Serial Numbers</b>	Used to allow serial numbers to be processed.
<b>Serial Number Prefix</b>	The number that will be added as a prefix to serial numbers from the input PIN file.
<b>Prefix Length</b>	Automatically calculated when a value is entered in the Prefix field. If the Serial Number Prefix field is left empty, Prefix Length can be used to specify the portion of the serial number itself that will be treated as a prefix.
<b>Append Check Digit</b>	If this option is checked, Pinelope will calculate and append a check digit for each serial number.
<b>Print Serial No as Barcode</b>	If checked, the serial number in the source file is printed as a barcode.

## Images

This tab is used to edit images and graphics in the layout.

<b>Name field</b>	The field for entering the name of each new image that should be added.
<b>+</b>	Launches an explorer window from which an image can be selected and loaded.
<b>-</b>	Removes a selected image.
<b>Images</b>	Lists all the currently loaded images.
<b>Reverse Side</b>	If checked, the selected image will be printed on the reverse side of the page. Available only if Duplex printing is enabled.
<b>Width</b>	The width of the image as printed on the page.
<b>X Position</b>	The x-coordinate of the top left corner of the image.
<b>Y Position</b>	The y-coordinate of the top left corner of the image.
<b>Original Width</b>	Original width of the image in pixels.
<b>Original Height</b>	Original height of the image in pixels.
<b>Scaling factor</b>	The factor that will be used to scale down the image when printed.

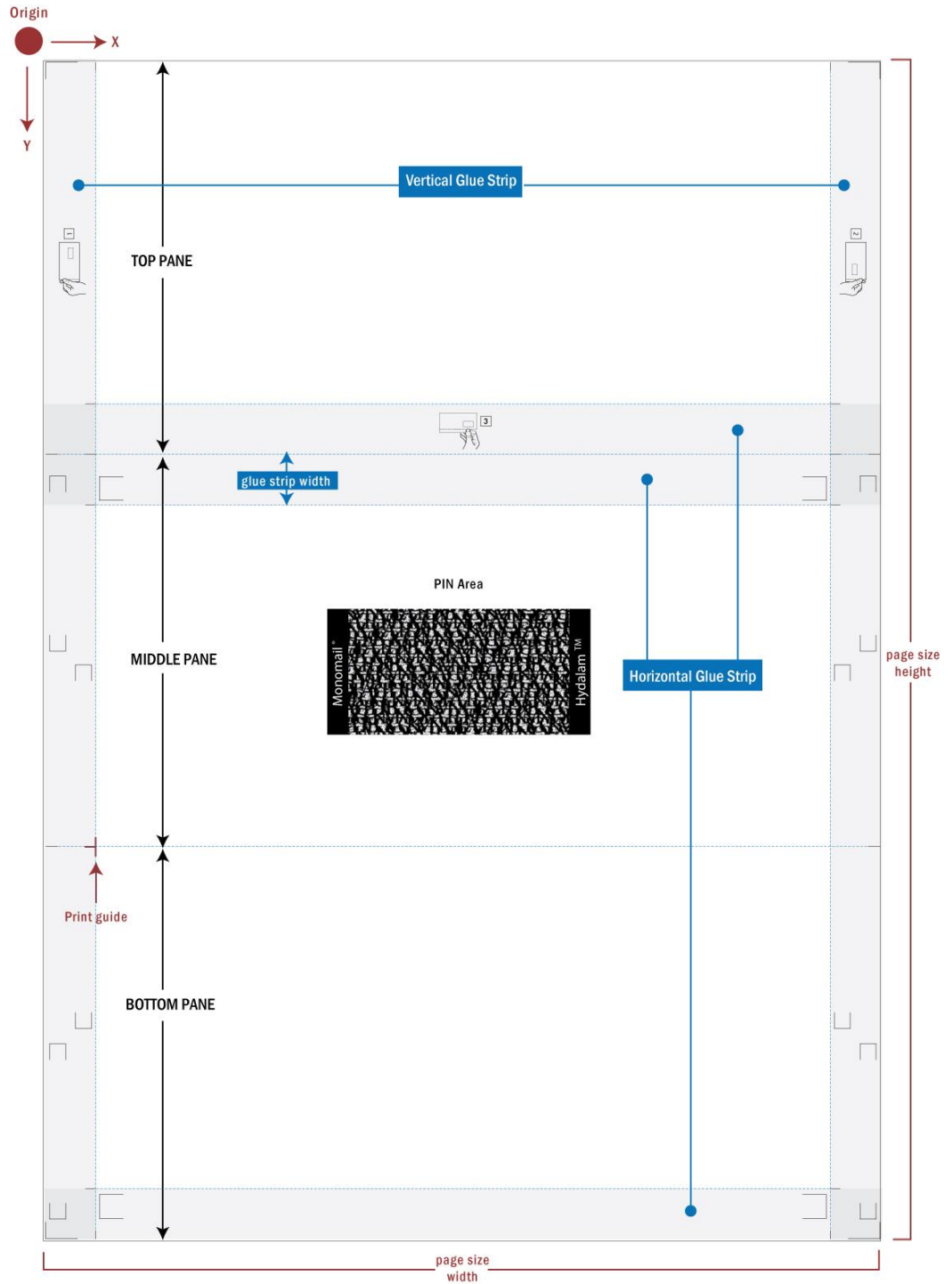
## Text fields

This tab is used to edit text fields in the layout (static, such as instructions about the PIN code, or dynamic, such as the recipient's name and address).

<b>Name field</b>	The field for entering the name of each new text field that should be added
<b>+</b>	Adds a new text field.
<b>-</b>	Removes a selected text field.
<b>Text fields</b>	Lists all the added text fields.
<b>Content field</b>	The field for entering the text that should be printed.
<b>X offset</b>	The x-coordinate of the top left corner of the selected text field.
<b>Y offset</b>	The y-coordinate of the top left corner of the selected text field.
<b>Width</b>	The width of the selected text field.
<b>Font...</b>	The font used to print the selected text field.
<b>Hdr font...</b>	The font used to print a specific portion of the text, delimited with = signs when entered in the text field.
<b>Size/pt</b>	Size of the characters in the selected text field.
<b>Line Height</b>	The height of each line in the selected text field.
<b>Alignment</b>	The position of the text inside the field.
<b>Colour</b>	The colour used to print the selected text field.



# Appendix A: Sample PIN Envelope Page



## Appendix B: Sample File Format IPIN

---

```

###PINELOPE SERVICE ID### CUST=17&FILE=pattern
bbbb ssssssssss iiii 111111111111111111 222222222222222222 333333333333333333
3267 7343810001 1111 Anna Ackermann 1 Main Street 12121 Central City
3267 7343810002 2222 Brigitte Bertolf 2 Main Alley 23232 North Village
3267 7343810003 3333 Charles Chapman 3 Main Close 34343 South Town
3267 7343810004 4444 Diego Dumpling 4 Main Road 45454 West Town
3267 7343810005 5555 Eric Eckhart 5 Main Avenue 56566 South City
3268 7343810006 6666 Frank Filbert 6 Main Boulevard 67676 South Village
3268 7343810007 7777 Gilbert Garmand 7 Main Court 78787 North Borough
3268 7343810008 8888 Helen Hilbert 8 Main Drive 89898 East Side
3268 7343810009 9999 Imelda Iglesias 9 Main Way 90909 West Town
3268 7343810010 0000 John Jackson 10 Main Parkway 01010 Central City

```

*Sample file format IPIN.txt*

An IPIN file contains an optional Service ID in the first line and then a header line defining the columns in the remaining lines, as follows:

###Pinelope Service ID###	Marker in the first line only that identifies it as containing a Service ID, which basically is a unique name associated with the specific VPM file. The Service ID ensures that an appropriate VPM file is used for the data file. In the case of multiple VPM and source data files this is a way to minimize human errors. In the example above the string: CUST=17&FILE=pattern must be entered verbatim in the Service ID field in the Page Pane of the Layout Dialog. When the operator selects a source file the FILE=pattern portion of the string will tell Pinelope to display files that match the pattern in the style of the windows command shell.
bbbb	Bundle name field that appears on the cover page.
SSSS...	The serial number field
iiii	Pin code. If word wrapping is necessary in the PIN field, the codes can be separated by a blank space. If blank spaces are used, Pinelope will wrap the text and centre it within the confines of the PIN area Width

---

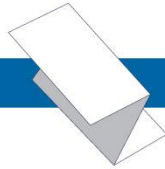
	and Height as defined in the Page dialog.
11111-9999	Dynamic fields.

---

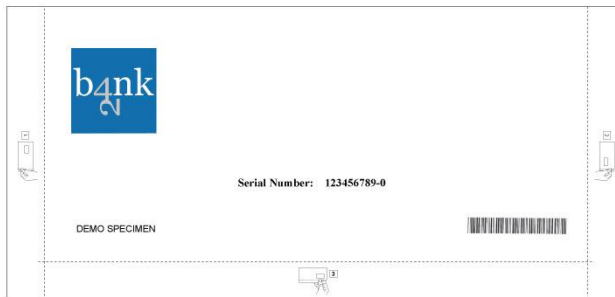
# Appendix C: Examples of folding

---

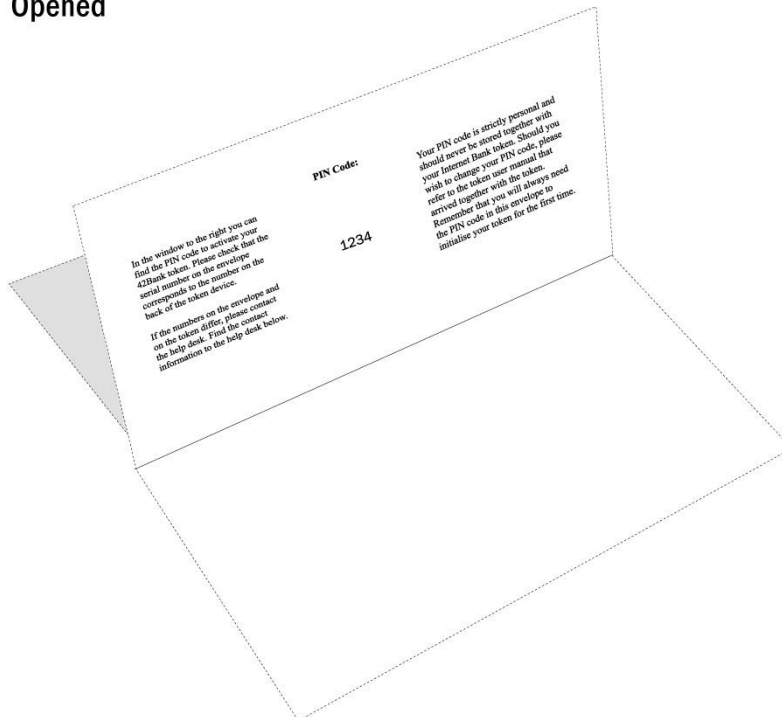
## Z-fold



### Closed



### Opened

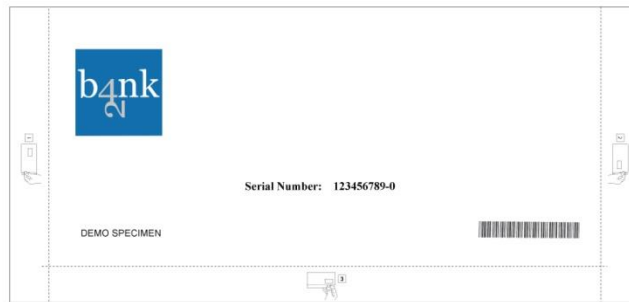


# Appendix C: cont'd

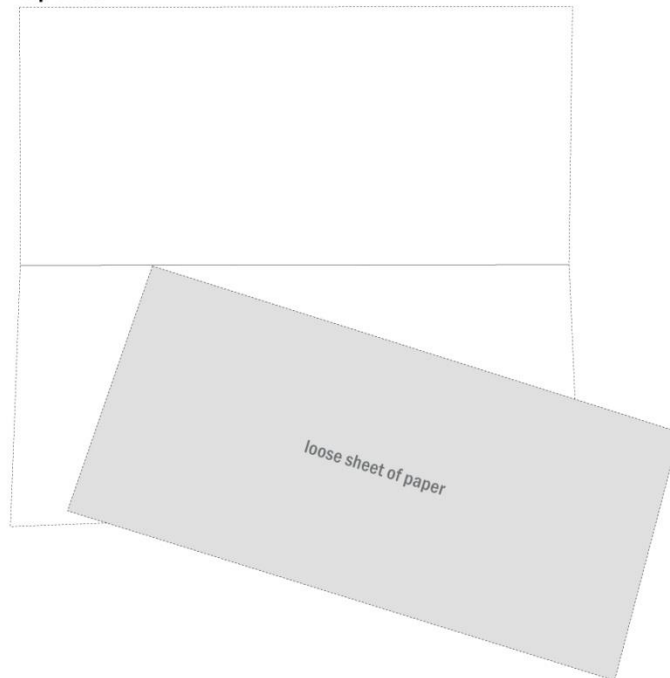
---



**Closed**



**Opened**

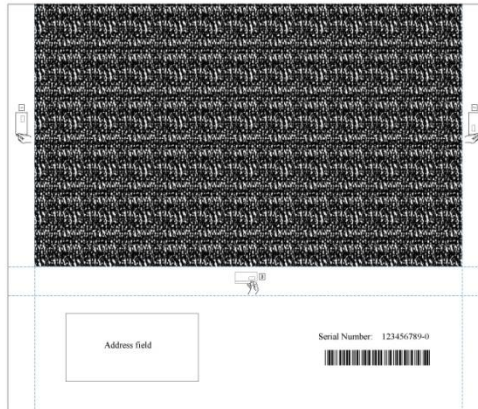


# Appendix C: cont'd

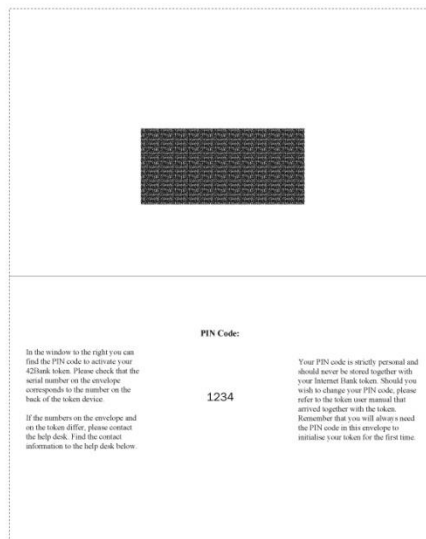
---



Closed



Opened





# Appendix D: Contact Information and Links

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The following information and the links provided are in no way an exhaustive list, nor does the author make any claims regarding the quality of the products. This appendix should be used to get started in finding more information related to your regional market.

## Sealer manufacturers

**BÖWE Systemec:** <http://www.bowesystemec.com/index.php?pub=2&pageid=2>  
[Heat/Pressure Sealer.](#)

**Welltec:** <http://www.welltecsystem.com.au/index.htm>. They are represented in many countries through partners. Pressure sealers.

## Security film manufacturers

The following are manufacturers and/or hold patents to Security film that can be used to increase security in a PIN envelope. These protective films can also be used when you don't need to fold the paper.

In some cases these vendors will manufacture the entire product (i.e. paper plus security film) and in other cases allow local printers to set the security film themselves. We suggest you contact these vendors in order to establish how they are represented in your country.

In the list below we have added commentary in those cases we have more information. We cannot guarantee the reliability of the information or that it remains updated. We strongly recommend you to take contact directly.

- **Bastione/ Smart-Tab Limited.** Bath, United Kingdom [www.bastione.co.uk](http://www.bastione.co.uk). They have a number of products that can be used in concealing PIN codes. Have historically had a relationship with Xerox. Bastione manufacture the entire product and ship as far as we know worldwide. Smart-Tab film has been tested by APACS (see standards 72 for PIN mailer security) in the UK. Please observe that each security film version needs to be tested and approved- it is not a general test for every product in the portfolio.



- **Hydalam.** Hydalam is a Security Film that is sold through local printers. As far as we can tell they always work through partners locally. If you Google Hydalam and your country we wouldn't be surprised if you find a local player. We have no status as to the testing of the Hydalam product.
- **Page International/ ICS V3.** Manufacture a security film and deliver a complete product including paper and printing. According to their homepage they are open to licensing agreements for their security film as well. Link to their homepage: [www.page-international.com](http://www.page-international.com)

## Interesting read

This section contains links to other material that we have found useful when exploring PIN mailers.

- **Laser-printed PIN Mailer Vulnerability Report;** Mike Bond, Steven J. Murdoch, and Jolyon Clulow; Computer Laboratory, University of Cambridge <http://www.cl.cam.ac.uk/~sjm217/papers/cl05pinmailer-vuln.pdf>
- This report is a bit old but still contains some important facts.
- **APACS** standards that can be obtained from the APACS Standards Unit are Standard 71 (Bank Card PIN Mailer Security) and Standard 72 ([pinmailer@apacs.org.uk](mailto:pinmailer@apacs.org.uk).)
- These standards apply primarily to paper and printing and does not at present discuss logical security or encryption of PIN codes. These standards are primarily oriented for use in the UK.
- **Böwe** have some good documents related to choice of paper for their Sealers. Contact your local Böwe reseller for more information.