

PHOTOGRAMMETRIC PRODUCTS FROM LEICA

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ABSTRACT

The creation of Leica plc following a merger between Wild Leitz Holding AG and The Cambridge Instrument Company plc has major implications for the photogrammetric community. This paper summarises the events leading to this new company and outlines its objectives, philosophy and structure. Finally, a review is given of the photogrammetric product lines of the concern, emphasising developments which have taken place since the Congress in Kyoto.

1 INTRODUCTION

On 2 April 1990 the Leica Public Limited Company was formed. Registered in England, the new concern is managed from St Gallen in Switzerland. Its shares are traded on the London Stock Exchange. This powerful new concern will have a profound influence on the photogrammetric world and the purpose of this paper is threefold: to give an outline of the events which led to the formation of the new concern; to explain the objectives, philosophy and structure of the concern, so that readers understand clearly where and how the sales and support of photogrammetric products are organised; and to list the photogrammetric product lines and highlight developments which are fresh since the XVI International Congress of Photogrammetry in Kyoto in 1988.

Readers are familiar with the merger of Wild and Leitz which took place in the 1970s, culminating in the change of name to Wild Leitz. More crucial to photogrammetrists, however, was the assumption of a controlling interest in Kern and Co AG in 1988. Even as plans were implemented to merge the photogrammetric efforts of the Aarau and Heerbrugg factories, however, negotiations were afoot to form an even bigger and more influential group. Spurred by numerous commercial factors, including the requirements to trade successfully in the European Community and to have available the massive resources necessary to develop new products in the fiercely competitive, systems oriented world of precision optics, mechanics and electronics ("mechoptronics"), the concern has been created to take advantage of personnel, manufacturing facilities and sales organisations in a host of countries.

The Leica Public Limited Company, for which the term "Leica" will be used here, is eponymous with its product line associated with

top class photography. It aspires to attain the same leading status in numerous other areas of "mechoptronics".

Leica was formed on 2 April 1990 through the merger of the Cambridge Instrument Company plc and Wild Leitz Holding AG. Leica operates under British law, is registered in London and has its formal headquarters in Bar Hill, near Cambridge. There is a thorough Swiss influence, however, and the management of the concern is based in St Gallen near Zurich. Leica is 71% controlled by Unotec holding, which in turn belongs to the ANOVA Group of Dr Stefan Schmidheiny, one of the two remarkable brothers who control a formidable share of Swiss industry.

Leica is large. Its annual turnover is 1500 million Swiss francs and it has 11500 employees. It has technological and manufacturing centres in eight countries and sales and marketing subsidiaries in 23, plus representatives in many more. Famous companies and trademarks are grouped under one roof (Fig. 1). Photogrammetrists will remember, too, that Cambridge Instruments had brought with it to the merger expertise and product lines from earlier confluences with American Optical and Bausch and Lomb. Leica offers "state of the art" products of the highest quality, leads in key technologies and has earned large market shares in strategic segments. Its objective has been defined as being "the world's first choice provider of innovative solutions to customers' needs for vision, measurement and analysis".

Leica
Leica Plc

KERN SWISS



Reichert-Jung

**Cambridge
Instruments**

**WILD
HEERBRUGG**

Fig. 1 Famous trademarks within Leica plc

Leica construes its market as consisting of eight segments: biology and medicine; materials sciences; microelectronics; surveying; photogrammetry; industry; defence; photography. Its vast range of products falls into eight areas, which have some correspondence with the market segments: microscopes; scanning electron microscopes; microtomes and ultramicrotomes; surveying instruments; photogrammetric systems; optronics for industry; optronics for defence; photographic and projection equipment. Turnover can be assessed according to five major product groups: microscopes is largest, followed by surveying, which includes photogrammetry; photography and defence are smaller, only about half as large as surveying, with industry smaller still. It may also be analysed according to regions, with Europe accounting for 60%, America 28% and the Far East and Rest of the World 6% each.

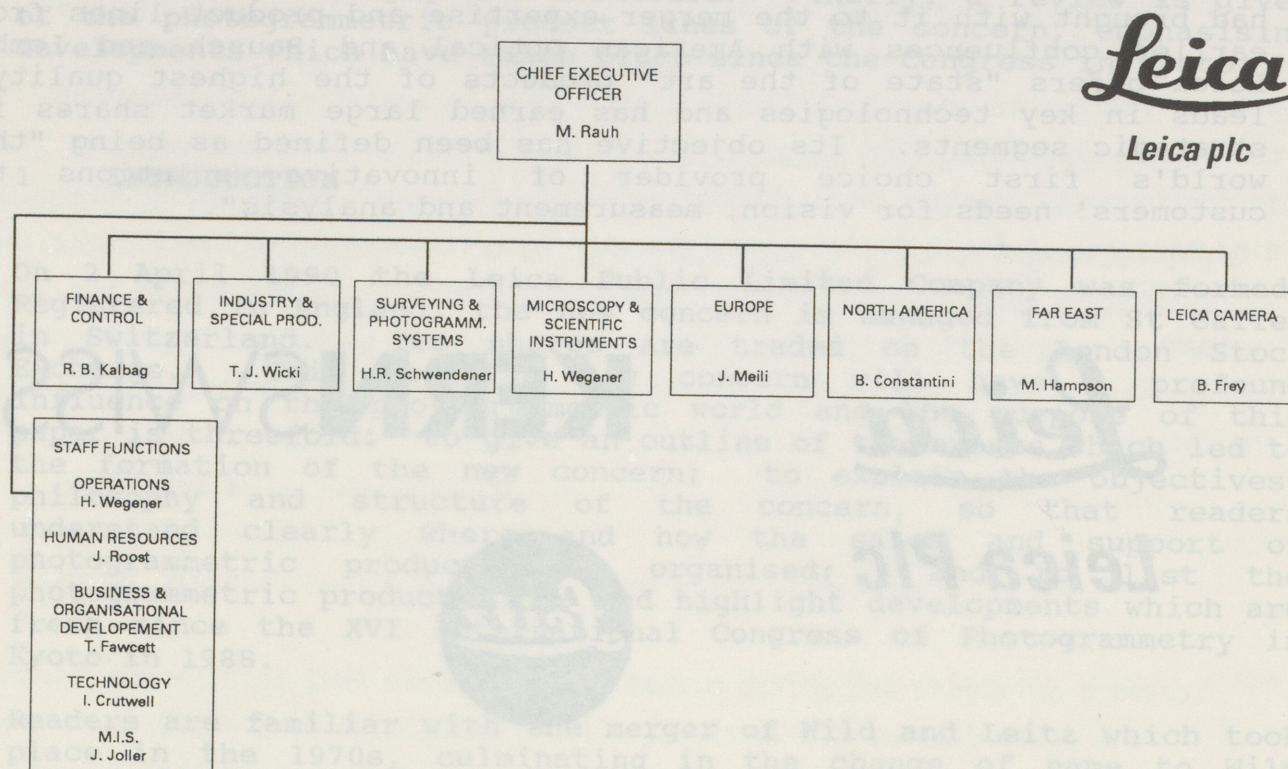
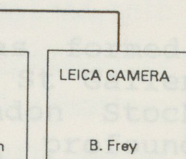


Fig. 2 The structure of Leica plc

Fig. 2 shows the structure of Leica. To permit a proper understanding of the activities and products within Leica which are relevant to photogrammetrists, however, some clear explanation is required. The Industry and Special Products division, which is represented in many locations, including Aarau and Heerbrugg, supplies both products and components to a wide range of organisations. Amongst the products sold to industry, for example, are prisms for scanners and the Wild range of plotters, such as TA10, TA30, TA40, TA41 and laser raster plotter. Defence products include not only sights and rangefinders but also high

segments:
electronics;
photography.
have some
scanning
surveying
industry;
equipment.
product groups:
which includes
only about
1. It may
accounting for
6% each.

Leica
Leica plc



powered devices for viewing imagery, which will be discussed further in section 3.1 below. Also, for historical reasons, the aerial cameras and other photogrammetric products manufactured by Leica Heerbrugg AG, formerly Wild Heerbrugg AG then Wild Leitz AG, fall within this division.

The Surveying and Photogrammetry Systems division is best known for its impressive range of total stations, theodolites, levels and accessories. These are manufactured mainly in Heerbrugg and Singapore. The Aarau part of this division is central to this paper. It includes photogrammetry, land information systems and industrial measurement systems, which are complete systems, as distinct from the special components made by the Industry and Special Products division.

The Microscopy and Scientific Instruments Division is of much less interest to readers of this paper. The Leica Camera division, based in Solms, West Germany, is of some interest with respect to close range applications (see 3.4 below).

2 LEICA AARAU AG

The bulk of Leica's photogrammetric operations are carried out by Leica Aarau AG, formerly Kern & Co AG, and referred to in this paper as Leica Aarau. Leica Aarau has around 500 employees. The composition of its turnover differs from that of Leica plc in several respects.

"Surveying" consists mainly of photogrammetry, land information systems and industrial measurement systems: geodesy instruments now represent less than 10% of turnover in Aarau and will be phased out by the end of 1993, although a service facility has been retained. Surveying accounts for more than one third of turnover in Aarau, defence products a similar proportion and products for industry, therefore, much less. The microscope and photography areas are not represented. Leica Aarau has higher turnover, proportionately, in Europe and much higher in the Far East than Leica plc.

As turnover from geodesy ceases, overall expansion is planned for Aarau, mainly from surveying and industry, with rather less from defence. Leica Aarau expects to be a major participant in the "mechoptronics" market with industrial measurement systems, sensor systems and stereometric systems and in the land surveying market with photogrammetric systems and land information systems. The future is seen to be the system business, based on sales of spatial sensors, key components manufactured in-house, software, system integration and customer training. The unique atmosphere of Aarau, blending 171 years of excellence in optics and mechanics since Jakob Kern began manufacturing his drawing instruments with modern facilities for research, development, manufacture, integration, marketing, sales and support of the latest "high tech" systems, all in a wonderful Swiss environment, will be exploited not only to attract and welcome current and potential customers but also to seek staff of the highest quality.

3 PHOTOGRAMMETRIC PRODUCTS

The photogrammetric products are most informatively covered according to location of manufacture. As has been explained above, products from Leica Aarau fall within the Surveying and Photogrammetry Systems division, whereas those from Heerbrugg fall within Industry and Special Products.

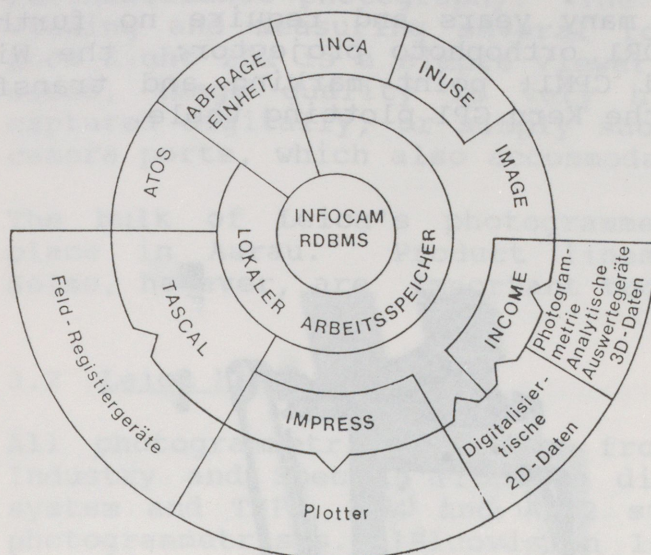
3.1 Leica Aarau AG

The main product ranges from Aarau are well known. Note that existing products will retain "Kern" and "Wild" in their product names. The Wild BC3 analytical stereoplotter is attracting high levels of sales. It is a versatile and productive instrument with modern, friendly mapping software running under the Unix operating system on Compaq or Data General computers. Users report high productivity in both mapping and close range applications. Upgrade kits are available to bring AC1s, BC1s and BC2s up to BC3 level. The recent launch of RISIS, Raster Image Superimposition System, in both mono and stereo versions, enables users of BC3s and upgraded BC1s and BC2s to check for completeness and accuracy of new mapping, map revision, digital terrain models, industrial measurement, etc.

The Kern DSR14 and DSR15 lines are also well known and successful. The DSR14 is the "workhorse" for mapping applications, appealing to users of the MS-DOS operating system on personal computers. A strong interface, PC-PRO 600, to Intergraph's powerful MicroStation CAD software provides customers with a superb environment for data collection, editing and presentation. The Polytel touch sensitive keyport simplifies the user interface. A new release of the DSR14 software at the end of 1990 will strengthen the appeal of this instrument. The DSR15 is the top of the line, offering a wide variety of options, such as CCD cameras or KRISS (Kern Raster Image Superimposition System). The DSR15 runs under VMS on Digital MicroVAX and VAXstation computers. Customers can upgrade their DSR1, DSR11 and DSR12 instruments to DSR14 or DSR15 as required. The DSR15-18 is also available, with double size stage plates for accommodating either LFC imagery or two simultaneous pairs of 23 x 23 cm photographs for comparative measurements in fields like glaciology.

A new development offered to DSR15 customers is MAPIT. This is a streamlined version of Kern INFOCAM, the established land information system from Leica Aarau. MAPIT is designed for photogrammetric data collection, editing and presentation and incorporates sufficient modules of INFOCAM to provide these functions in a friendly but powerful way (Fig. 3). MAPIT operates in conjunction with KRISS, on which the menus appear, so that the photogrammetric operator can make selections without looking away from his oculars. MAPIT incorporates a topology builder with an inconsistency check. Thus the operator not only collects complete and accurate data, verifiable by KRISS, but he forwards clean, consistent data to the next stage of the process. The IMPRESS module, which is part of MAPIT and is an option available to INFOCAM customers, is new and includes powerful interactive facilities for designing plots, which can be directed to Kern GP1,

INFOCAM



MAPIT

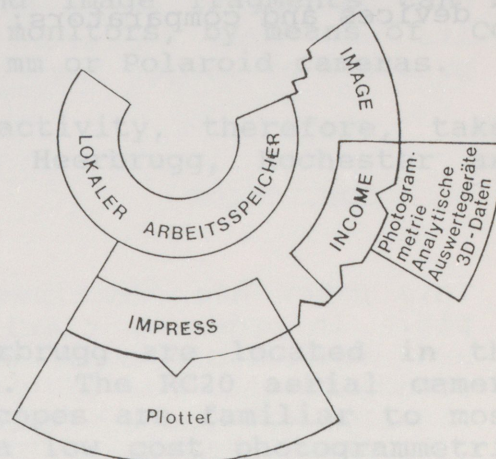


Fig. 3 MAPIT as a subset of Kern INFOCAM

Wild TA2/TA10 or numerous drum plotters. Naturally, the MAPIT customer has the option of upgrading to a full INFOCAM package, including the ORACLE relational database management system.

The Wild S9-AP is the photogrammetric workstation of the System 9 geographical information system. Thus it is no longer sold as a Leica product but is manufactured in Aarau to meet orders from Prime Computer Inc.

The Kern DSP1 digital stereoplotter has been widely reported elsewhere. Various minor improvements have been made, the most visible being new furniture to match DSR14/15 and the option of handwheels (Fig. 4), to suit operators for whom data acquisition by track ball is not the natural choice.

In addition to its own software and a range of familiar packages for block adjustment - BINGO, BLUH, PAT-B, PAT-M, in various versions for various computers - Leica Aarau offers certain third party software products to enhance photogrammetrists' work. Intergraph MicroStation has been mentioned above. A second example is SCOP, the package for digital terrain modelling from the Technical University of Vienna. Also well known and successful is LITES2 from Laser-Scan Ltd of England. Leica have sold several Laser-Scan systems for editing and digital mapping, but it is worth mentioning the online interface between the DSR15 with KRISS and LITES2. Again this displays menus to the operator through the oculars, so maximising productivity, with menu selection accomplished by using the DSR hand controller like a mouse. The LITES2 environment can be extensively customised to

suit the project in hand. This DSR15/KRISS-LITES2 interface has been very well received by Ordnance Survey in England, the bulk of whose work is now map revision rather than new mapping.

This product range is completed by a number of instruments which have been on the market for many years and require no further description here: the Wild OR1 orthophoto projector; the Wild PUG5 and Kern PMG2, CPM1 and CPM1+ point marking and transfer devices and comparators; and the Kern GP1 plotting table.



Fig. 4 Kern DSP1 digital stereoplottter

Also manufactured in Aarau, as explained in sections 1 and 2 above, are the ECDS and SPACE systems for industrial measurement. ECDS makes use of industrial versions of the E2 electronic theodolite, whereas SPACE uses a version in which the telescope is replaced by a CCD array. Whether these systems are photogrammetric is a nice point for debate, but SPACE has certainly been described by some workers as a system for close range photogrammetry. Special measurement systems are also manufactured to order, some of which use CCD cameras and bundle adjustment but fall within the purview of ISPRS Commission V.

The suite of products from Aarau is completed by three devices from the Industry and Special Products division. The RK820 stereoscope has optics of the highest quality and offers a magnification of up to 285x for detailed examination of metric and reconnaissance photography. The SMI2 stereoscope is designed for viewing and measuring several rolls of 70 mm film, whereas the Zoom Sight 20x is a simple viewer for single images. In all three cases, image quality is very high and image fragments can be captured digitally, or simply shown on monitors, by means of CCD camera ports, which also accommodate 35 mm or Polaroid cameras.

The bulk of Leica's photogrammetric activity, therefore, takes place in Aarau. Product lines from Heerbrugg, Rochester and Solms, however, are important too.

3.2 Leica Heerbrugg AG

All photogrammetric products from Heerbrugg are located in the Industry and Special Products division. The RC20 aerial camera system and TSP1, ST4 and APT2 stereoscopes are familiar to most photogrammetrists. Elcovision 10 is a low cost photogrammetric measuring system based on the Leica R5 camera (see 3.4 below), enlarged paper prints, digitising tablet, Wild software and the AutoCAD package. Finally, a tiny proportion of the Wild plotters is sold for use in photogrammetry, primarily TA10s and TA30s.

3.3 Image Interpretation Systems, Inc.

The manufacturing unit of Cambridge Instruments located in Rochester, New York, is now known as Image Interpretation Systems, Inc. The products are well established and popular. Zoom 95, Zoom 240 and Zoom 500 stereoscopes have sold in large numbers for many years. The ZT-4, ZT4-H and Stereo Zoom Transfer Scopes are used in numerous mapping organisations throughout the world to transfer photographic information graphically on to maps. The ZTS/VM is a Stereo ZTS with the VM Vertical Measurement Module for calculating XYZ ground coordinates rigorously. The newest product is the GIS/VM, which omits the map superimposition and optics for anamorphic geometry from the ZTS/VM, leaving an economical instrument designed for data acquisition for input to GIS systems with straightforward operating procedures (Fig. 5).

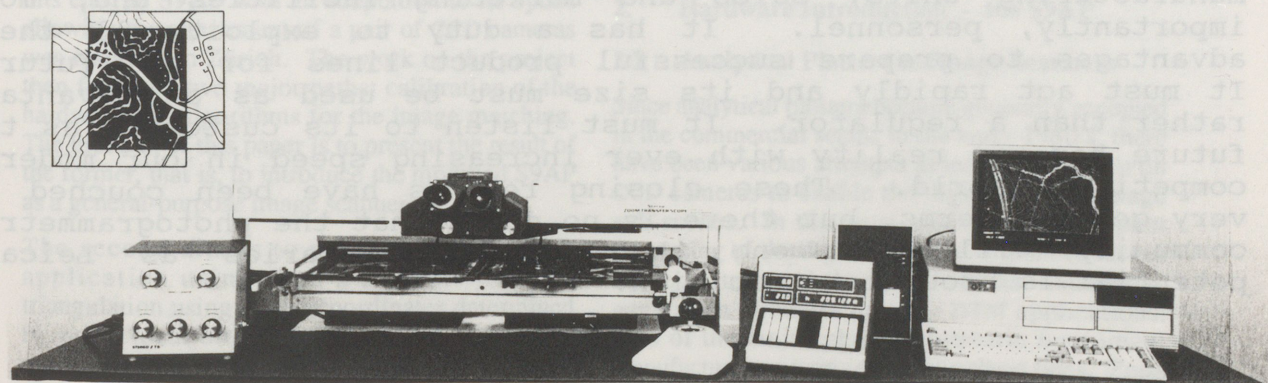


Fig. 5 GIS/VM from Image Interpretation Systems

3.4 Leica GmbH

Leica GmbH in Solms is part of the Camera division of Leica. It produces one product of interest to photogrammetrists, the R5 35 mm camera with reseau. Good results are obtained if the camera is properly used in conjunction with its calibration certificate. The R5 is sold not only as part of Elcovision 10 (see 3.2 above), but on its own as a data acquisition device for close range photogrammetry, where the convenience and reliability have led to its use even in architectural photogrammetry, traditionally a preserve of larger format cameras.

4 CONCLUSION

This paper has described the formation and organisation of Leica plc. In order to clarify how and where photogrammetric products are manufactured and managed, it has outlined the divisional structure and some of the manufacturing facilities of the concern. Finally, the photogrammetric products themselves have been listed, with brief information added on recent developments.

Leica is a major multinational organisation with the potential to dominate certain market segments where its high quality "mechoptronics" products are in great demand. In Aarau it is blessed with an outstandingly attractive venue on which to centre its photogrammetric activities, supported by further product ranges from Heerbrugg, Rochester and Solms.

It is clear that Leica must rationalise a number of overlapping product ranges and facilities. But customers can relax in the knowledge that their investments will be fully protected because Leica, as a result not only of Swiss law but also of its approach to and respect for its customers, guarantees to support both hardware and software for many years to come. Furthermore, minor improvements in organisation and structure will doubtless take place, although the major strategic decisions have already been made. During these formative stages, Leica must ensure that its customers are kept fully informed: this paper is one of many documents prepared with such an objective.

This careful evolution must be echoed by a concern for the future. Leica has enormous potential in terms of customer base, manufacturing units, sales and marketing facilities and, most importantly, personnel. It has a duty to exploit all these advantages to prepare successful product lines for the future. It must act rapidly and its size must be used as an advantage rather than a regulator. It must listen to its customers as the future becomes reality with ever increasing speed in our modern, competitive world. These closing remarks have been couched in very general terms, but there is no doubt that the photogrammetric community will be among the main beneficiaries as Leica's potential is brought to fruition.