ASML Veldhoven plant in the Netherlands.

Finding a solution together

Text:
Arno Sprengers
(Team Leader Precision Mechanics)

Lithography machines

ASML is a developer and manufacturer of chip-making equipment. An ASML lithography system contains thousands of mechanical and electrical parts, programmed and driven by software. This enables the exposure of small pattern at nanometre accuracy onto a wafer.

Make the impossible possible

Already some time ago we were confronted with a problem regarding wear in our wafer handler module. The wafer pre-positioning mechanism was equipped with mechanical parts which collide and slide against each other for millions of times. A new challenge! Looking for enthusiastic technical people, who want to solve this together with ASML, we contacted Jan van Goudswaard from Ceratizit.

Ceratizit declared to be interested in a challenging development co-operation. The technical content of the problem was discussed with Arndt Lüdtke, Jan van Goudswaard and Jan van Frankenhuyzen during a visit of Ceratizit in Empfingen. After having discussed the specifications, a constructive conversation started during which everybody wanted to put his findings on the table. But it also became clear that this project would require a very effective way of collaboration to make it a success. At that moment nobody surmised which great and efficient co-operation between three companies was started. And finally this would serve as starting point for another initiative.


Jan van Goudswaard

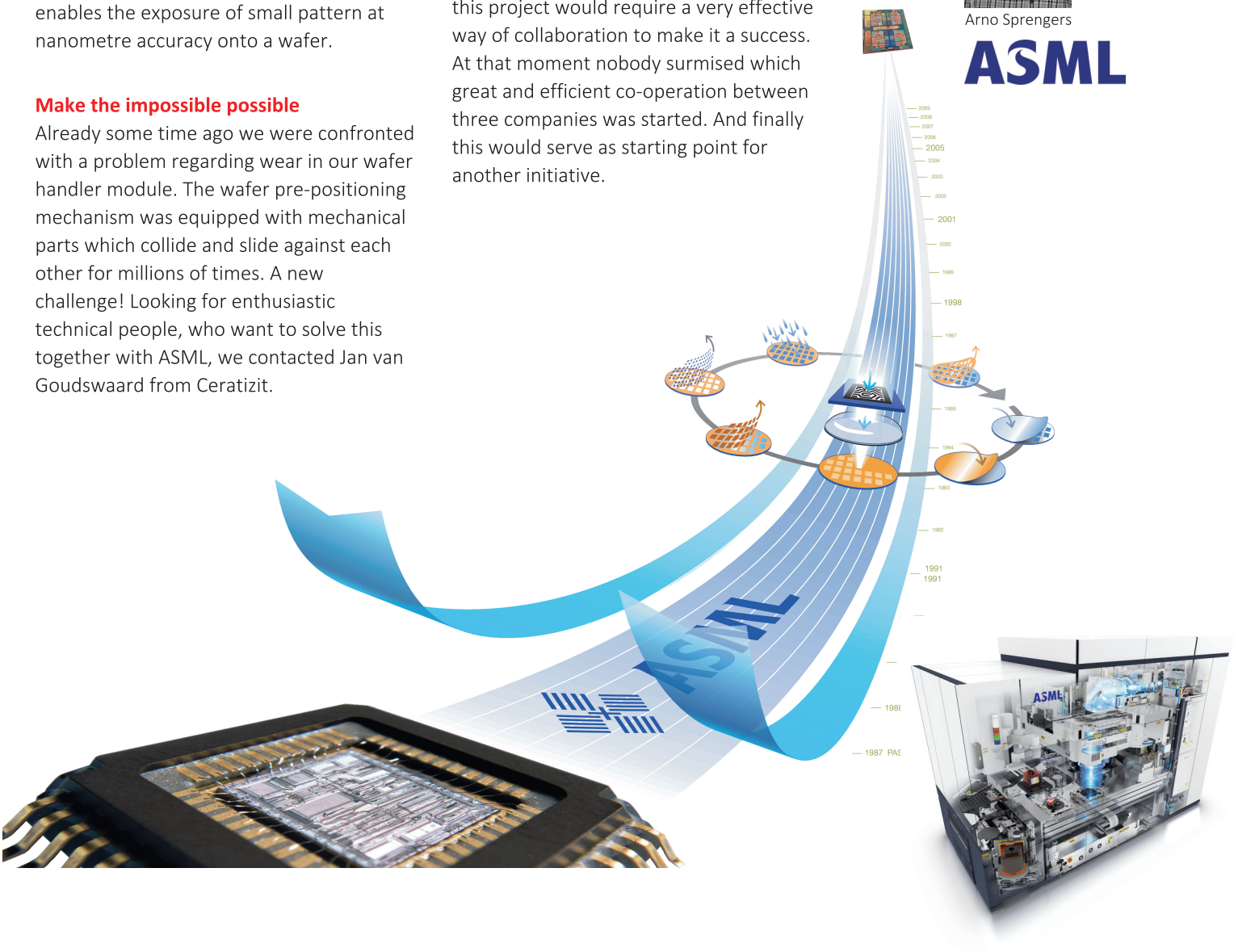
CERATIZIT GROUP


Jan van Frankenhuyzen

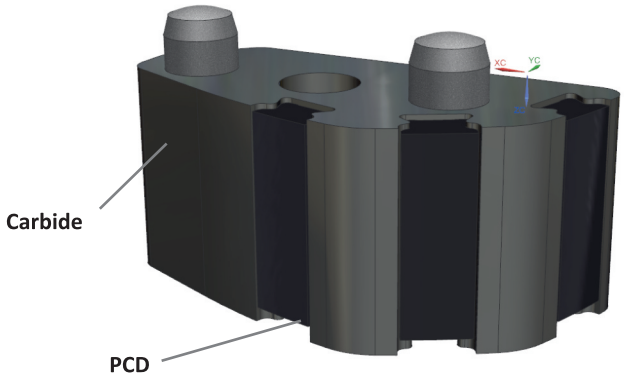
Frankenhuyzen
Industrial cutting tools


Arno Sprengers

ASML



Workshop of Frankenhuyzen.
Processing of PCD.



To the solution

Research

It was agreed to share all gained knowledge and written documents in a transparent way. Everyone should become smarter! Next to this, it was clear from the beginning that the solution could only be found by material tests. After all, we were looking for a material combination which have friction coefficient over seven years below 0.3 [-] and wear factor small enough to fit in the drift budget. After numerous tribology tests we finally found the combination that would probably lead to success.

Mechanical design solution

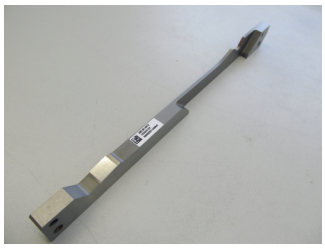
The chosen materials had to be designed into a usable product. Considering the manufacturability and other ASML demands this was tougher than expected. Connecting the chosen materials was hard to achieve with tacking into account the right design constrains within the lithography environment. Finally, Jan van Frankenhuyzen came up with the most suitable solution. Feasibility tests of the first proto type showed positive result. ASML designer Christian Liedecke had to employ full sails for a long time, to steer it in the right direction.

Demonstration

Several performance and robustness tests have been carried out in order to proof full function of the final design over the entire lifespan. Some last optimizations made the product ready for production and the process could be finalized successfully.

Success

After more than two years of research and perseverance, the technical solution was found due to a good co-operating. Something the participants will never forget! Currently, the parts are in production and they will be assembled in a working machine by VDL in Eindhoven.
www.youtube.com/watch?v=B9uDMNmajgw



Knowledge Sharing Centre

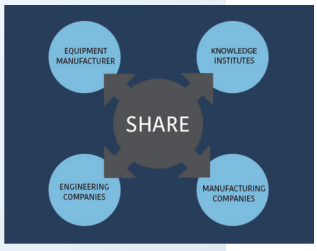
This inspired me to develop this way of working in a more general sense. I came up with the idea to offer designers a platform, where they could study all manufacturing processes and where they can easily pick the most suitable process for their specific design. It should become "the place to be for every designer" real soon.

The ultimate goal is creating a win-win situation from which both – the manufacturing company and the designer – will benefit. Because in the end knowledge sharing leads to a better balance between manufacturing capabilities and product quality. By sharing his knowledge, the manufacturer benefits from filling their order book, while having the opportunity to take early influence on design decisions as well. Together you make new design applications possible!

Christian Liedecke

ASML

Knowledge
Sharing Centre



"More collaboration and innovation"
"From individual challenges to common solutions"