



SCORPION

TOOLING UK LIMITED



COMPANY PROFILE

Scorpion Tooling are a UK cutting tool manufacturer specialising in tool design and optimisation for the machining of advanced materials.

We have significant experience working with high profile engineering, manufacturing and automotive clients and in undertaking collaborative research and development projects with industry and academia.

Certified ISO9001 and actively investing in R&D for advanced manufacturing we have state-of-the-art machining equipment with very high accuracy. This allows us to consistently provide products and services that meet customers' requirements on delivery, quality and performance.



WE ARE COMMITTED TO ENSURING CUTTING EDGE TOOLING WITH ENHANCED TOOL PERFORMANCE.



Schlumberger

RENISHAW
apply innovation™

NOV

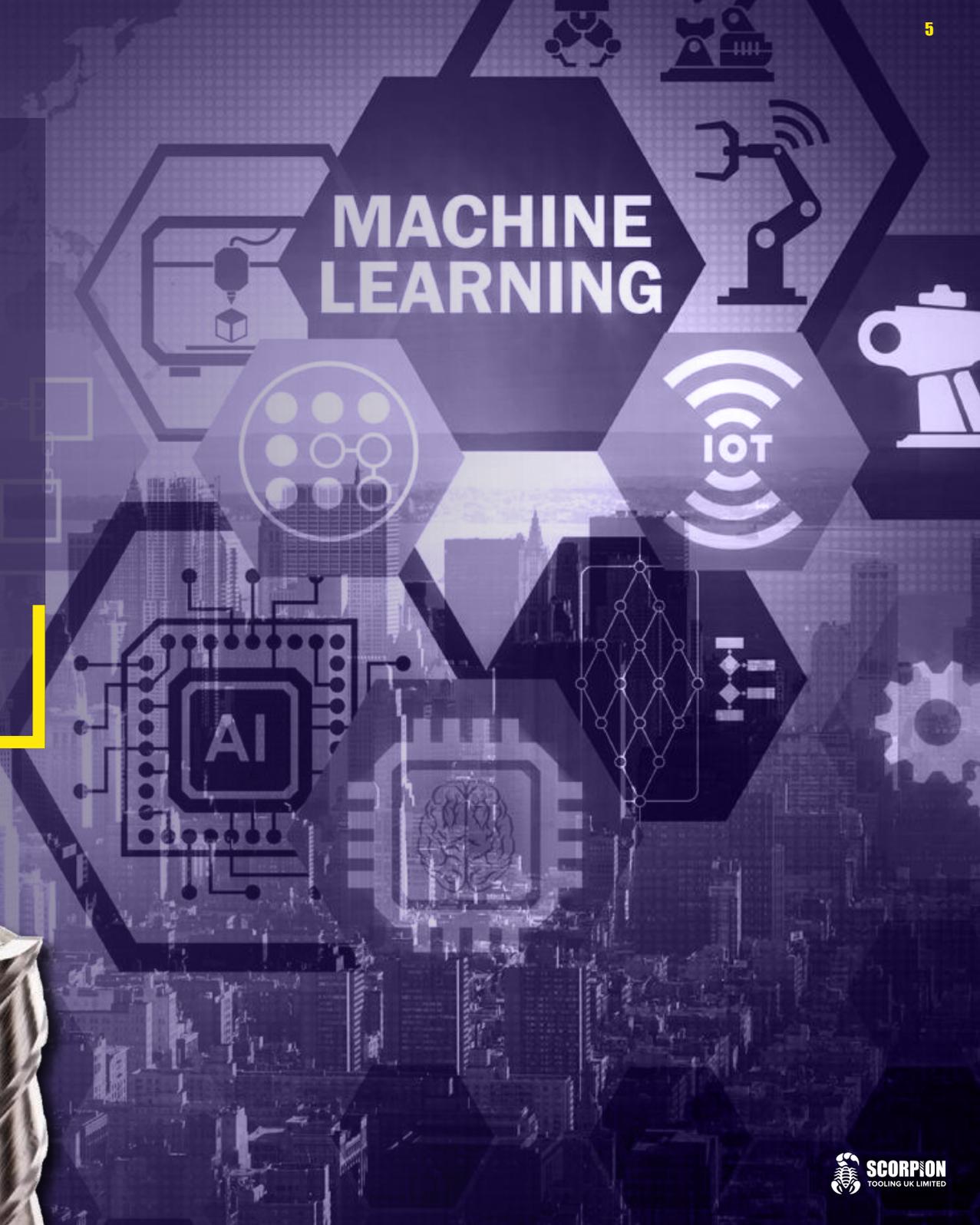
dyson

SKF

OUR MISSION...

With the transition of traditional manufacturing to SMART manufacturing and industry 4.0, understanding the machining process and making sure the process is as consistent as possible has never been more important.

We are looking to expand existing knowledge on tool optimisation to investigate the complete machining process, this includes machining strategy and environmentally conscious cooling techniques to achieve this goal.



MACHINE LEARNING

IOT

AI



R&D CAPABILITIES...

We have a dedicated R&D facility where we design and test our new range of cutting tools for difficult-to-machine materials.

Expertise includes:

- Machining advanced materials such as advanced alloys, Additively Manufactured materials, Controlled Expansion Alloys and Composites.
- Design of specialised cutting tools based on material properties and material micro-structure which can be extended from one material to another through mathematical modelling.
- Manufacturing specialist cutting tools with improved performance based on tool geometry, material properties, tool coating properties, cooling techniques and machining strategy.



**SCORPION TOOLING WANTS TO
WORK WITH YOU, OUR CUSTOMER,
TO CREATE THE BEST TOOL FOR
YOUR PRODUCTION LINE.**



CURRENT R&D ACTIVITY

Our company is lucky to be collaborating with the UK's innovation agency - Innovate UK. They allow us to develop and realise the potential of new ideas through their support, expertise and funding.

MACE

Scorpion tooling aims to fill the gap in knowledge regarding machinability of controlled expansion alloys that include Kovar, MuMetal and Hiperco 50 and to develop a specialist cutting tool set for machining each of these alloys alongside optimised machining parameters.

This is in partnership with the University of Bath who will develop an optimised machining environment for both effective and economic manufacturing.

KTP

Scorpion have completed a 3 year Knowledge Transfer Partnership with the University of Bath to prove that the right combination of tool geometry/coating/material improves tool life, surface finish and wear on cutting tools.

Now available for our customers.

Innovate UK



UNIVERSITY OF
BATH



OUR ACADEMIC PARTNER THE UNIVERSITY OF BATH

Working closely with the University of Bath's advanced design and manufacture team we have access to a vast amount of academic expertise and equipment. This combined with our 30 years of tooling manufacturing knowledge and state of the art machinery, we can provide high quality tooling solutions validated with accurate computer-generated data.

We have helped to publish leading research in the areas of environmentally conscious machining and have contributed towards papers on machining difficult alloys in different machining environments.



OTHER RESEARCH PARTNERS INCLUDE...



Innovate UK
Knowledge Transfer Network

EPSRC
Engineering and Physical Sciences
Research Council

ATLAS
COMPOSITE TECHNOLOGIES

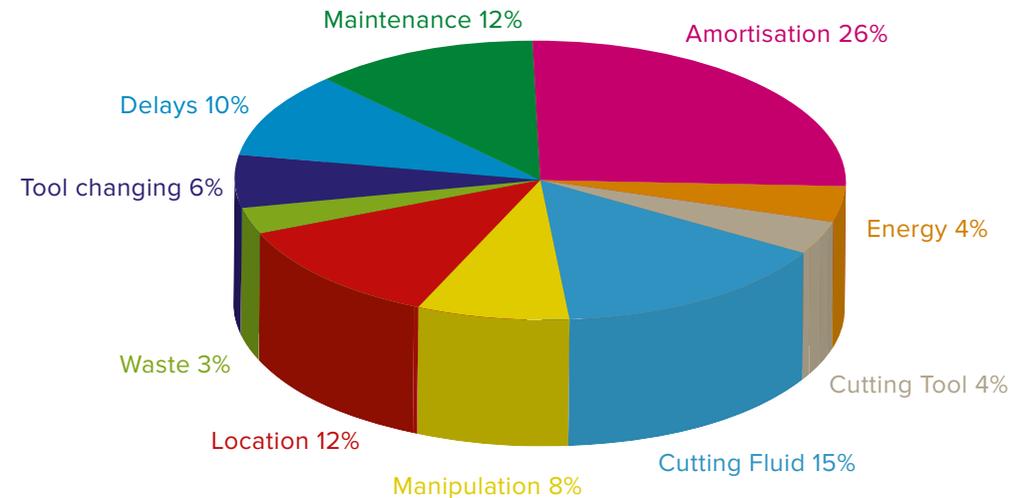
RECENT PROJECTS

Recent projects with the University of Bath include feasibility investigation into the effect of end mill tool geometries on tool wear and the surface finish of:

- Aluminium6082-T6
- Ti-4Al-4V
- HiperCo50
- PEEKGF30
- Inconel
- Kovar
- Invar
- μ PVC
- CFRP



MACHINING COSTS BREAKDOWN



Elahi, F.; Nisha, Z.-A.; Ferdous, I.-U. Intelligent cooling system for machining. In Proceedings of the Conference on Mechanical Engineering and Renewable Energy, Santa Barbara, CA, USA, 21–23

The above graph shows the typical machining cost breakdown of a production line. The basic aim of manufacturing firms is to minimise the total cost of production and ensure sustainable manufacturing. We design to reduce machining cost, waste and power consumption by focusing on key areas.

We focus on the optimisation of:

- Cutting tool design (Cutting tool/Waste/Delays/Maintenance)
- Cooling technique (Energy/Cutting fluid/Maintenance)
- Machining strategy (Tool Changing/Delays)

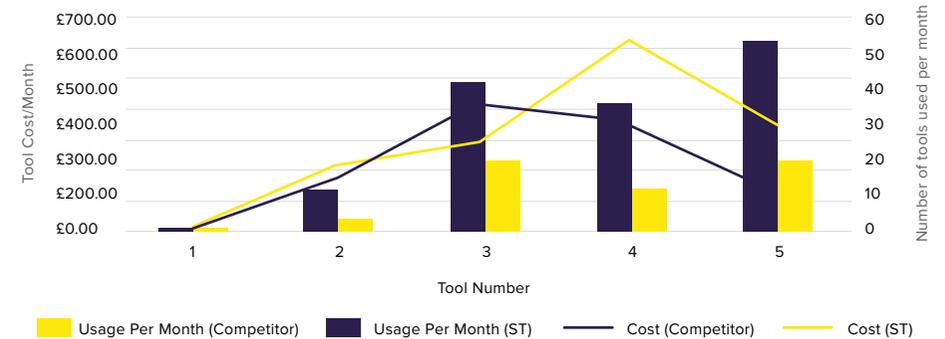
CUSTOMER CASE STUDY

The company was tasked with identifying problems in the manufacturing process to improve tool consistency and where possible increase production output across multiple machines.

Working closely with the engineering team at CompanyX, Scorpion Tooling's R&D department produced several developmental tools that were tested by CompanyX during normal production conditions and provided feedback on machining strategy, optimum speeds and feed rates for the specific tools.



PRICE VS TOOL LIFE - TOOLING COMPARISON



The implementation of these tools and optimum machine parameters **INCREASED TOOL LIFE BY 37%** leading to an increase in productivity as well as allowing for increased part production. Allowing Scorpion to develop bespoke cutting tools along with optimum speeds and feed rate increases the consistency of tool quality and for Company X will lead to **27% SAVING IN TOOL COST COMPARED TO MARKET COMPETITOR.**

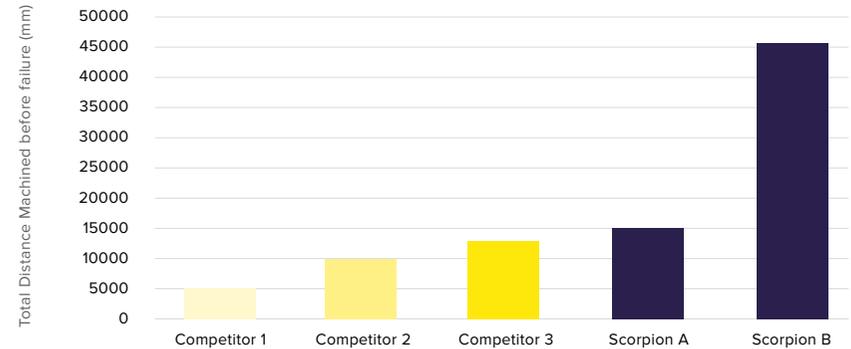
FEASIBILITY

Tests undertaken have shown the following performance improvement over existing competitors:

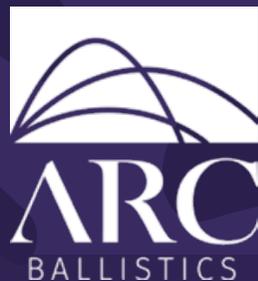
- Drill performance increase of 168% – average number of holes drilled 360 compared to 134.
- End mill performance increase 365%– tool life in minutes, 121 compared to 26.
- Drill performance increase in Inconel 11% - average number of holes drilled 68 compared to 61.



MACHINING OF TI-6Al-4V: SCORPION TOOLING VS COMPETITORS



Focusing on the machining of titanium alloy Ti-6Al-4V Scorpion A shows that a small change in geometry can increase tool performance however Scorpion B shows the combination of tool geometry, carbide grade and coating means **OUR TOOLS VASTLY OUTLAST THE COMPETITION.**



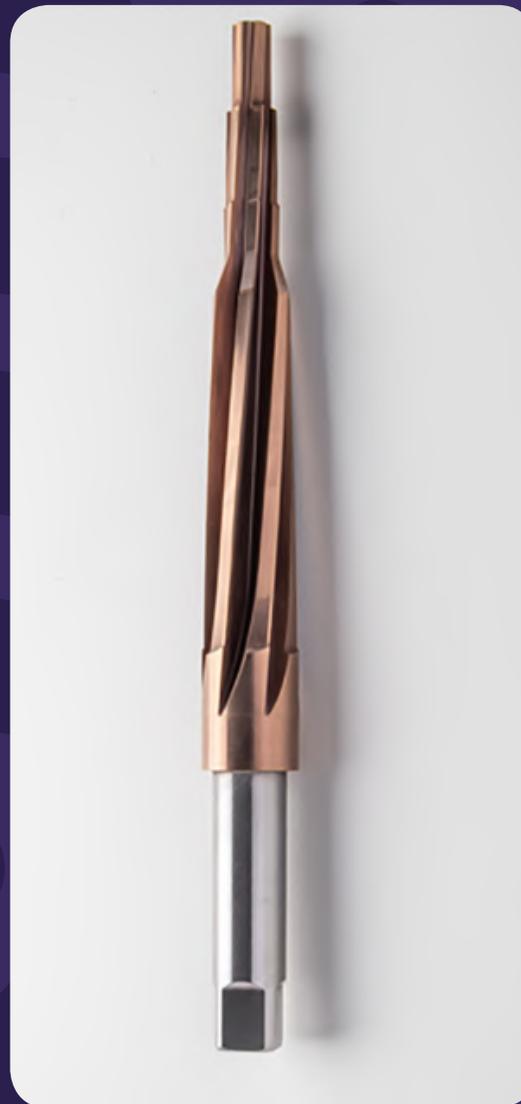
ARC BALLISTICS

Arc Ballistics is Scorpion Tooling's sister company who specialises in tool design and manufacture of ballistics cutting tools.

Arc has reputation as a expert manufacturer of specific chamber tooling for small arms. With customers including leading rifle manufactures RPA International and Accuracy International, ARC is known for its balance of speed and precision when it comes to manufacturing.

CIP and SAMMI compliant, Arc work closely with customers to ensure the correct solution can be provided for every production job, so that the tool will have an optimised feed and speed rate for each individual machine. This ensures that your production line runs as efficiently as possible.

Unlike off the shelf tooling Arc provides specialist calibres in a full range of sizes at high capacity with a quick turnaround.



We at SKF (U.K.) Limited have been using Scorpion Tooling for our cutting tool needs for the last 15 years. We have always found them to be very knowledgeable on tooling design and manufacture, as well as always helpful to address any tooling problems we might have.



I would have no hesitation in recommending them as a quality tooling supplier.

*Paul Trim | Tooling Engineer and Toolroom Supervisor SKF
January 2018*

The service and personal attention we have received over the last 30 years from Scorpion tooling has been exceptional. Their knowledge of cutting tool geometry and their willingness to overcome and solve machine cutting issues such as vibration, improvements to surface finish, bespoke tooling, to name but three, has been key to achieving NOV objectives within the oil industry in recent years. They truly have a high calibre team.



*Mike Barnes, Production Service Manager
NOV Wellbore Technologies*



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