Is it possible to use robotics to place fibres more efficiently in the production of reinforced rubber products like offshore oil and dredging hoses? When TANIQ was founded in 2005 most manufacturers were sceptical. Recently, TANIQ delivered a fully automated robot cell to one of the leading manufacturers in the industry. The robot places all rubber, fibre and vulcanization-tape layers quickly and accurately leading to significant savings in labour and material costs. In a traditional market characterized by labour-intensive production TANIQ is slowly changing the game.

TEXT Søren Blomaaard, Founder TANIQ, Rob Barendse, Engineer at TANIQ (Former Student Aerospace Engineering)
available winding equipment we found that we could offer more flexibility and lower prices to our customers by offering industrial robots, which we would program ourselves. So we rented office and production space at YES!Delft and bought our first robot in 2007.

The first commercial robot cell was developed for a US customer and was designed for fibre winding on complex shaped mandrels. Analysing the entire production processes of our customers made us realize that to offer a complete solution, we also needed to provide a solution for the rubber and vulcanization-tape layers. At this point our initial choice to invest in robotics turned out to be the right one. Using our existing Technology Platform we were able to develop new software modules and special tooling (e.g. placement heads) for the robot to apply rubber strips and tapes. The cell shown in Figure 1, which was recently developed, applies all material layers (rubber strips, fibres, vulcanization-tapes) automatically. The robot even switches between the different tools of the robot automatically.

BLACK MAGIC
When you think of composite products in relation to Aerospace Engineering you probably think of high performance fibres embedded in (thermo)plastic matrices like epoxy or polyester. TANIQ took a different approach and focused on reinforcement of rubber products. The main difference is that for rubber composites, an elastomeric matrix material is used. Using the combination of a rubber matrix and a reinforcing material, high strength to flexibility ratios can be achieved. Our first experiences with rubber felt like black magic. For example, we learned that most manufacturers have their own special rubber recipes and vulcanization methods. The vulcanization process of these various rubbers and the adhesion problems with fibres were definitely (and sometimes still are) challenging. By working closely together with our customers and material suppliers such as Teijin Aramid we managed to tweak the parameters to optimize the rubber strips and fibres for our technology. Now we can develop products with almost any type of rubber and fibre commercially available.

NEW DEVELOPMENTS
A trend in the market is that to stay competitive manufacturers have to produce locally. Investment in design software and robotic equipment makes them less dependent on labour costs and skilled personnel. This makes it possible to keep their production in Europe and North-America, while easily allowing manufacturers to copy their production to other locations.

Currently TANIQ is developing design software and production equipment for various products. One of them is a turbo hose with increased pressure and temperature resistance for future turbo systems in trucks. This product development is part of the international EUREKA project with the TU Delft. Another example is a graduation assignment on the development of a geodesic tyre by AE student Ronald Mollers. The new challenge for TANIQ is moving towards larger products and production equipment. Currently TANIQ is working on a robotic cell to manufacture products up to 14m in length and 1.5m in diameter.

VACANCIES
TANIQ is looking for talented Mechanical/Aerospace Engineers to develop new products and robotic equipment/tooling. Internships, graduation assignments & jobs are all possible. For more details, please visit our website.

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