

Profile of an Independent and Growing Optical Security Company

As editor of *Holography News*®, I have followed, with some admiration, the activities of renowned Czech Republic optical innovators IQ Structures. So, as I made my plans to attend the ODDS Conference in Prague it made sense that I should try and visit their facilities to find out more about the company.



IQ Structures Building (© IQS).

On the morning of the first day of the ODDS conference, before Dr Alan Hodgson's excellent seminar on using smartphones as authentication tools, I took the short 20-minute train trip north of Prague to the beautiful town of Rez and to the Nuclear Research Institute of Czech Academy of Science (Ustav Jaderneho Vyzkumu) – which, apart from having an active nuclear research reactor, is the production and administration centre for IQ Structures. The company has been based there almost from its foundation in 2012 and the Institute continues to make the perfect setting for a secure production facility, as was witnessed by the thorough entry procedure I had to pass through to gain access.

I write 'almost from its foundation' because there was a period, shortly after Dr Tomas Tethal, Petr Franc and Robert Dvorak started IQ Structures, that the company operated out of a villa on a hill above Rez. 'Those were interesting times, shall we say,' offered Robert. 'Between the founders we had all the know-how necessary to create optical security devices, but we were assembling the equipment and labs from scratch. At one time, we had to use the bath in the villa as a materials' washing station!'

As Robert tells it, it took a little time for IQS to get up and running, but by 2016 they were fully functional and had started marketing and gaining commercial contracts. During the early times the company also built their mastering facilities, in partnership with API Foils, in Brno – Czech Republic's second city – where it is still situated today, producing masters

using e-beam and UV lithography as well as IQS's own proprietary 3D nano-printers.

Having come from a coherent optics background myself I had to ask Robert a question that had always intrigued me: whether IQS had started making holograms in the classical object/reference beam setup and then moved over to computer generated holography?

'No, from the beginning we have always taken a digital approach, believing that it gives us greater control and flexibility over the image. We do have one vibration-isolation table sitting on the ground floor, though.'

When Robert showed me the table, I saw that it wasn't used for laser holography but as a resting place for one of the many microscopes they use to test the performance of the nanostructures they write.

The array of anti-counterfeiting devices that IQS has assembled over the years to protect paper, hybrid and polymer banknotes is impressive and they have full in-house capabilities to provide nanostructured manufacturing tools for the production of patches, stripes or threads. They also produce and convert the full-face laminates that can be integrated within polycarbonate ID and passport documents during the lamination process to protect the entire document. 'The masters and raw materials come in one end. Finished product ready to be applied to the document leaves at the other end,' said Robert.

The security print sector has always been the main focus for IQS and it continues to be the major source of growth within the organisation. The company hired 20 additional staff in 2022, bringing the total to over 70 employees and increasing the manufacturing capacity of card laminates up to 100 million in the same year.

It is also finding more niche markets in security-related applications, such as IQ Mint, a technology solution for protecting and decorating precious metal objects such as coins, medals and investment bars. According to the company, IQ Mint overcomes the technical difficulties in transferring the holographic relief to metals and ensures the diffractive colours, 2-D flip-flops and 3-D imagery and nano-scaled forensic motifs survive reasonable handling.



IQ Structures Investment Coin © IQS

IQS's premises in Rez actually houses three separate subsidiaries of the holding company IQS Group sro. Apart from IQ Structures, there is IQS Nanoptiqs and Brno based IQS Nano.

IQS Nanoptiqs' attention is on micro- and nano-structured optics for applications in automotive, aeronautical and architectural lighting, LEDs, and sensors. But it is in industrial lighting that the company anticipates its first breakthrough products that will be lighter, more efficient and less expensive than the current offerings.

IQS Nano develops lithographic and 3D nano printing technologies for use in 3D architecture metamaterials, bio-engineering and medical applications, as well as for anti-counterfeiting and micro/nanostructured optics. What unites the business units is their development of lithography techniques, 3D nano-printing and industrial replication of nanostructured materials.

'There is so much cross-fertilisation across the three units that it makes sense that they should be in the same building, but we keep the units separated to ensure focus and set clear objectives for each management,' said Robert. This becomes even clearer as I am shown around the facility and have to tap-in and then tap-out of the security gates as I move from one unit to the next.

In a sector that has seen a move toward vertical integration in the 2010s, with very few independent technology companies operating independent of larger security print companies, I asked Robert how long IQS could remain independent? 'We are not looking to sell the company. From experience we have learnt that it is important to keep control of your destiny through majority share ownership. But there's always an opportunity for the right investor', he said with a smile.

As I left the Ustav Jaderneho Vyzkumu, I said my farewells to Robert but then realised that I would be seeing him, and others from IQS, at the ODDS Conference as they were not only presenting at the event but also sponsoring it. They've come a long way from that bathtub in the hills above Rez!