



Florentis Ltd.

Notes on Florentis Signature Data

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Introduction

Florentis Ltd. has developed a range of software tools that enable the signing of electronic documents using a suitable digitizer tablet.

The signature is typically embedded into the target document so that it appears just the same as conventional paper-based signature:

The image shows a screenshot of a web-based form titled "Proposal for Life Assurance Single Premium / Recurrent Single Premium". At the top, it displays "Ref No. demo-data-01" and "Agency Number 1234" on the left, and "Form Version 1.00" on the right. A red warning message states: "WARNING: STATEMENT PURSUANT TO SECTION 25(5) OF THE INSURANCE ACT (CAP 142), YOU ARE TO DISCLOSE IN THIS PROPOSAL FORM FULLY AND FAITHFULLY, ALL THE FACTS WHICH YOU KNOW OR OUGHT TO KNOW, OTHERWISE YOU MAY RECEIVE NOTHING FROM THE POLICY." Below this is a section for "Personal Details of Life to be Assured". It includes a text field for "Full Name (According to Passport / Birth Certificate)" with the value "full-name". There are also fields for "Title" (Mr.), "Gender" (male), and "Married" (Yes checked, No unchecked). A "Signature of Client" section shows a handwritten signature "W. Hanger" with a green checkmark above it. To the right of the signature is a "Token required:" section with "YES" selected and "NO" unselected. At the bottom, there is a small text box with "Mr. J. Smith" and "I hereby accept the terms and conditions 14:33 15 May 2005". A footer line reads: "*** YOU HAVE COMPLETED THE PERSONAL DETAILS OF LIFE TO BE ASSURED PLEASE PROCEED TO THE NEXT SECTION ***".

Figure 1 Electronic signature on document

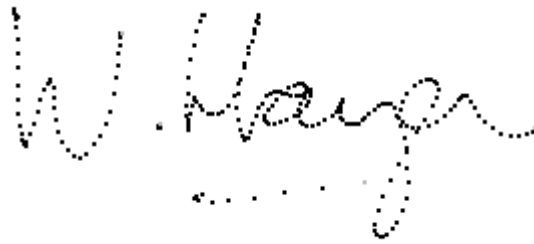
In fact, the electronic signature consists of far more than just the image. A wealth of additional information is stored with each signature and can be used for different purposes. This document gives an overview of the signature data and its uses.

Electronic Signature Data

When signing on paper the pen leaves a continuous trail of ink that forms the signature image:

A handwritten signature "W. Hanger" in black ink on a white background. The signature is written in a cursive style with a horizontal line under the name.

A digitizer tablet works very differently, by recording the position of the pen at frequent intervals, measuring the x (horizontal) and y (vertical) positions at each point:



To display an electronic signature the software must draw a curved line that passes through all the points, thus rendering an impression of the signature on the screen or when printed.

For many applications the point information is all that is needed, but the digitizer provides much more detailed data which is also stored with the signature. The most important is the time information. Every point in the signature is recorded with its precise time measured to an accuracy of less than a thousandth of a second. The timing information makes it possible to observe the direction of the pen movement and to infer the speed and acceleration at each position.

Some digitizers provide additional information that is considered less important and may not be supported by all makes or types of pad. This includes:-

Pressure	Actually the force applied to the nib of the pen
Inclination	The angle between the pen barrel and vertical
Orientation	The plan-direction of the pen from the nib
Twist	The rotation of the barrel during signing.

The Florentis Signature Components always collect all the available data from the pad being used.

Forensic Signature Data

An important objective in the design of the Florentis Signature software was to ensure that the electronic data is superior to inked signatures on paper. The forensic strength of the data is of paramount importance, and means that the data-collection philosophy differs in many respects from competing signature technologies.

A key principle is that during the collection of the signature the software stores the data exactly as it is supplied by the device. Each type of data (i.e positions, times, pressures etc) is collected with metric information which describes the units being used by the device, and this is stored with the raw point data to allow the conversion to true units when required. The advantage of this is that the accuracy of the information is determined by the device and cannot be compromised by the conversion process.

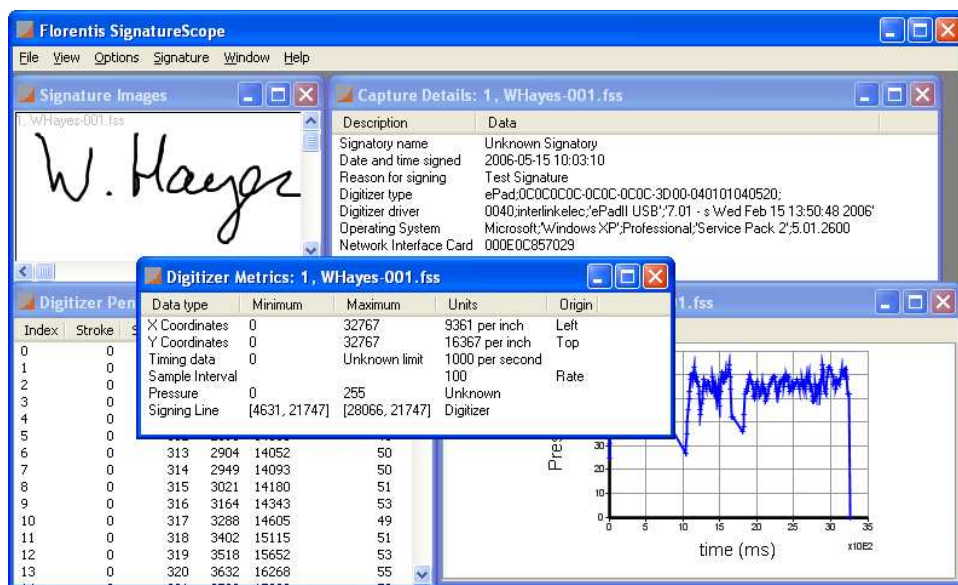
In addition to the pen-data, contextual data is collected and stored with the signature. This includes:

- The name of the signatory

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- The date and time at which the signature was given
- The reason for signing.
- The make and type of digitizer being used
- The type and version of the digitizer driver being used
- The type and version of the operating system of the client PC being used
- The Network Interface Card address of the PC
- The hash type and data used for the document being signed (if used)
- The hash type and data used to control the integrity of the signature data.

Some of the forensic data can be accessed and displayed using the published API provided with the signature tools. For detailed forensic analysis Florentis has developed the SignatureScope application which is intended for use by Forensic Document Examiners.



Data Storage

Signature data is stored using the Florentis Streamed Signature (FSS) format. Each type of data is stored in the form of a binary-independent stream, so constructed that it can be read on any computer platform irrespective of proprietary dependencies such as byte ordering.

The use of data streams is important because they allow forward and backward compatibility. When the data is read unrecognized streams are simply ignored without causing a problem; this means that new streams can be added and still handled by old applications. Similarly new applications can read old data – an important attribute for legal documents which may need to be stored for decades.

The streamed data is held in a nested structure as illustrated in the diagram below:

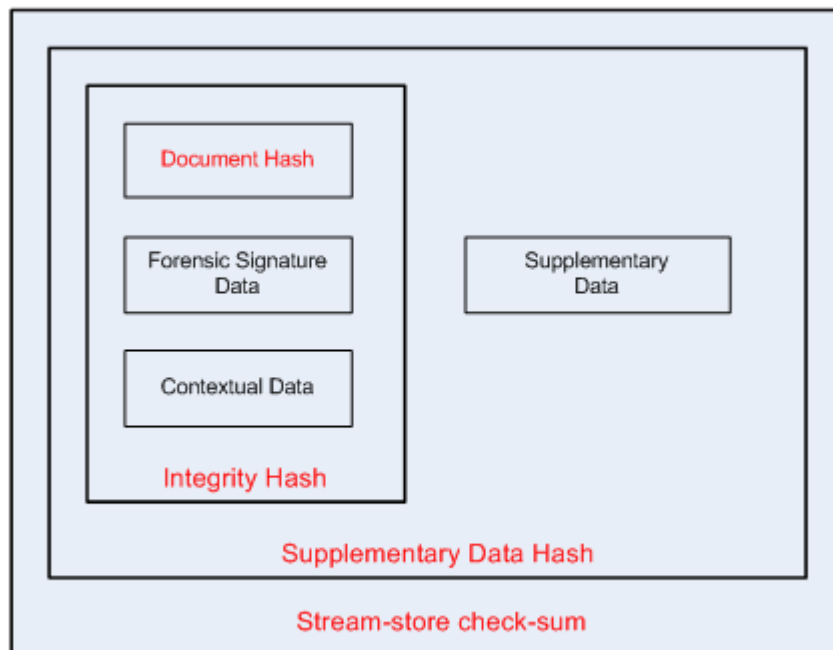


Figure 2: Signature Data Structure

Signature Data Size

The size of the signature data is variable and depends primarily on the duration of the signature; data points are collected at fixed intervals and so the number of points that must be stored is proportional to the overall time taken to sign. This aspect can also be heavily influenced by the rate of data collection, particularly as some pads now allow the rate to be configured and set as high as 400 points per second.

The size will also depend on the presence of optional data streams such as pressure and pen angles.

As a guide a typical signature comprising x, y, time and pressure information collected at 100 points per second (the most common frequency) will occupy between 1 and 2 kilo-bytes when stored in binary form.