

70 years of Ikegami

(1946–2016)

With an association that goes back more than 30 years, the Japanese camera manufacturer Ikegami is one of the GTC's longest-standing sponsor companies. This year the company celebrates its 70th anniversary and to mark this milestone **Dudley Darby** looks back at the diverse history of this richly innovative company, whose high-quality broadcast cameras have frequently been at the forefront of latest developments in camera technology.

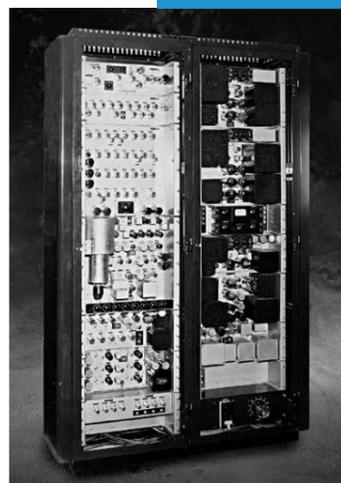
Out of the ashes of war

At the start of the Ikegami story, in 1946, Japan was just beginning to pick itself up from World War II and the devastating consequences of the only two nuclear bombs ever to be dropped in anger. Electronics was a field which had experienced great strides forward in innovation and expertise during the conflict, and much of this could be translated into a world at peace. There was an emerging need for electronic components and this inspired the formation of Ikegami Tsushinki Seisakusho on 10 September 1946. The company was initially founded under its first president, Kosei Saito, to manufacture power supply components, chokes and transformers.

The company was incorporated in February 1948 and, within two years, had moved into the audio field with the development of an automatic frequency response recorder.

The following year, 1951, saw the company renamed Ikegami Tsushinki Co. Ltd and the start of its interest in television broadcasting with a move to manufacturing studio equipment. By 1955 a flying spot scanner had been developed along with the Monoscope Camera, a device to scan a fixed testcard mounted within a monoscope tube. As the decade came to an end, the company had expanded enough to open a new factory at Kawasaki and work was well underway on development of their first transistorised TV camera, the TK-31T, which would establish Ikegami as a TV camera manufacturer when it appeared in 1960.

Monoscope camera



Expansion in the 1960s

Development and production of improved transmitting and receiving equipment helped greatly in spreading TV coverage in many Japanese towns, which had up until then suffered from poor reception due to terrain problems. Two more factories were opened and the thriving company was listed in the second tier of the Tokyo Stock Exchange. The transmission arm of the company was developing a series of microwave relay transmitters, while camera development had led to the first portable broadcast-quality camera, the 'Handy-Looky' – (with this name becoming the root of all the subsequent HL model numbers) – based on a 3" Image Orthicon tube. This camera was sold to CBS in the USA to cover the launch of the Aurora 7 satellite in 1962.

Following this success with CBS, Ikegami opened a subsidiary in New York, where it remained for 14 years before moving out to Maywood, New Jersey, in 1978. Camera development continued throughout the 1960s, alongside other TV equipment, including a colour flying spot scanner, the TGK-6TC, which appeared in 1967. In anticipation of diversification into the computer-based market, the company also developed an optical character recognizer (OCR) as an in-house project, meeting with some success in 1968. The following year the Utsunomiya Factory was opened and the company's first industrial colour camera, the VF-7001, debuted.

Diversification in the 70s

The early 70s saw a flurry of activity and expansion both at home and internationally. Ikegami Electronics (Europe) GmbH was founded in 1970 in Dusseldorf, Germany, as the sales and service centre for Europe and Africa.

On the camera side, development of more compact, lightweight colour cameras was the focus. The TK-301 was used for helicopter coverage of the Osaka Exposition of

1970, and a year later, the TK-301A appeared with massive improvements in performance, so much so that it soon became the standard camera for NHK (the Japanese National broadcaster)'s operations nationally, as well as for many commercial broadcasters. This was the camera that really established Ikegami as a major colour camera manufacturer, no doubt helped by its extensive use on the Sapporo Winter Olympic Games.

The lightweight HL-33 portable colour camera also quickly became a favourite for ENG operations, and other ENG products were added towards the end of the decade. Camera developments weren't just progressing in the broadcast and industrial fields though. By 1973 a medical camera, the MKC-309, had been launched – while, in an unrelated field, an offshoot of the earlier OCR development had resulted in a money-changing machine that exchanged 1000-yen bills.

1978 was a particularly good year for new Ikegami cameras. The Saticon-tubed HL-77 was offered as part of the ENG range (as simply a camera, with no recorder or onboard battery) while, for top-of-the-range lightweight field and studio production, the 18mm-tubed HL-79A appeared. This was a camera optimised to produce the best possible picture with minimal need for engineering intervention. Full-sized studio cameras were also being developed alongside the lightweight range, with advances in automatic adjustment, winning Ikegami an Engineering Emmy in 1981 for its digital computerised adjustment of the HK-312 and HK-357A.



The TK-301A, which established Ikegami as a major manufacturer of colour cameras



The first 'Handy Looky' camera, the HL-33 was an early ENG favourite



Top-end lightweight field/studio camera, the HL-79A, from the late 1970s



The HK-357A launched in the early 1980s won Ikegami an Engineering Emmy

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Early glimpses of the future

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Less well-known was Ikegami's involvement in developing original program code for Japanese video game companies. Computer programs as such were not considered to be copyrightable at that time, but when Nintendo later released a game which used code from a previous Ikegami development, the two companies ended up in the Tokyo District Court in 1983. It took six years for the Tokyo High Court to deliver a verdict in Ikegami's favour, which acknowledged originality of the program code. An undisclosed settlement was reached the following year.

Following a CBS proposal for an electronic camera that would produce pictures comparable to film, Ikegami developed the EC-35, a digital cinematography camera. In 1983 this camera secured another Emmy, this time for Technological Development. The company was thriving, and some 23 years after first being listed, in 1984, it joined the first section of the Tokyo Stock Exchange.

In the same year, the company completed installation of a nationwide optical cable data network in Japan for Japan Races and a UK office opened as a branch of the European company in Germany, with Koichi Fukuda as the first General Manager. Previously, Ikegami had been represented by Dixons Technical in the UK, and enjoyed success in selling the HL-33.

The latter half of the 1980s saw further developments in ancillary broadcast and medical equipment, digital switchers, projectors, a still-store and a new helicopter microwave system suitable for both broadcast and rescue operations. An office in Beijing was also opened.

The advent of suitable frame interline transfer (FIT) CCDs allowed the company to move from the era of the tube into the digital age for cameras, with the HL-55 Unicam Portable Colour Camera launched



The EC-35, an early digital cinema camera – launched in 1983



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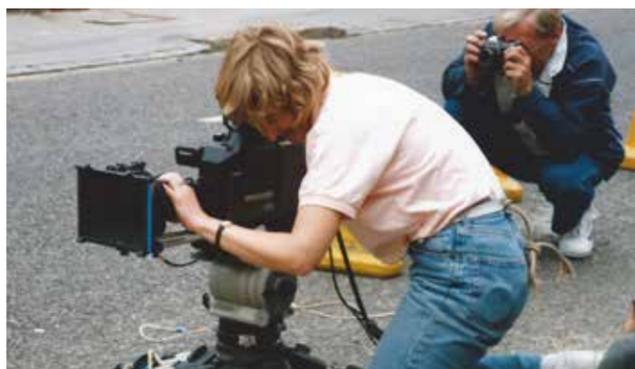
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in 1988. These new compact-form cameras, which could record to a portable recorder, enabled innovative shooting styles on shows such as *The Bill*, which prided itself on pushing the limits for handheld drama work with ever more complex shots (one entire episode consisted of just two shots – one either side of the commercial break).

Ikegami also developed its video and network technologies to accommodate entry into the direct broadcast satellite market. In addition, a resurgence of interest in 3D had led to a 3D camera system, claimed to produce more realistic 3D images than other conventional systems; this debuted in 1989.



Past GTC Chairman Dave Ballantyne shooting with an HL-79 – the portability of the camera allowed filming in previously impossible situations



Out on the streets shooting *The Bill* on a HL-55; the camera was controlled from an early fly-away setup with the lighting director working either out of a van or from a customised trolley



Connections to the portable Panasonic M2 recorder and sound could be complicated for the, complex handheld shots that *The Bill* pioneered

Tricky times in the 1990s

The 1990s brought rather more mixed fortunes. On the one hand, the company was going from strength to strength in its homeland, forming two new subsidiary companies and opening an office in Singapore. In what was another period of busy innovation, it introduced: a 70" box-type projector TV, the TPP-1600HLB; the THD-100 Super-Micro Colour Camera; some excellent broadcast-quality monitors, as well as its first 9" monitor with a liquid crystal display, (LCD); and, also for the first time, a one-piece camcorder, the HL-V55, with an integral Betacam SP VCR. The decision was taken to develop a hard disk drive recording system which was integrated into a digital camcorder within a year.

However, April 1994 saw a major setback in Europe. Following a 'dumping' complaint by camera manufacturers based in the European Union (EU), the EU imposed a levy, the Anti-Dumping Duty, on broadcast cameras from Japan. Ikegami was hit hardest of all the manufacturers, incurring a levy of 82.9% of its purchase price from Japan in addition to the normal import duty, substantially more than its Japanese competitors. This was only supposed to last for five years, but was extended and in fact increased until it was finally abolished in 2007, by which time it stood at a massive 200.9%. Prior to the levy, in the UK, all but one of the BBC regions, and many of the ITV companies and independent OB units, had been using Ikegami cameras; because of the tariff, the system camera market was virtually wiped out in Europe and especially in the UK.

Throughout this period, the company was fortunately sustained by its lightweight camcorder, non-broadcast camera and monitor businesses. There were various attempts to manufacture in Europe but these were thwarted by allegations that CCD blocks were being imported and should therefore be subject to the same levy as the completed camera systems, raising the spectre of retrospective levies being imposed. After several years of legal argument, Ikegami was eventually vindicated.

In the mean time, new digital tape formats had been appearing and for the camcorder market Ikegami took on board DVCPRO, producing the HL-V77 series of camcorders with a digital DVCPRO recorder. In the same year as this launch, 1996, some 300 sets of Ikegami camera equipment were provided for the Summer Olympic Games in Atlanta, Georgia, with pictures sent digitally by cable to Japan using Ikegami-developed codecs. For broadcast applications, the HK-388 series digital CCD system camera was developed in anticipation of the move from analogue to digital broadcasting, culminating in an export order for 49 studio cameras from Doordarshan, India's state broadcaster.

Other parts of the business continued to develop cameras and equipment for the professional, security and medical markets along with a high-speed, high-capacity digital Transmitter-Studio link delivered to the Tokyo Broadcasting System. By the end of the decade Editcam2 had appeared with its Fieldpak2 lightweight hard disk unit.

Into the new millennium

As the new millennium dawned, Ikegami was developing 0.18µm rule application-specific integrated circuits (ASICs) and was the first to use these in broadcast cameras with the debut of the HDK-790E and 79E in 2001. With DVCPRO from Panasonic and DVCPAM from Sony now emerging as the two main competitors in the digital tape format market, Ikegami



The HL-V55 camera was the first to include an integral Betacam SP recorder



Shooting with the HDK-79EXIII on location for Yorkshire TV drama series *Emmerdale*

produced the versatile HL-DV7W DVCAM camcorder, which became very popular worldwide among cameramen for its excellent picture quality, ability to switch between 4:3 and 16:9, robust build quality, and features previously only found on much pricier Betacam offerings. It was around this time that Ikegami also took the decision to supply future cameras with B4 lens mounts rather than the B3 on earlier products. In 2003 the DNE-31 portable hard disk recorder suitable for broadcast appeared, as did the first microwave digital Hi-Vision wireless system combining a camera with an on-board orthogonal frequency-division multiplexing (OFDM) modulated transmission system.

While broadcast sales had been severely hit in the EU, other parts of the business were still bringing in European orders, notably for 3000 ICD-808P colour monitoring cameras for the Paris RATP transport network.

Meanwhile, Editcam was further enhanced, culminating in the third-generation Editcam3, with the DNS-33W well-placed to take advantage of the increasing move to tapeless production. The company's development and production of portable tapeless acquisition equipment would later win them a further Technology and Engineering Emmy.

After the CCD issue had been resolved, European camera production continued sporadically in the UK and Germany but eventually ceased in the UK due to lack of space and the move to more sophisticated HD product lines. Production of broadcast and medical cameras transferred back to Germany, where it continues to this day.

Moving into HD and beyond

Having long been at the forefront of electronic camera development, it came as no great surprise that Ikegami had been collaborating with NHK's laboratories to explore Ultra High Definition – not today's 4K, but 8K Super Hi-Vision 4320-pixel vertical resolution. Europe's very first look at 8K was through two prototype cameras at IBC2006. There were

no 8K projectors or monitors, so two 4K projectors were used to project the 8K image. The cameras showed stunning live pictures, one outside looking towards the city of Amsterdam, the other adjacent to the screen. The stated aim at the time was to achieve a transmission system by 2025.

In the same year Ikegami made an original equipment manufacturer (OEM) agreement with InPhase Technologies to badge their holographic drive, taking 300Gb cartridges as an archiving device for material originated on Editcam and Editcam HD. An alliance with Toshiba the following year facilitated the development of the GF™ series of cameras and other products. Then the EU levy was finally abolished and the HDK-790EXIII and HDK-79EXIII appeared, full facility HDTV digital cameras with an impressive signal/noise ratio. The Toshiba collaboration paid off, resulting in the HDS-V10 and GFS-V10 with its 4-hour recording capability at 50Mb/s. As cathode ray tube (CRT) monitors were going out of fashion, Ikegami began to experiment with field emission display (FED) technology, which produced excellent black level reproduction.

No sooner had the EU levy been abolished than the global recession hit. There was a slowdown for a couple of years and two of the factory operations were combined on the Utsonomiya site. Development continued though, albeit at a reduced pace, allowing Ikegami a breathing space before introducing their first 16-bit digital camera, the HDK-97A UnicamHD, featuring output at 1080p 4:2:2, 4:4:4 at 1080i in 50 or 60Hz. Alongside it, a 14-bit one-piece multifunctional camera, the HDL-45E, was launched.

This brings us into the current decade. Research and development has continued, with advances in the broadcast arena in HD, high speed in association with NAC, 4K and 8K. The HC-HD300 multifunction camera was added to the Unicam range in 2014, using three 1/3" chips to achieve 1080i, 720p, and older PAL and NTSC outputs usable with either a dockable recorder, a fibre adapter or a base station. Two Grade 1 organic light-emitting diode (OLED) monitors were also added to the product range.

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Ikegami is now on its fourth generation of 8K Super Hi-Vision cameras with the single 33-million pixel Super 35 CMOS sensor, PL-mount SHK-810, developed in cooperation with NHK.



First sight at IBC2006 of the experimental Super Hi-Vision camera Ikegami had been working on with NHK

UHK-430 4K camera



State of play today

Over the years Ikegami has produced a wide range of excellent and innovative equipment. There is genuine pride in the company among its staff, many of whom have been with Ikegami for decades. Many customers have also stuck with Ikegami through various changes in acquisition and transmission standards, taking advantage of the different generations of technology, perhaps the most notable overseas example being CBS in America, while in the UK Granada has been a particularly loyal client.

The EU anti-dumping duty had far more impact on the company in Europe than the recent global recession. However, even in spite of this, as well as other more minor setbacks along the way, Ikegami Tsushinki has survived and thrived for 70 years and today offers a fine product range comprising: 12 camera heads, including the HDK-97ARRI developed in



cooperation with ARRI using the latter's Super 35mm large sensor with Ikegami processing and electronics, and the 4K/HD UNICAM XE; viewfinders, including a multiformat 7.4" OLED; adapters; base stations; miniature cameras; a range of monitors including two Grade 1 OLED offerings; and a wide variety of transmission and control equipment.

The Medical division has its own HD cameras, recorders and monitors; the Security section has day and night cameras, a range of lenses both for optical and infra-red use, and robust monitors; and for Industry there is a range of inspection equipment.

Bringing the story right up to date, the first product in Ikegami's next-generation UNICAM XE series, the UHK-430 4K/HD camera, utilises three newly developed 4K-native 2/3" CMOS sensors and a new processor to provide 3840 x 2160 resolution with a 16-axis colour matrix, while allowing the greater depth of field required for studio and location production. Its B4 bayonet mount means compatibility with 2/3" HD lenses, including large studio and OB lenses when used with the SE-U430 expander. The lens and sensor module can be detached and operated up to 50m from the camera body. Both 4K and HD outputs are available, plus the built-in 40Gb/s optical transceiver will deliver full-bandwidth 4K RGB 4:4:4 component channels to an associated CCU-430 camera control unit. The camera can be controlled via a network through its Gigabit Ethernet port.

Ikegami is now on its fourth generation of 8K Super Hi-Vision cameras with the single 33-million pixel Super 35 CMOS sensor, PL-mount SHK-810, developed in cooperation with NHK. Test transmissions of 8K have already started, with expectations that the Tokyo Olympics in 2020 will see 8K coverage transmitted some five years ahead of initial predictions.

With three factories, nine sales and servicing organisations worldwide, and some 800 employees, Kosei Saito would be immensely proud of today's Ikegami Tsushinki 70 years on, now led by its current President, Yosuke Kiyomori.

Fact File

Now retired, Dudley Darby was a BBC cameraman based at TV Centre, and a valued GTC Council Member for many years, in particular as GTC Secretary and Exhibitions Officer.

Our thanks to David Kirk of Stylus Media Consultants for his help with latter-day photographs and information.

See more about Ikegami:
www.ikegami.com
 and more about its history:
www.ikegami.com/milestones.html



HDL-51 minicam – as used on the Royal Barge during Queen Elizabeth's Golden Jubilee river pageant



SHK-810 8K UHD camera – 8K trials are already underway with the 2020 Tokyo Olympics in mind

UNICAM XE

UHK-430



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Ultra Wide Bandwidth

Native 4K Full Colour Space RGB 4:4:4



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