ARRK

SPG Pre-Series Tooling & Prototyping

Shaping the world of tomorrow

Lighting & Optics


ARRK
SPG Pre-Series Tooling & Prototyping
3

Driven by experience, motivated by your ideas

Successful product development relies on effective testing and prototyping. At ARRK SPG, we support your team with precise prototype and low-volume parts including the needed expertise throughout the entire development cycle.

ARRK Corporation

ARRK Corporation is a global company that provides product development support services.

Since its founding in Japan in 1948, and the support of Mitsui Chemicals as a mother company since 2018, ARRK has a strong focus on product development in the field of automotive, design, and other industries.

With their main activities including product planning, design, engineering, prototyping and low volume production ARRK facilitates every step of the production cycle.

3000+ **Employees**

14 **ARRK companies worldwide**

3 **Continents**

ARRK SPG

ARRK SPG Pre-Series Tooling and Prototyping B.V. is an intermediary link between the customer and the supplier.

We offer proactive project management and product sourcing in every step of the product development cycle.

How it began

1948
FOUNDATION ARRK
Japan

In post-war **Osaka, Mr. Araki** established the Osaka Design Model Center, laying the foundation for what would become the ARRK Corporation.

The core mission was to transform abstract designs and ideas into tangible, working models.

1988
ARRK EUROPE
United Kingdom

Began international expansion with the establishment of Model Maker Associates (now ARRK North America) in the U.S. (1984) and Model Makers Associate Ltd (ARRK PDG U.K.) in the UK (1988), later **ARRK Europe Ltd.**

2001
START OF SPG
Netherlands

SPG Pre-Series Tooling & Prototyping B.V. is established and begins injection molding for pre-series production of automotive parts.

Prior to this period, it was part of the SPG Group, owned by Kroymans. The company was previously known as SPG-Kroymans & SPG Project Management B.V.

2006
SPG JOINS ARRK CORPORATION

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2007
ARRK SPG MOVES TO WEERT

ARRK SPG Pre-Series Tooling & Prototyping B.V. has relocates to Weert.

This move was driven by a requirement for more space for storage and assembly, combined with a desire for a more strategic geographical location.

Building on a rich heritage of craftsmanship and prototyping that spans over seven decades, ARRK is continuously pushing the boundaries of innovation globally. We are driven by our mission!

Shaping the world of tomorrow

ready to realize our partners' most complex and creative product ideas for the future.

2018

ARRK SPG MOVES TO NEDERWEERT

ARRK SPG Pre-Series Tooling & Prototyping B.V. enjoying the benefits of the larger building, which has been tailored to our needs.

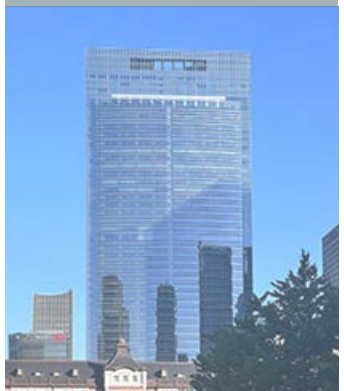
This includes the customer meeting rooms, showroom, administration offices, as well as an improved factory layout.

2020

ARRK AFFILIATES TO MITSUI CHEMICALS

ARRK is part of the Japanese **Mitsui Chemicals Group** since 2020.

ARRK draws on that wide materials expertise of Mitsui Chemicals by using its wide range of product and material technologies in engineering, prototyping and production.



2021

INTEGRATION INTO ARRK ENGINEERING

ARRK Engineering is a globally active development partner for the automotive and mobility industry.

Headquarter is located in Munich, throughout Germany there are four more offices based. At international level, we benefit from our subsidiaries in China and Romania as well as locations in Malaysia, Spain, Japan and in the US.

2023

ARRK VISIBILITY SOLUTIONS

ARRK Visibility Solutions brings full package visibility to the mobility market with dedicated project management and strong capabilities in development and low volume production. ARRK Visibility Solutions enables you to see and be seen.

Why ARRK SPG?

Professionality

Entrepreneurship

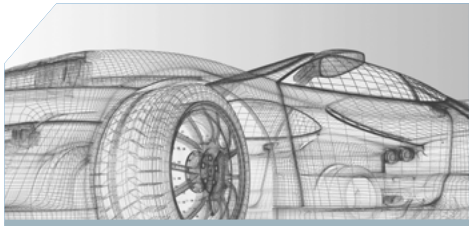
Passionate

Solution & oriented thinking

Maximum service, keeping promises

Look and think beyond customer demand

Technical Excellence, Seamless Supply



1. Engineering

2. Rapid Prototyping

3. Raw Materials

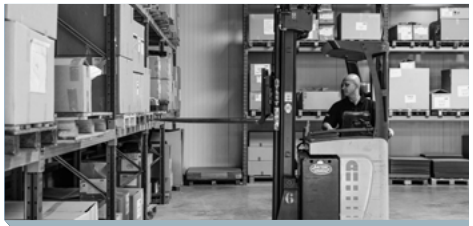
4. Toolmaking

10. Logistics

ARRK

SPG Pre-Series Tooling & Prototyping

5. Parts Production



9. Warehousing

8. Quality Control

7. Assembly

6. Finishing

Project Management

We take care of the supply chain, so you don’t have to.

Motivated to fulfill
Together with our valued partners in our supply chain, we can manage any project from A to Z. First, we map all of our customer’s wishes. Next, we plan, arrange and oversee the execution and deliver the final product.
This way, ARRK SPG can offer complete fulfilment, or surpass expectations.

Supply Chain & Logistics
- Sense of ownership & pro-active approach
- Strong and frequent communication
- Planning & EDI
- Packaging & RFID-Labeling
- Warehousing & Logistics

Quality Control
Finally, we execute various quality checks to make sure the products we deliver meet the highest standards.
- Parts measurement 3D CMM, tactile or digital scanning
- Process FMEA and control plan
- PPAP / EMPB & IMDS registration

Certificates
- ISO9001:2015
- ISO14001:2015
- ISO27001:2017
- TISAX-Label

Finishing

Using various finishing techniques, we ensure your prototype is of the highest possible quality.

Make it unique
In order to truly assess a product's aesthetics in the early stages of product development, it is absolutely worthwhile to build a prototype with a high-quality finish. Using various finishing techniques, we can match or surpass the quality standards of the final product.

Surface treatment and decoration
- Painting: texture painting & HSP diffuse painting
- Laser texturing (femtosecond) and laser etching
- Metallization (transclucent) and PVD-coating
- Matt translucent silkscreen printing
- And many more…

Assembly

Regardless of its complexity, we can assemble various parts into a complete product.

Ready to install
Besides the production of single parts, we can also take care of the assembly of an integrated module or even a full product. We are especially skilled in:
- Complex assemblies with multiple options, e.g. bumper facias and door panels
- Functional lighting modules including PCB's

Our Technologies

Prototyping & Low-Volume Production

Tailored solutions from individual components to full assemblies, up to 2,000 units.

CNC-machining

- Optical materials like PMMA, PC, Zeonex, etc. including engineering plastics
- Metals including aluminium for heatsinks and reflectors
- Milling radius from R0.5 up to R0.05 for optics
- Unique diamond polishing technology for small optics
- Femtosecond laser engraving of free-form microstructures, micro-optics or textures
- ARRK Fasttool technology for milled parts in series materials (e.g. milky, smokey)
- SPDT (Single Point Diamond Turning) and Diamond Machining Technology

PU-vacuum casting

- Including 2-/3-shot casting
- Standardized colours for (semi-)translucent materials
- Reflex patterns can be included
- Silicone tools based on CNC-machined masters for excellent surface quality, highest accuracy and optimum dimensional stability
- Acomon RAVolution™ PU optical clear material resistant to UV yellowing
- PU Back molding of polymer foils include in-mold structural electronics IMSE ®

ARRK global 3D-Rapid Prototyping

- SLS Selective Laser Sintering
- SLA Stereolithography
- Polyjet (Objet)
- DMLS / SLM Metal Sintering
- DLP Technology
- FFF/FDM – Printing (Fused Filament Fabrication)

Optical silicone casting
- Optical silicone parts with DOW materials by using steel prototype tooling

Injection moulding
- Using aluminium moulds at ARRK SPG as well as rapid steel non-export moulds operated from our ARRK Far-East facilities
- PRE-TENSION Tool® for large mouldings
- In-Mould-Decoration (IMD) & IML/FIM with printing electronics
- Including 2-/3-shot overmoulding, gas injection (GID) and Sequential Valve Gating (SQV)
- Expandable polypropylene EPP & PUR-Foaming

Light-weight solutions
- MuCell® and Chemical foaming
- CRFP composite solutions
- Thermoplastic-prepreg overmoulding include Mitsui Tafnex™ CF-PP UD Tapes
- D-LFT Direct Long Fiber Thermoplastic moulding

Sustainable solutions
- Using high-flow PP compounds from Mitsui Chemicals
- Using PCR and bio-based material & additives

Other solutions
- Compression Moulding (Rubber) & Liquid Silicone Rubber (LSR)
- Blow moulding
- Thermoforming
- Aluminium Sand Casting & High Pressure Die-Casting (HPDC)
- Extrusion (Aluminium, plastics, TPE and EPDM)
- Sheet metal (Stamping, deep drawing and pressing)

Our clients


FORVIA
HELLA


ZKW


Grote


MARELLI


LUMILEDS


BEGA


SKODA


Signify


EDAG


rebo

FORVIA HELLA

“I would like to thank you for the perfect cooperation and quality of parts from your company. We are very satisfy with your kindly communication and perfect support for all projects, because the effort is excellent and you are able to gives us the best information about technologies and possible production method of separately parts for projects, which are becomes still more complicated! ARRK SPG is a very reliable and flexible partner for us.”

DAF

“Recently, DAF introduced a new generation of trucks to which ARRK SPG collaborated in the design and styling phase. We really appreciated your cooperation from the beginning in realizing all deadlines and getting the styling models ready for management presentations on time with excellent quality. The prototypes helped us to make the right choices along the way. A personal highlight for me was the fact that the headlight was already operational in the early prototype phase of the project.
That helped us to implement LED lighting on the entire vehicle, which is an important step towards a sustainable future.”

LEDLENSER

“ARRK SPG delivers rapidly and with a consistent quality. We rely on the fast response time of the ARRK SPG team to provide first prototypes of plastic optical systems. The quality and delivery time always meets our demands. Our flagship lamp XP30R was first built with lenses made by ARRK SPG to successfully prove out the concept - thank you!”

Lightyear

“ARRK SPG has guided us as a reliable and knowledgeable manufacturing partner from the first concept to the start of small-scale production of the Lightyear 0 rear lighting system. Their experience, knowledge and craftsmanship have made a major contribution to our development process.”

Gazelle

“During the early design stages of the Gazelle N01, ARRK SPG proved to be a reliable and knowledgeable partner. Their strong alignment with our Dutch heritage and way of working helped lay a solid foundation for this innovative bicycle lighting concept.”

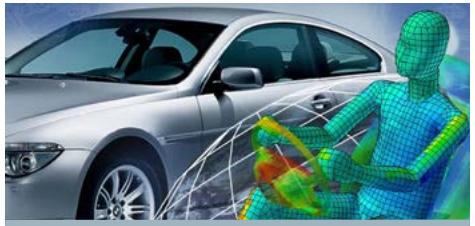
ARRK ENGINEERING

Your specialist for forward-looking automotive development

ARRK Engineering's range of services pools skills from different thematic fields in order to achieve the best possible production results as well as consistent quality of manufactured components. Teams of experts work with certain key issues in mind to find interdisciplinary ways of realizing projects faster and in a more technically comprehensive manner.

Interdisciplinary Topics


Electronics & Software


CAE & Simulation


Material


Acoustics


Composite


Digitalization & Software


Sustainability Management

Modules

Car Body & High Voltage Battery

Powertrain

Chassis

Interior & Exterior

Optical Systems

Entire Vehicle Systems

Automated Driving

Passive Safety

Thermal Management

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ARRK
VISIBILITY SOLUTIONS

Small Series Tier-1 Lighting supplier

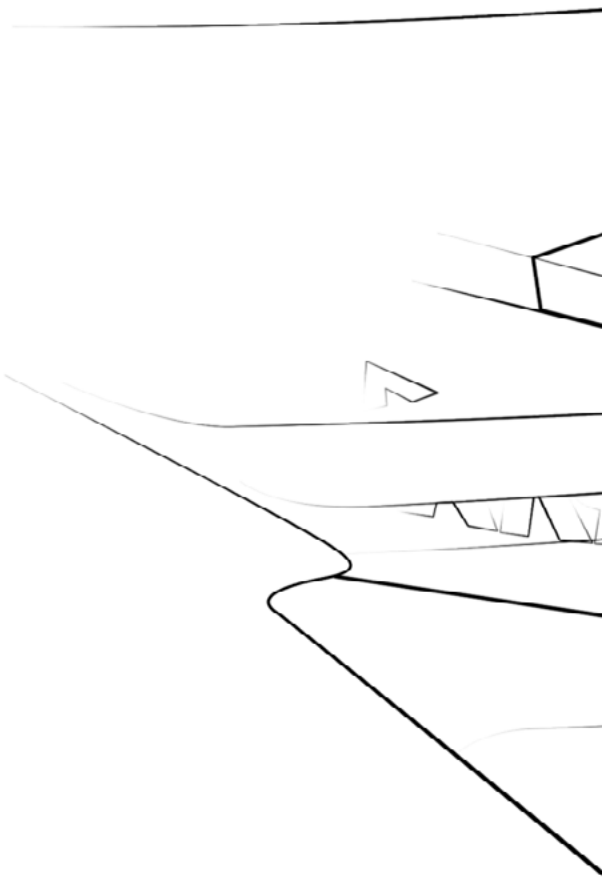
Through Visibility Solutions, ARRK serves the Mobility Market as a Tier-1 Lighting Supplier. OEMs are directly supported on the design, development, and manufacturing of (customized) lighting systems - from concept to retirement.

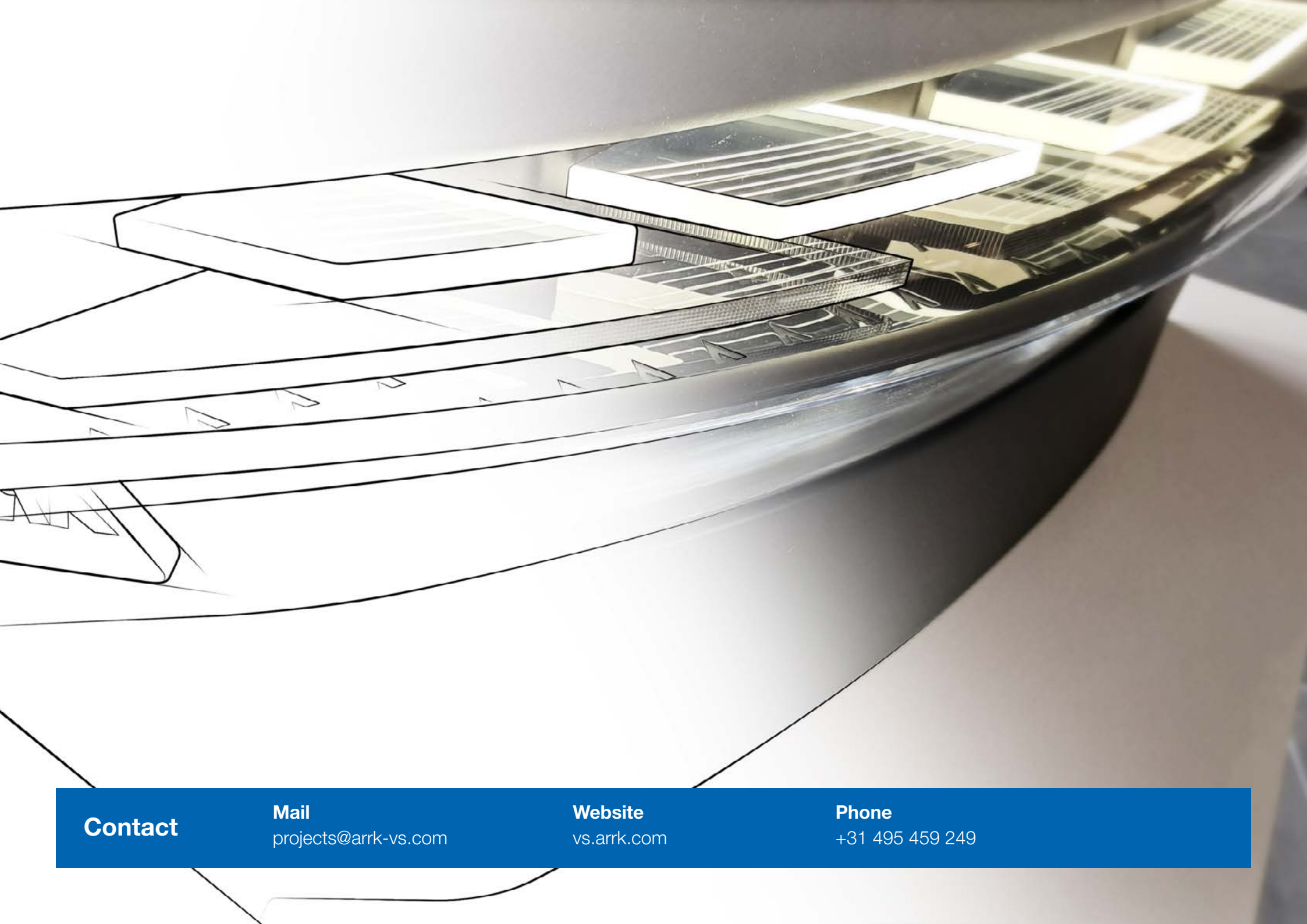
Our focus is on Small Series programs, where our approach is built on flexibility, agility, and commitment to close collaboration, ensuring a high service level for our customers.

We serve the entire Mobility Market, from bespoke vehicle series and hypercars to people movers, delivering tailored lighting solutions for diverse applications.

Although located in Europe (Netherlands), we operate globally, leveraging the capabilities and capacity of the ARRK Group and its supply base.

Our approach is guided by our extensive experience in the Automotive Market, Lighting Development and Manufacturing and our core values.





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Index technology brochures

Navigate back to the index by clicking the ARRK logo

ARRK
SPG Pre-Series Tooling & Prototyping

Rapid CNC-Machining

ARRK SPG is able to offer customers a wide range of CNC machining options from our niche CNC centres in Europe, to our larger volume operations in the Far East.

Our strengths

Why use ARRK-SPG's CNC Service

- Speed of delivery
- Huge capacity
- Outstanding part quality
- High precision
- Wide range of material and finishing options
- Highly competitive service and rates

Materials offered

- PMMA
- PC
- POM
- PA6-GF30
- PBT
- PBT-GF30
- PEEK
- PPS-GF
- PTFE
- PVC
- ABS
- ASA
- PC/ABS
- Aluminium
- Steel
- Brass
- Stainless Steel
- EPP-Foam
- FDA approved materials
- And many more...

Block modelling service

We are able to produce exceptionally high quality visual representation block models. Using a combination of high speed machining and traditional model making, these models are made from a variety of materials. The components are then finished, painted, metallised, screen or pad printed, and assembled to a realistic model. This block modelling service is perfect for exhibition or display models.

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Primary Optics (PC-Clear)

The primary optics are typically positioned in close proximity to the LED die and therefore exhibit the most significant yellowing or aging affects due to the proportionally higher flux.
ARRK SPG offers machined clear PC optical prototypes with high accuracy.

Characteristic of Primary optics:

- Lens integrated into the LED package;
- Optimized for:
  - Light extraction
  - General beam shaping
  - Or both

PC Clear Materials available:

- PC LG Lupoy 1302-05
- PC Idemitsu Tarflon LC1500
- PC Mitsubishi Lupilon HL-3503 N428

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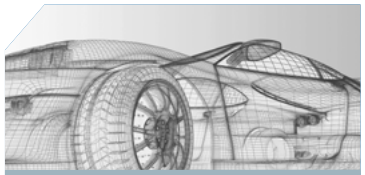
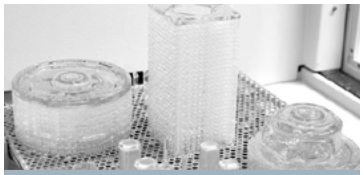

1. Engineering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3. Raw Materials


4. Toolmaking


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5. Parts Production


9. Warehousing


8. Quality Control


7. Assembly


6. Finishing

SPG Pre-Series Tooling & Prototyping B.V.
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projects@spg-arrk.nl
www.spg.arrk.com

Interested in what we can do for you?
Scan the QR code for more information.

ARRK
SPG Pre-Series Tooling & Prototyping

ARRK has doubled their 5-axis capacity for optical parts!

Characteristics:

- 5-axis simultaneous machining can complete complex
- High rigidity structure with closed design.
- Gantry type movement, 3-axis feed rate will not affected
- Adopts oil air lubrication spindle, provides low heat and
- 5-axis turning table is driven by built-in DD motor,

Specifications:

Max. loading capacity	600 kg
X/Y/Z axis travel	760/820/560 mm
A/C axis travel	+30°~-120°/±360° deg
X/Y/Z axis rapid rapid traverse	48/48/48 m/min
A/C axis rapid rapid traverse	50/100 rpm
Spindle taper	7/24 Taper No.40
Spindle speed	15000 (20000) rpm
Spindle motor	40/40 (18.5/11/7.5) (40/30) kW
Tool capacity	32 (40) (64) pc

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5-Axis movie

Scan the QR code
to watch the video.

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New 3-Axis high precision machining

ARRK takes (optical) parts to the next level with enhanced quality and high-precision machining performance!

- High Performance: Delivering speed, precision, and power.
- High Quality: Trusted brand.
- Advanced Capability: Purpose-built for precision manufacturing.

FANUC ROBODRILL D28LiB ADV Plus

Specifications:

Max. loading capacity	400 kg
X/Y/Z axis travel	850 / 500 / 400 mm
X/Y/Z axis rapid rapid traverse	54 / 54 / 60 m/min
Spindle taper	7/24 Taper No.30
Spindle speed	24,000 rpm
Spindle motor	11.0 kW (1 min. rated) / 3.7 kW (continuous rated)
Tool capacity	28 pcs

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3-Axis movie

Scan the QR code
to watch the video.

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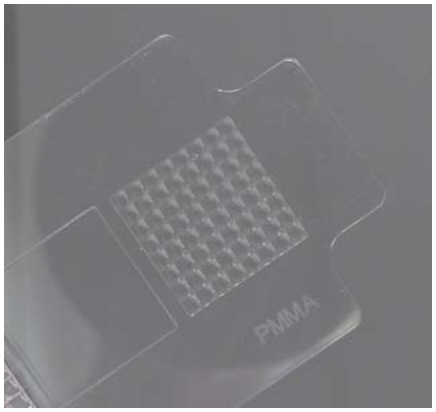
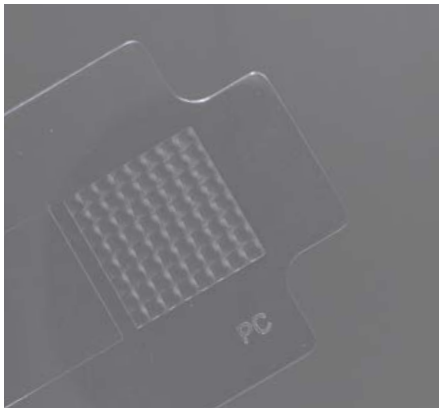
Optical polishing

ARRK's polishing department is truly one of the most unique and critical departments. It balances ancient recipes of optical craftsmanship, with modern technology.

Through decades of trials, experiments and demand-driven polishing, we have developed polishing techniques and recipes that are repeatable and of the highest quality.





Our strengths:

- Using unique polishing techniques for highest accuracy and translucency of your optical parts!
- PMMA (Acrylic) → Diamond Polishing
- PC (Polycarbonate) → Vapor/ Chemical Polishing

Materials to polish:

- PMMA
- PC
- Zeonex
- COC (Topas)
- Röhm Block materials
- All our ARRK Fasttool parts using optical moulding granulates
- Aluminium 7075 for reflector parts.

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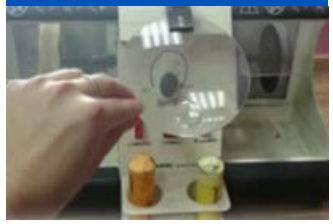
Polishing techniques - CNC Machining

	Buffing	Flame Polish	Vapor polish	Paint	Diamond/Silicone polishing
					
Clarity	A	A	B	A	A
Flatness	A	B	B	B	A
Maintain	C	C	A	B	A
Optical	B	B	B	C	A
Issue	• Hard to maintain accuracy • Small feature cannot be polish	• Cause deformation • Air pocket form on sharp edge	• Crack on surface • Flow mark	• Crack on surface • Paint build up at corner area	-

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ARRK Fasttool

From granulate to prototype in just a few weeks

ARRK SPG is able to offer customers a new possibility to prototype special materials mainly for lighting application where no block material is available. With this ARRK Fasttool technology we are able to supply customers with prototypes from real series materials!

Why use ARRK Fasttool Technology

- Competitive cost compared with standard Aluminium Tooling.
- Flexibility;
  - Possible to make prototypes from different materials out of one Fasttool.
  - Possible to do changes very easily.
  - Possible to combine parts in one Fasttool.
- Real series materials.
- Short leadtime compared with aluminium tooling.
- Highly competitive price if you need 1 off or just a few parts.

Materials possibilities

- Röhm Plexiglas materials, like;
  - Röhm DF21 & DF23
  - Röhm LD Edge (LD12~LD96)
  - Smokey materials
- Covestro Makrolon materials, like;
  - 2405 & 2407
  - 2207
  - Etc.
- MOCOM Alcom
- And many more...

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Automotive interior

Automotive exterior

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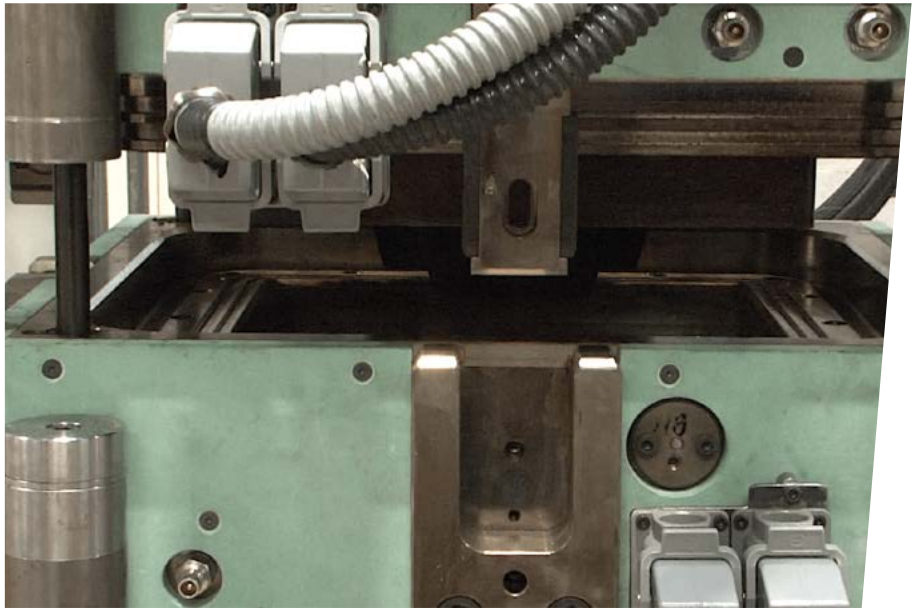
PC (polycarbonate) block manufacturing

By thermocompression process

Our partner can produce homogeneous semi plastic products (amorphous plastics) without internal defects (cracks) by using a transformation process called thermocompression which associates temperature and pressure.

This process is controlled by the recording and the filing of the manufacturing parameters.

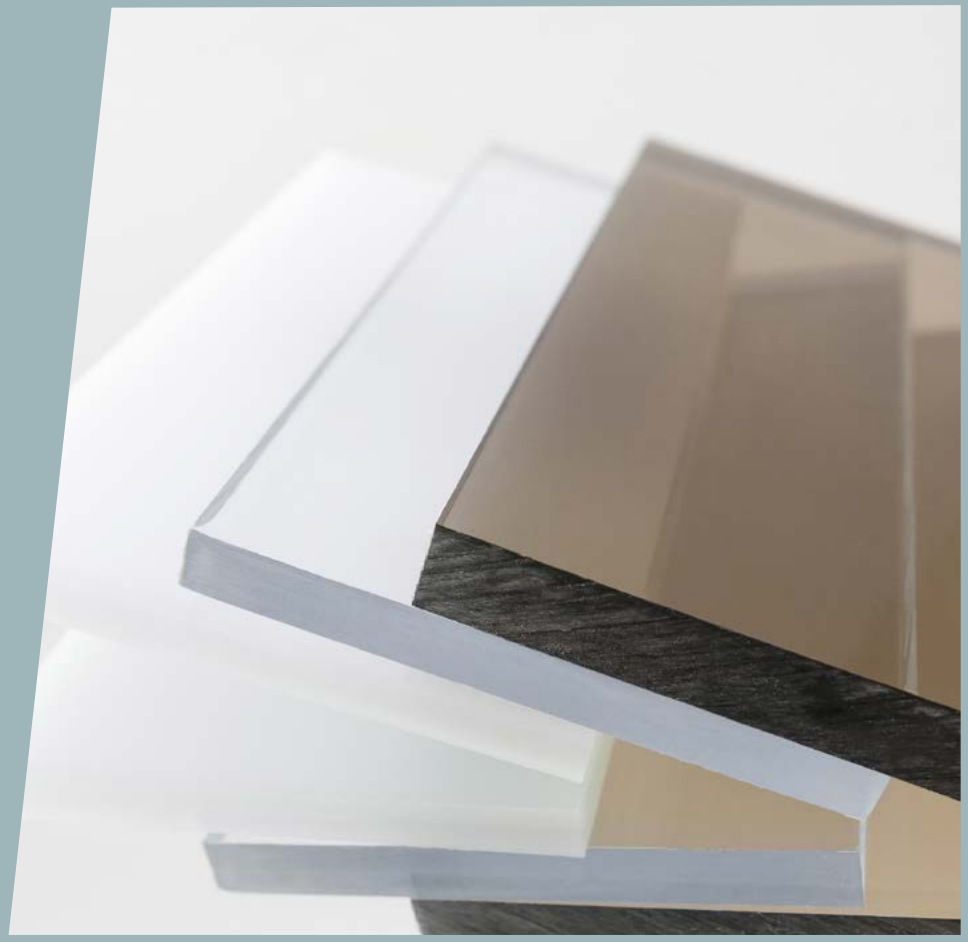
They produces forms by compression without internal defects.
Its range of products is dedicated to high precision manufacturing.



Our manufacturing process allows us to produce sheets in the following dimensions depending on the material.

Plates dimensions:

- 600 mm x 500 mm - Thickness 5 mm to 200 mm
- 1000 mm x 600 mm - Thickness 5 mm to 130 mm
- 1200 mm x 1000 mm - Thickness 5 mm to 100 mm



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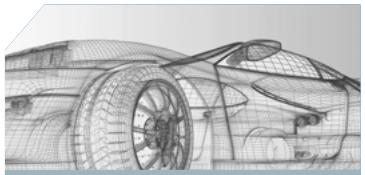
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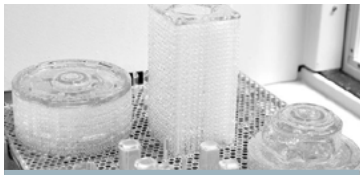
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Diamond machining

Single point diamond turning (SPDT) is a well known method for manufacturing micro optics. The big difference between a standard lathe and a single point diamond turning machine is that the SPDT machine uses a diamond tipped bit for its machining and it is able to machine surface finishes of a few nanometers.

Our strengths:

- Specialized in single pieces or just a few parts.
- Fast delivery.
- Competitive pricing.
- We do offer both Diamond turning (SPDT) and milling technology.
- From micro optics (diameters smaller than 1mm) to larger optics till 500 mm in diameter.

What kind of optics:

- Freeform optics
- Aspherics
- Off axis
- Torics
- Cylinders
- Etc.

Materials to use:

- PMMA
- PC
- Aluminium Hokotool
- COP (Zeonex E48R, 480R)
- OKP1 + OKP4
- APL5014CL
- EP7000

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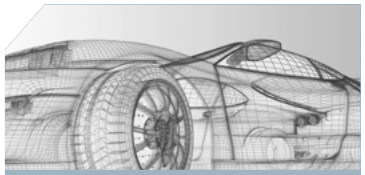
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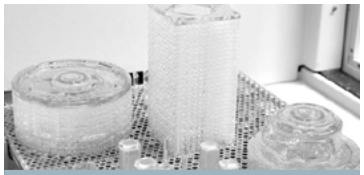
2. Rapid Prototyping


3. Raw Materials


4. Toolmaking


10. Logistics

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8. Quality Control


7. Assembly


6. Finishing

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Texture Painting

Texture painting can be applied on CNC, PU and 3D-printed parts to simulate VDI-3400 Textures. It can be done with coloured texture paint or clear texture paint for optical components.

Our possibilities:

- Only VDI-3400 Textures are available ranging from VDI-12 to VDI-39
- Other textures can be simulated by using reference part

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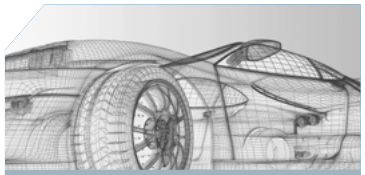
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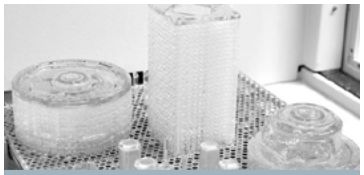
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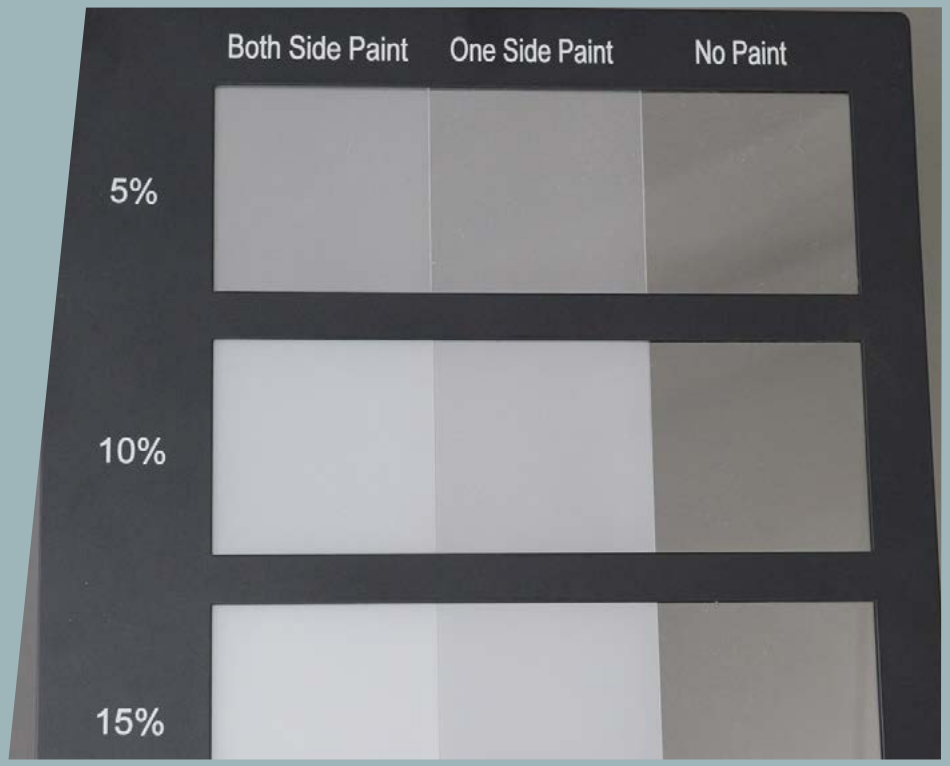
HSP Diffusive Painting

HSP Painting is a diffusive paint which can be applied on clear materials. It can be applied on one side or both sides of the part. The translucency can be controlled by measuring the transmission.

Advantages & Characteristics:

- Quick and cheap processing to create scattering effect
- Applied by painting process
- Ideal process to be used for demonstrators and showcars
- the translucency can be controlled by measuring the transmission.
- Usually we work based on quick sampling before painting the real part.



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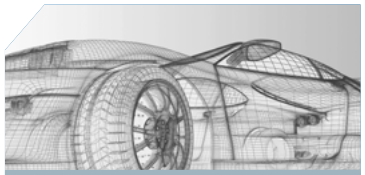
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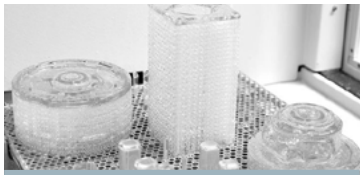
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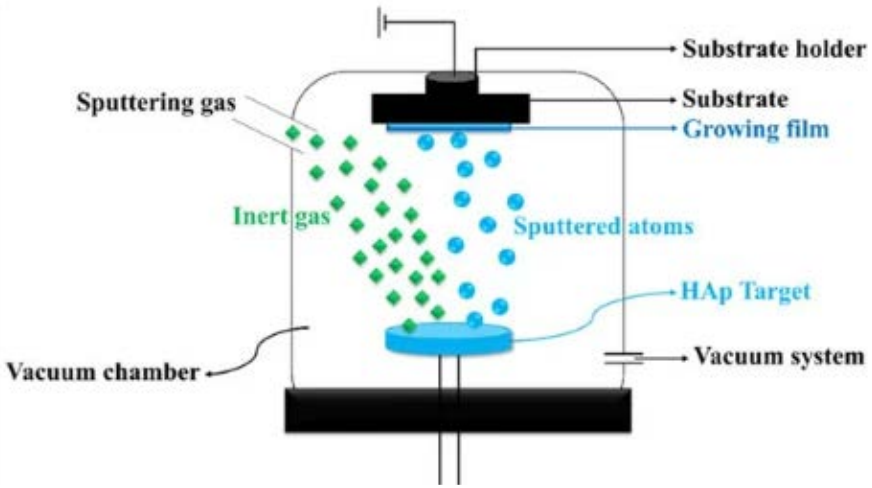
Vacuum Metallization

Vacuum metallization is a form of physical vapor deposition (PVD), a process of coating a metal such as aluminum to a non-metallic substrate through evaporation. The most common metal used in vacuum metallization is aluminium.

The process may use various heating methods, including plasma beams, resistance heating, and electron beams. The end result is a metal layer that can range in thickness from a single atom through to several millimeters.



Characteristics & Possibilities:

- Aluminium coating
- Application like reflectors and chrome alternatives
- From matt to satin to gloss possibilities
- Translucent effect possible by adjusting layer thickness
- Colouring like gold and rose can be achieved by additional paint

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Vacuum metallization equipment

Vacuum metallized products

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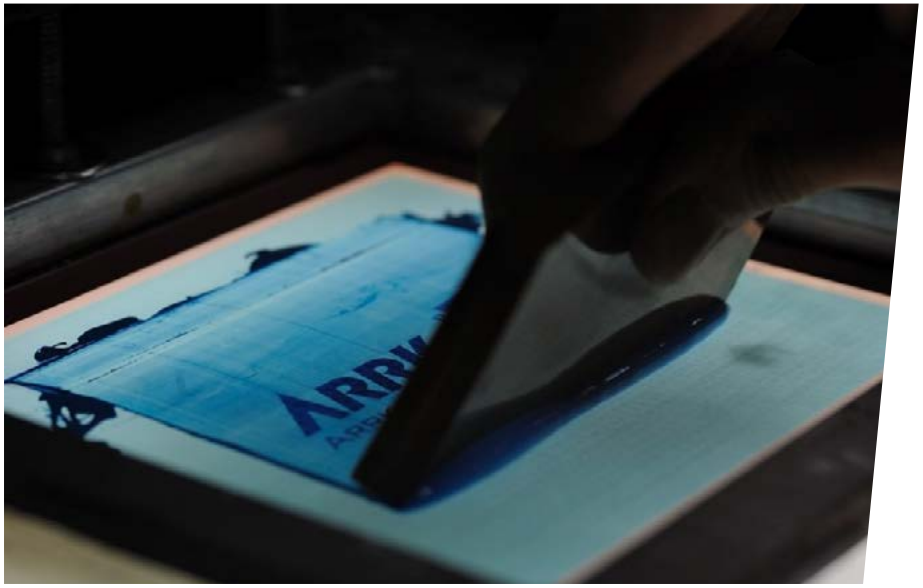
Silkscreen printing for lighting parts

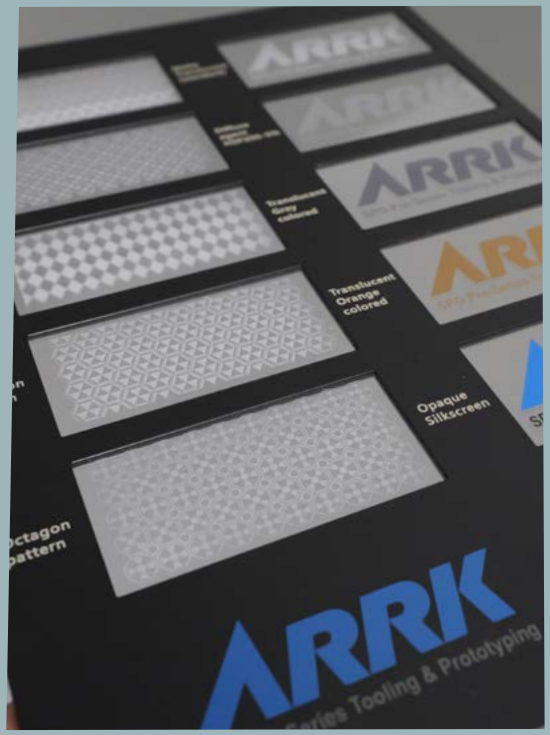
Silkscreen printing is a technique where a mesh is used to transfer ink (or dye) onto a substrate, except in areas made impermeable to the ink by a blocking stencil. A blade or squeegee is moved across the screen to fill the open mesh apertures with ink, and a reverse stroke then causes the screen to touch the substrate momentarily along a line of contact.

This causes the ink to wet the substrate and be pulled out of the mesh apertures as the screen springs back after the blade has passed. One colour is printed at a time, so several screens can be used to produce a multi-coloured image or design.



Characteristics and applications:

- Smallest detail and line width of 0.2 mm can be achieved.
- Logo's or symbols can be applied in a proper way.
- No masking needed compared to texture paint technology.
- Wide variety of colours are available.
- Matt translucent effect possible for optical parts.
- Also possible to apply on top of any soft touch or standard painting layer to create texture or special effect.



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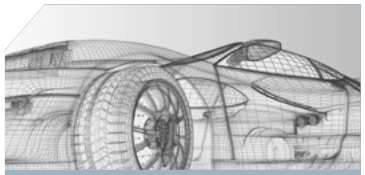
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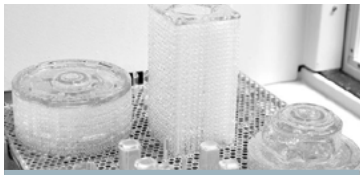
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Laser Etching

Laser etching is the process of creating patterns and designs on a material by altering its surface with a laser. While the term laser etching is often used interchangeably with the terms laser engraving and laser marking, there are definitely differences among the processes.

Characteristics:

- Produces superior quality marks compared to traditional methods that use acids or abrasion.
- A faster process compared to traditional marking methods.
- Can be used on a wide variety of materials.
- Is a non-contact process that doesn't introduce mechanical stresses into the part or cause chemical reactions.

Laser Process Availability:

Co2 Laser Engrave

- Cut plastic, mainly acrylic, and 2D-cutting only;

Fiber Laser Engrave

- Can be used on round/curved surface, it is mainly used for etch painted surfaces. (not for white colour paint suitable due to reflection)

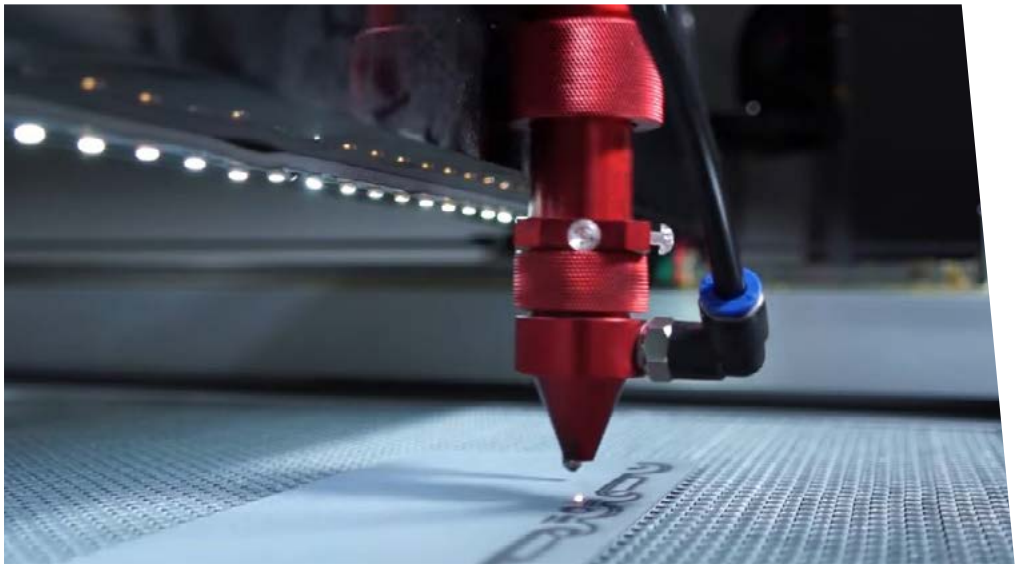
Femto-Second Laser

- See brochure Laser Machining & Texturing

Laser Etching

A wide variety of materials are used in laser etching.
Some of them are listed below:

- Plastics
- Metal
- Leather
- Paper and cardstock
- Wood
- Medium-density fibreboard (MDF)
- Ceramics
- Glass



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Laser Machining & Texturing

We can achieve smaller milling details than conventional technologies in an industrial way! New micromilling/texturing possibilities directly on PMMA or PC machined or moulded prototypes over a 3D surface.

Textures & Graining

All VDI-Textures are possible. MT-Texture on request.

Detail under microscope

VDI-33

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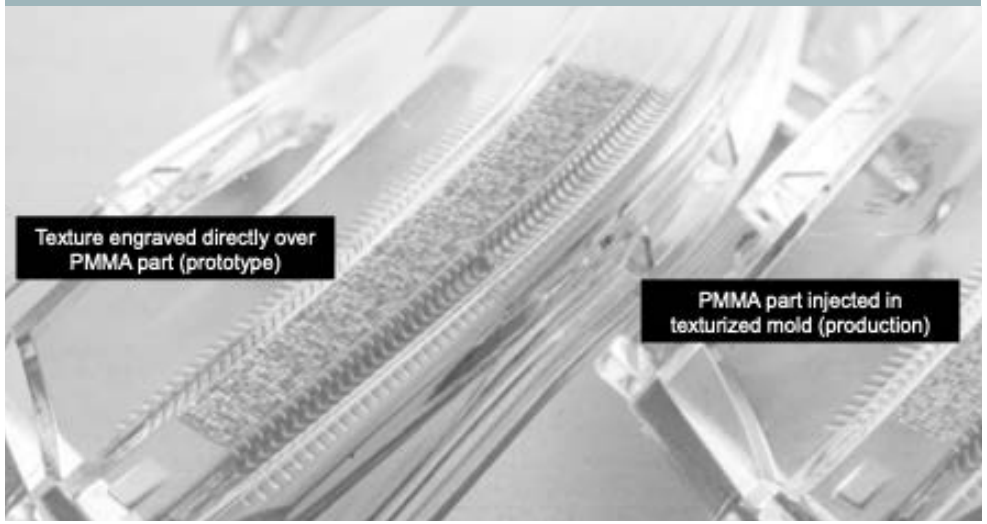
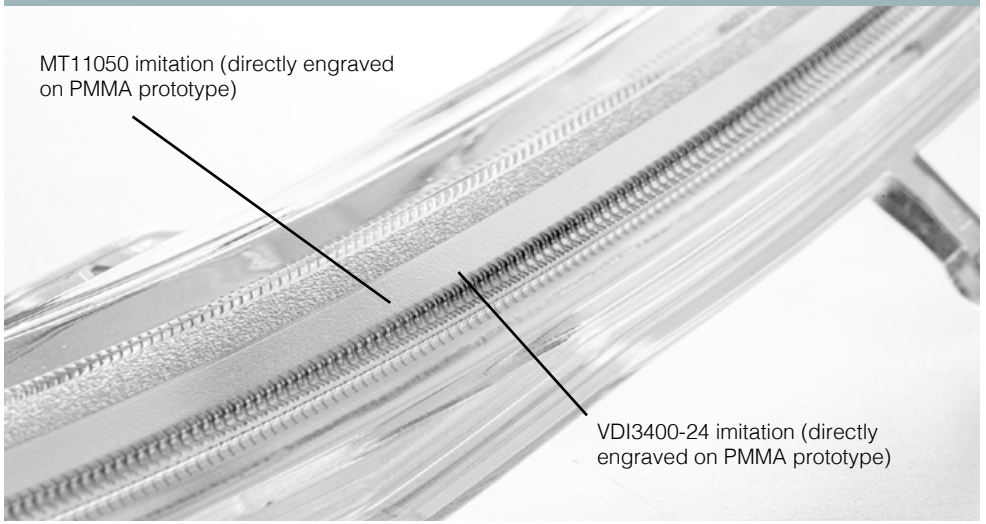
Comparison CNC lasered vs. moulded



Imitation directly engraved on a CNC PMMA part



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Eschmann 3D printing foil technology for pre-visualisation

Eschmann Textures develop aesthetic and functional surfaces with cutting-edge graphics processing on foil and can present them on plastic using 3D printing technology in a wide colour palette.

Surface textures developed in a 3D printing process can also be transferred to components with a high degree of reproducibility. This means a significant shortening of the decision-making process. Depending on the respective requirements for tool geometry and design, the appropriate technology can be selected for subsequent tool processing.

PROTOtex at a glance:

- 3D textures can be applied to flexible, self-adhesive decorative carriers (foils). Which thereafter can be applied on our CNC, 3D-printed or PU-Vacuum casted parts.
- Ideal for sampling, trade shows or presentations.
- Virtually any design can be presented, even in multi-colour.

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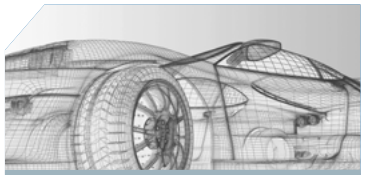
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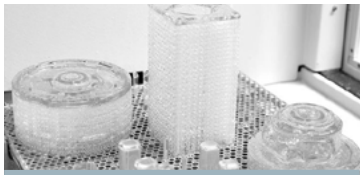
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Showcars & design models

It's all about the details!

ARRK SPG's experienced team has extensive, first-hand experience meeting client's requirements in the most demanding timescales.

With master craftsmanship and the capacity of our worldwide network, we have supported some of world's leading companies with showcars and designmodels the last 15 years.

Design Models

We are able to produce exceptionally high quality visual representation models. Using a combination of high speed machining and traditional model making, these models are made from a variety of materials. The components are then finished, painted, metallised, screen or pad printed, and assembled to a realistic model. This modelling service is perfect for exhibitionor display models.

Applications

- Exterior Trim (for example logo's and emblems)
- Interior Trim (for example steering wheel, mid-console, etc.)
- Lighting and illumination parts or modules
- Functional models

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Bentley Bacalar

Volkswagen BUDD-E Showcar (2016)

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PU Vacuum Casting

ARRK SPG's vacuum casting prototyping service gives you access to high quality, low volume reproductions of CNC-machined or stereolithography prototypes in a variety of polyurethane resins.

Unique service

Besides our standard vacuum casted parts for small and mid-size we offer a **unique service for large prototype parts** casted from one single piece.

- Maximum size part: 2300 x 1350 x 1250 mm.
- Part weight: Up to12 kg.
- Materials and techniques: Technical PU resins with properties like ABS, PC, PP, Rubber, UL94 V-0, Clear, High temperature, overmolding 2K, 3K, etc.

Finishing

Your components can be painted, textured, polished and/or coloured according to your requirements.

The PU/Polyurethane method provides prototypes which resemble the final product not only in shape and material, but also in appearance and feel, so providing for visual as well as practical appraisal. In turn, these polyurethane prototypes can prove extremely valuable for early market testing.

PU Materials offered

ABS Like PU	ABS
HT-ABS Like PU	High Temp ABS
UHT-ABS Like PU	Ultra High Temp
TF-PP Like PU	Talc Filler Poly Prop
PP Like PU	High Impact Poly Prop
GFN Like PU	Glass Filled Nylon
FR Like PU	Flame Retardant (UL94 V-0)
CLEAR PU	Acrylic / Polycarbonate
CF Like PU	Carbon Fibre

Besides the rigid materials ARRK SPG offers Elastomer, flexible materials ranging from PU-Rubber Shore 20 to 90A. We can also cast Silicone Rubber materials in Shore 40 and 60A.

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Example truck front panel and grille

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PU Acomon RAVolution™

ARRK co-develops a transparent PU-Resin called RAVolution™, resistant to UV yellowing

ACOMON, just like ARRK part of the Mitsui Chemicals Group, is an Italian company and is specialized in the production of optical monomers. Mitsui Chemicals intends to create synergies between its subsidiaries. This is how ARRK, a specialist in rapid prototyping and small series production, will rely on ACOMON's expertise in the formulation of polyurethane resins (PU) to expand its commercial outlets in optical applications.

Together, ARRK and ACOMON collaborated on the development of an innovative transparent resin, resistant to yellowing caused by UV radiation.

The main features of RAVolution™

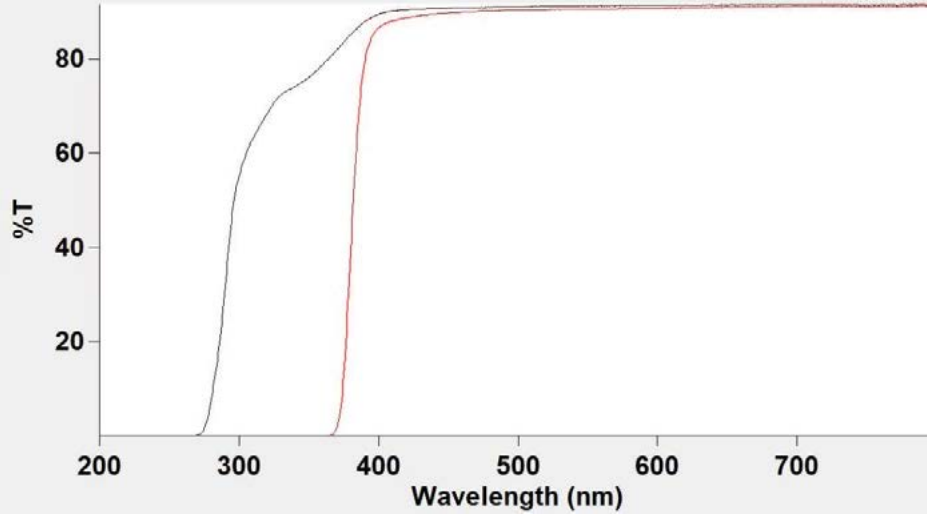
- High reactivity and good conversion using moderatepolymerization conditions.
- Mild towards silicone molds > long mold lifetime.
- Excellent polymer optical properties: excellent color, high Abbe value, high clarity, low haziness.
- Superior polymer ageing behavior, UV resistant.
- Suitable for in mass colored and tinted parts.
- Available in packages to cut all UV + part of the HEV (High Energy Visible) blue light for better personal protection.
- Excellent coatability.

A PU resin with interesting physico-mechanical properties

In addition to the excellent properties of transparency and low yellowing, the RAVolution™ LH resin has the following characteristics:

- Refractive index: 1.513
- Strong impact resistance:
  - Hardness = 98 Shore D
  - Flexural modulus: 3300 MPa
- High thermal resistance: thermosetting polymer
- Colorless transparent resin. Color in the mass andgradient dip-dye
- Light material. Density = 1.1 g / cm 3

UV-A And B Radiation Absorption Test

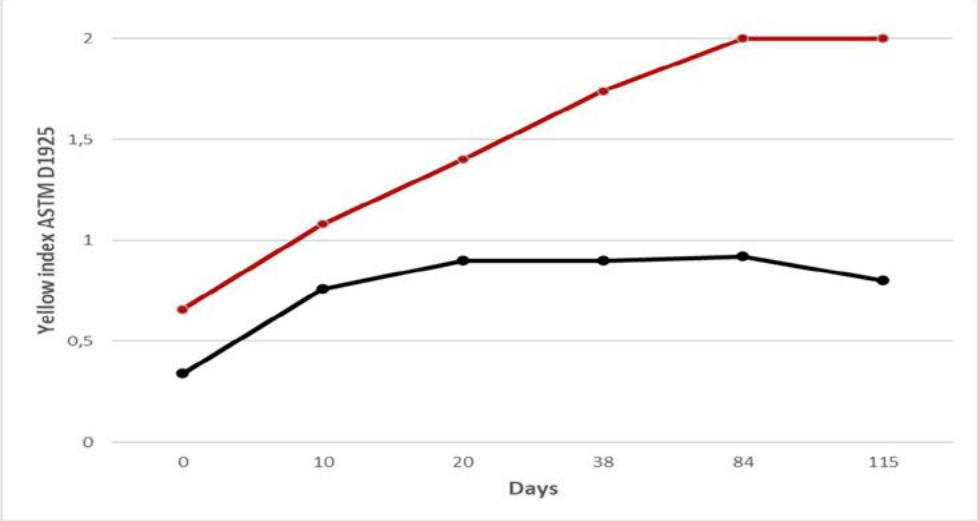


UV-A And B Radiation Absorption Test

Black curve: RAVolution™ LH resin.
Red curve: competitive PU resin.

RAVolution™ LH resin does not absorb UV-A radiation (wavelength between 315 and 400 nm). It offers very good transparency. Its transmission rate is over 92%.

Test of RAVolution™ Resin in real conditions of use (building roof)



Test of RAVolution™ Lh Resin in real conditions of use (building roof)

Black curve: RAVolution™ LH resin.
Red curve: competitive PU resin.

The yellowness index of RAVolution™ LH resin is less than 0.3. A brief yellowing of the material is measured in its first days of use. It reaches its maximum on the 10th day and recedes from the 84th day. The appearance of the material is stable over time.

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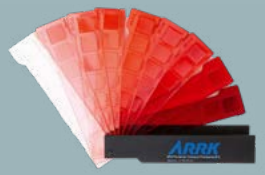
PU Sample Kit

Please choose your colour and transparency for your prototype!
The sample kit has several wall-thicknesses to compare with your design.

Available PU-Sample kits

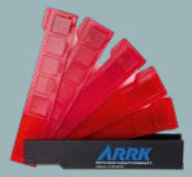


PU-Transparent ~ Opaque Red
SPG-R-01 ~ SPG-R-09

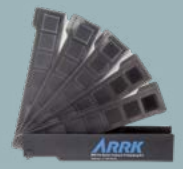
PU-Transparent ~ Opaque black
SPG-B-01 ~ SPG-B-09

PU-Transparent ~ Opaque white
SPG-W-01 ~ SPG-W-09

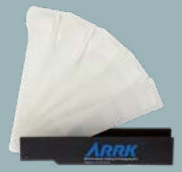
PU-Translucent Red + Diffuse
2% ~ 10% diffuse



PU-Translucent black + Diffuse
2% ~ 10% diffuse



PU-Translucent Diffuse
2% ~ 10% diffuse



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Include integrated reflex pattern

2K rear light prototype

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PU Backmolding (with IMSE®)

IMSE technology is unparalleled for creating high-performance, thin, lightweight, and sustainable lighting solutions.
ARRK SPG is renowned for its lighting expertise and will focus on IMSE solutions that define and differentiate identity for premium brands. The company's rapid proof-of-concept capability, enables designers to quickly explore novel ideas. Our ability to quickly execute proofs for IMSE lighting applications is a key success factor for enabling fast-paced innovation for premium OEMs and Tiers.

IMSE eliminates the limitations that have held designers back with regard to functionality, ergonomics, and aesthetics.

Automotive interiors provide a good illustration of the best features of the technology, such as capacitive touch, functional decorative surfaces, large area lighting surfaces, ambient light, and space-saving design.

A seamless one-piece smart structure replaces multi-part assemblies and uses up to 70% less plastics.

Benefits:

- Remove design obstacles
- Introduce an environmentally conscious lifecycle
- Reduce total cost of ownership
- Embrace a smarter, more efficient approach
- Manage yield to match your innovation

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Overhead console demonstrator with IMSE®

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Silicone Optics

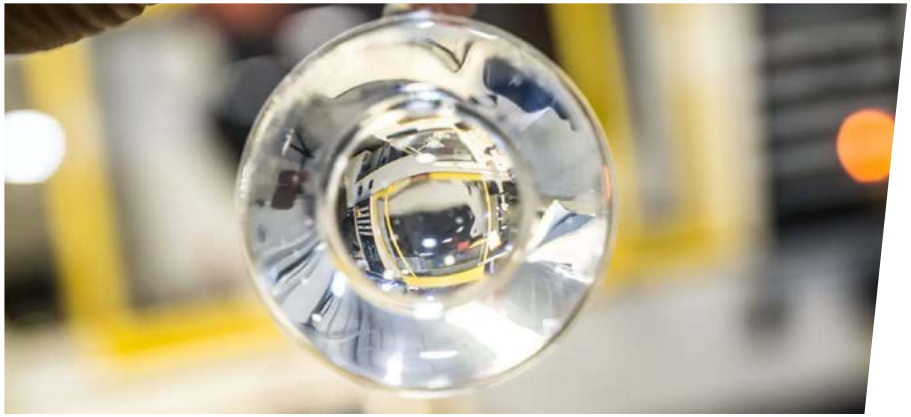
“Silicone materials are continuing to revolutionize lighting”

ARRK SPG offering customers with optical silicone prototype parts made from DOW Silastic materials, whether you need just one off or a few hundred. These silicone parts will be casted manually or injection moulded (LIM).

Moldable optical silicones

Benefits:

- High clarity → Match LED efficiency
- Stability → LED lifetime/efficacy
- Impact resistance → Assembly
- Consistent performance → High and low temperatures
- Design flexibility → LED integration



Why moldable optical silicones

- Use in harsh environments
  - Photo-thermal stability, UV heat, humidity, …
- Ingress (IP) and Impact (IK) protection
- UL recognition for all products
  - UL94, UL746C(f1)(f8)
- Automotive recognition
  - AMECA (outdoor weathering), FMVSS (abrasion), SAE (impact), GMW (chemicals), fogging
- Efficient liquid injection molding
- Design flexibility in tooling and form factor
  - Undercuts, trapped features
  - Near perfect replication of optical surfaces and features

Aging	Silicone (1)	PC (2)	PMMA (3)
Initial			
Sunlight UV			
Heat 125°C			
Heat 150°C			NA
85°C/85%RH			

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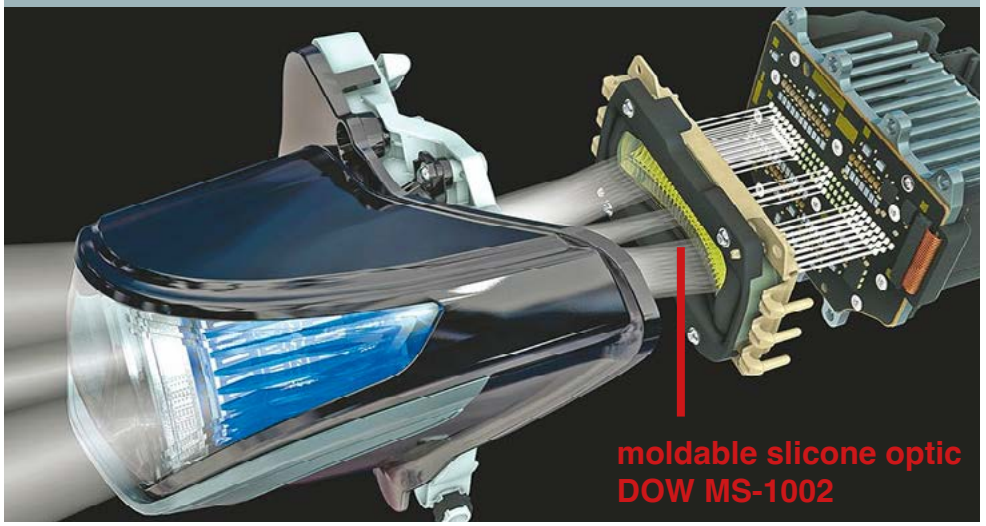
Moldable silicone

Headlamp module application



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projects@spg-arrk.nl
www.spg.arrk.com

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Selective Laser Sintering (SLS)

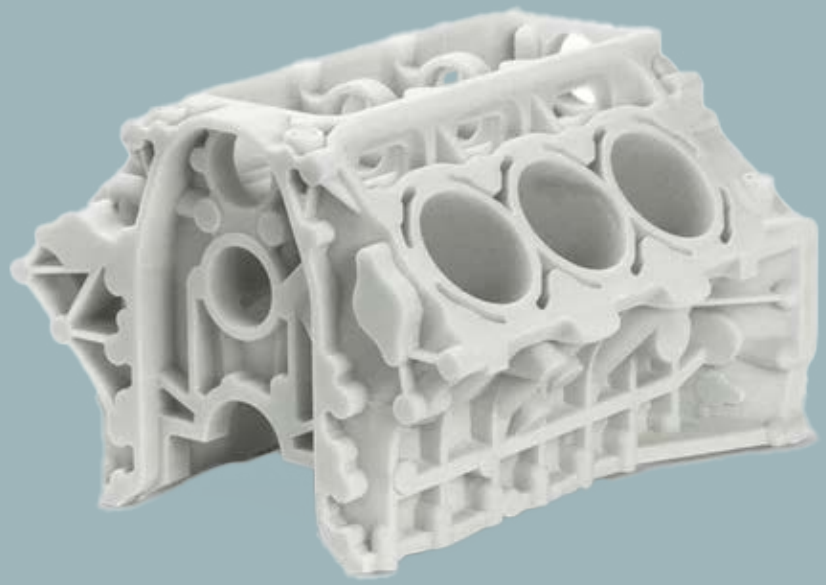
Our sintering service (SLS) provides tough, rapid, durable prototype components in 3-6 days from acceptance of CAD data. With a range of materials on offer from flexible to enhanced strength, we'll find a material that suits you. Capacity should never be an issue at ARRK as it runs 10 SLS machines across Europe.

Available Materials

- SLS-PA (Nylon PA) - available in black and white
- SLS-GFN (Nylon Glass-Filled)

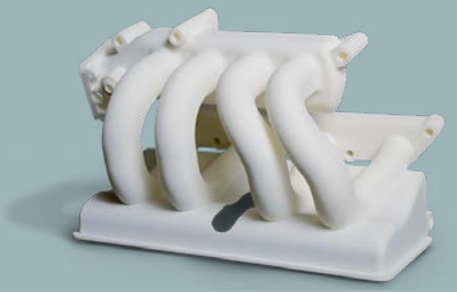
Typical Tolerances

± 0.25 per 100 mm



Realistic finished prototypes

Advances in post-production allow for parts to be painted and textured to provide that finished appearance. Our inhouse paint shops can spray your parts to match most looks.



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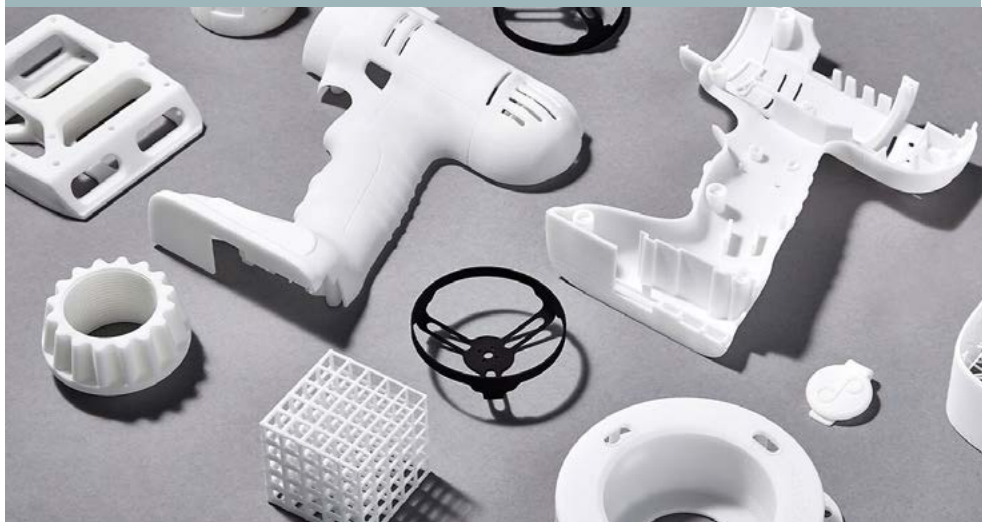
SLS-GFN



SLS-PA

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Stereolithography (SLA)

Our stereolithography service is fast and flexible, and offers a choice of 3 different resins. With 18 ARRK SLA machines at our disposal, we are typically able to deliver parts within three or five days from acceptance of CAD-data.

Materials available:

- ClearVue
  - Clear optical material
- Accura 25
  - White colour
  - Multi-funtional material
- Accura Extreme
  - Grey colour
  - Extreme durability

Typical tolerance:

± 0.15 per 100 mm

Surface finishing

Our in house finishing teams offer customers a range of surface finishes along with a paint and texturing service, so that your prototypes look as real as possible.

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SLA Movie

Scan the QR code to watch the video.

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Stereolithography - SLA-ClearVue

Optical transparant SLA material.

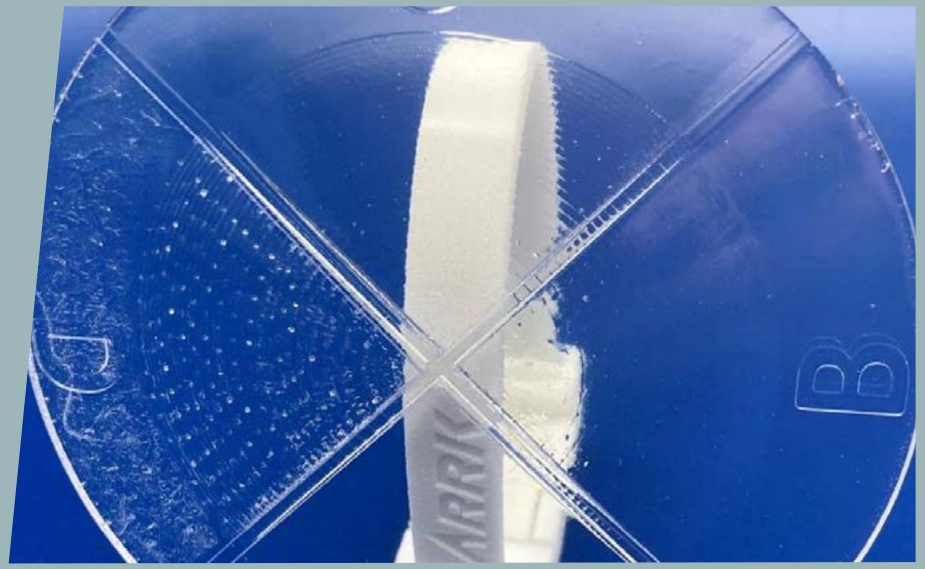
ARRK SPG using Accura® ClearVue Material for SLA-Printing.
This enable us to offer printed prototypes with high clarity.

Applications

- General purpose prototyping
- Models requiring high clarity
  - Headlamps and lenses
  - Fluid flow and visualization models
  - Transparent assemblies
- Snapfits and comlex assemblies
- Medical models and medical devices

Advantages & characteristics

- The highest clarity and transparency
- Durable and strong
- Humidity and moisture stable
- USP class VI capable



Realistic finished prototypes

Grade	Finish
A	Premium finish both sides
B	Premium finish on top surface
C	Build supports removed, part cleaned & standard finishing applied
D	Support structures removed & part cleaned

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SLA Movie

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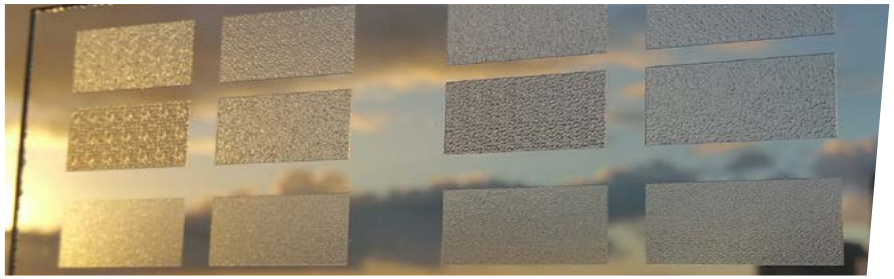
Printoptical Technology

Printoptical Technology is a unique additive manufacturing methodology primarily developed for the fabrication of custom optics and Optographix. The unique DoD-printing technology comes with smooth surfaces straight from the 3D printer and requires zero post processing such as polishing or grinding.

With parts generated in a one-step 'CAD-to-Optic' approach, the process avoids costly commitments related to tooling and inventory, and opens door to new spaces in lighting design and system development.

The large-format platform capabilities allow for the rapid prototyping and low volume production of custom optics, textured surfaces, diffusers, color- and B&W masks and Optographix. The process works with a variety of resins and substrates and is also suited for reworking existing optical components.

The Printoptical process enables the fabrication of custom optical parts in a fast (delivery in days), flexible (easy design variations/ iterations) and cost-effective manner. The process is extremely well suited for rapid prototyping and low-volume production.



Available materials:
- LUX Standard (n = 1.540)
- LUX Crystalline (n = 1.51)
- LUX Colorline (RGB color + Black/White resins)

Typical tolerances:
- 60-80 micron

Optical Performance Materials
Contrary to conventional 3D printing methodologies, the Printoptical Process generates functional optical parts straight from the printer utilizing optical performance resins. The resulting surfaces can be optically smooth or intentionally frosted ("Frosted Finishes"), applied in a single manufacturing process.

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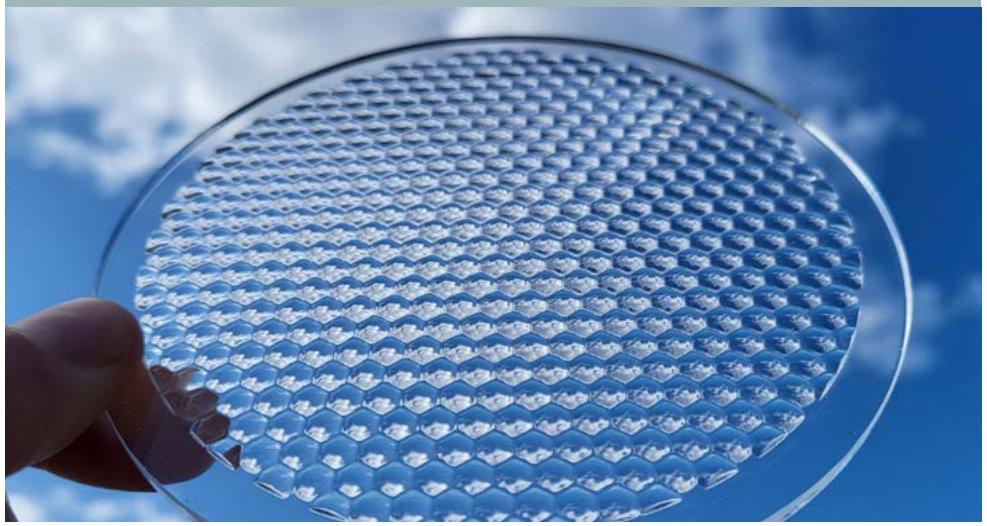
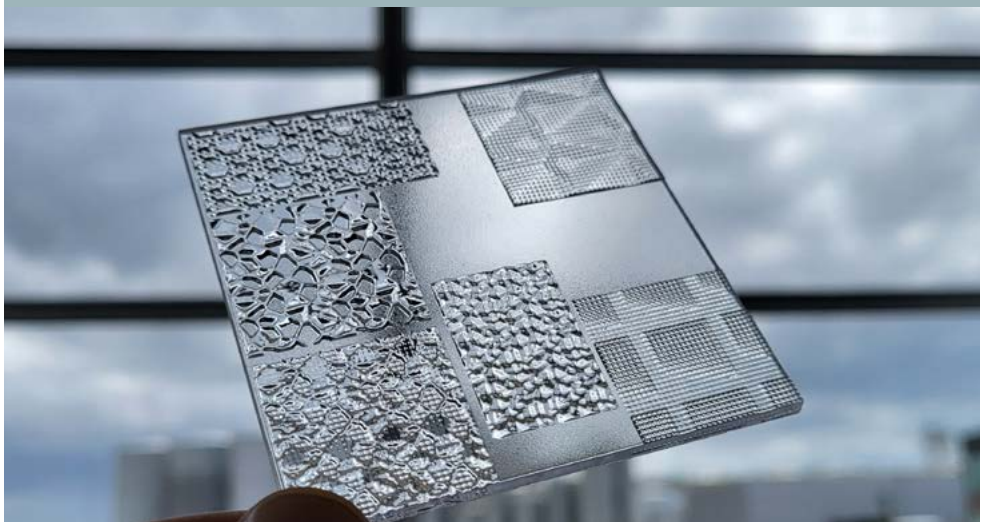
Printed Optics



Optographix



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DLP (Digital Light Processing) Technology

DLP is a 3D printing technology used to rapidly produce photopolymer parts. It's very similar to SLA with one significant difference – where SLA machines use a laser that traces a layer, a **DLP machine uses a projected light source to cure the entire layer at once.** The parts are formed layer by layer.

DLP can be used to print extremely intricate resin design items with fine details. Due to it curing the entire layer at once, it's much faster than SLA.

Advantages & Characteristics:

- Excellent part quality and fineness
- Ultra-fast: very high production speed (up to 10cm/h)
- Industrial quality prototypes or even production parts for low volume quantities. Due to the wide range of materials available, most industrial sectors and fields can be addressed.
- Same post-process steps as SLA.
- Minimal finishing required

Typical tolerances:

- Typical Tolerances: NF T 58-000 normal class prototyping
- Layer Thickness: 50 micron

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DLP - G:

- Machine size: 231 x 130 x 300 mm

- **Materials available:**
  - Soft resin: Loctite Ind402
    Black, 82A Shore Elastomer, High Tear Strength
  - Semi-flexible resin: Loctite 3843
    Black, Semi-Flexible, Outstanding surface finish
  - Rigid resin: Loctite 3172
    Grey, High-Impact Strength, 100% Elongation at Break

- **Special materials:**
  - BASF Ultracur3D RG 3280
    White, Ivory, Ceramic-filled, HDT 284C, Hard Surface Finish

- **Superior Stiffness:**
  - BASF Ultracur3D RG 9400 B FR
    Black, UL94 V0, HDT 255C
  - BASF Ultracur3D RG 35 B
    Black, Biocompatible, Low Moisture Absorption

DLP - L:

- Machine size: 124.8 x 70.2 x 196 mm

- Materials available:
  - **Soft resin:** Rubber Shore 65A Black
  - **Flexible resin:** Flex-BLK-20
  - **Rigid resin:** Black, white and grey colour

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Fused Filament Fabrication (FFF/FDM - Printing)

3D printing is a fast and accessible way to bring ideas to life. Whether you need a prototype or a small functional series, we can deliver a ready-to-use model within just a few working days – perfect for testing or presenting. With no mold costs and complete design freedom, 3D printing is ideal for small quantities and short development cycles.

At ARRK SPG, we use FFF technology: a precise printing method where plastic filament is built up layer by layer. Together, we'll determine the right material – from PLA to fiber-reinforced plastics – and we'll actively support you in design, application, and manufacturability. We can also develop and apply virtually any color you want during the 3D printing process, fully tailored to your product or brand identity.

From material to application: always the right match
A great 3D-printed part starts with the right material selection. At ARRK SPG, we work with a wide range of technical plastics, including combinations such as ABS with glass fiber (ABS+GF), polyamide with carbon (PA6+CF), polypropylene with carbon (PP+CF), PPA with carbon (PPA+CF), and various ASA compounds. Each material has its own strengths in terms of durability, flexibility, temperature resistance, or finish.

Machines:
Bambu Lab
Max build volume : 350 x 320 x 325mm3

Standard materials:
Introducing "Standard," our 3D printing material line that includes PLA, PHA filled & CPE. We strive for sustainability by incorporating (partly) biobased material and Bio-tech companies polymers and offering recycle grades. Our focus is on reducing carbon footprint whenever feasible, providing eco-friendly choices without compromising performance.

- AURA PHA
- AURA PLA
- AURA PETG
- AURA CPE

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Engineering materials:
We specialize in advanced polymer engineering applications and provide state-of-the-art CAE solutions for structural simulations and topology optimization. With a unified technique across all materials, customers can easily compare and select the best fit for their needs.

- AURA ABS
- AURA ASA
- AURA ASA+
- KRATIR MII PA6 CF
- KRATIR PA6/66 CF
- KRATIR PA11 CF
- KRATIR PET CF
- KRATIR PP CF
- PYRA PC/ABS FR
- ATAR FST1
- ANASA TPC 80A
- ANASA TPC 95A
- ANASA TPC L80A

Ultra Polymers materials:
We partner with leading bio-tech companies to engineer specialized polymer properties for various applications, such as Automotive, Railway and Aerospace, focusing on flammability, low smoke, toxicity, lightweight, electrical properties, and shielding. Our standardized Technical Data Sheets (sTDS) simplify information access, and we offer comprehensive support in obtaining application certifications.

- VULCAN PEKK-A
- VULCAN PEI 1010
- VULCAN PEI 9085
- VULCAN PPSU
- VULCAN TPI
- VULCAN rPEEK
- KRATIR rPEEK-CF

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Metal Printing (DMLS/SLM)

3D metal printing offers durable parts with great mechanical and chemical resistance with density up to 99.9%.

An ideal solution

This process is an ideal solution where:

- The parts cannot be CNC machined or cast because of its complex geometry and thin wall sections.
- Parts that have been through topology optimisation benefit particularly from an additive layer manufacturing process to provide lightweight parts.
- The part requires high performance materials.

Additional Services

- CNC post machining to meet required tolerances
- Heat treatments: stress relief, tempering, ageing
- Surface finish: sandblast, polish, satin
- Galvanisation, coating and paint
- Quality control, CMM inspection report, material analysis

Materials offered

- Stainless Steel (316L)
- Aluminium (AlSi10Mg)
- Titanium (Ti6Al4v)
- Steel (1.2708)

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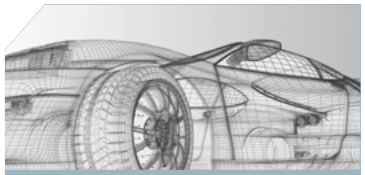
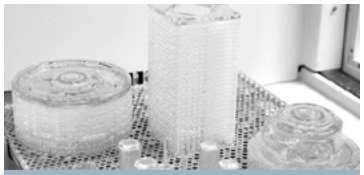

1. Engineering


2. Rapid Prototyping


3. Raw Materials


4. Toolmaking


10. Logistics

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5. Parts Production


9. Warehousing


8. Quality Control


7. Assembly


6. Finishing

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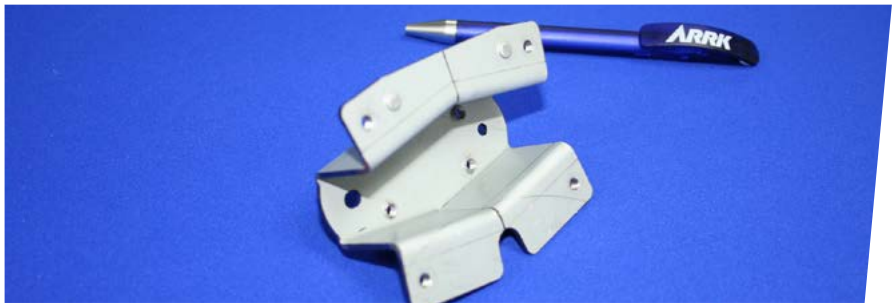
Sheet Metal

With a range of metals and thicknesses to choose from, ARRK SPG is able to offer clients anything from just a few parts to hundreds of parts in sheet metal.

We offer a comprehensive service. From cut&press, deep drawing, pressing, punching, stamping, drilling, insert pinning, embossing, deep drawing and clinching right through to surface finishing. From single parts to fully finished and welded modules.

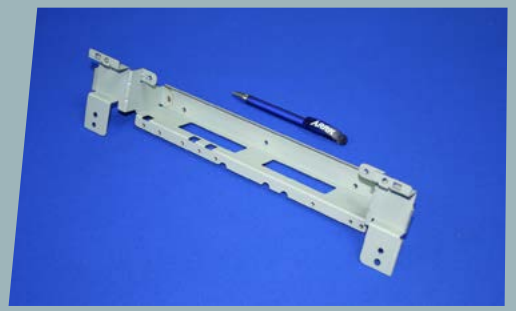


Materials offered:

- Aluminium
- Brass
- Copper
- Stainless steel
- Wide variety of steel qualities
- And many more….

Surface treatment & Finishing

We have an wide range of finishing possibilities available. To discover more please contact our team!



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Deep drawing

3D lasercutting

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“Automotive Low Volume Production”

From 50 to 2000 parts or assemblies

ARRK SPG offers high-volume quality at low quantities and cost. We cover both pre-series and **niche volumes.** Our special competences lie with the production of fully finished and assembled modules for the automotive and truck industry.

Injection moulding:

- Using aluminium moulds operated at SPG as well as rapid steel non-export moulds operated from our ARRK Far-East facilities
- PRE-TENSION Tool® for large mouldings
- In-Mould-Decoration (IMD)
- Including 2-/3- shot over-moulding, gas injection (GID) and Sequential Valve Gating (SQV)
- Insert moulding for metal and CFRP reinforcements shafts, helicoils, etc.

Assembly & Finishing:

Ready to install

- Complex assemblies with multiple options, e.g. bumper facias and door panels
- Functional lighting modules including PCB’s

Welding and Industrial Gluing

Full surface finishing

- Painting: Soft-touch, texture and high gloss painting
- Laser texturing, machining and etching
- E-coating (KTL), electroplating and anodizing
- Flocking and galvanic chrome plating
- Metallization and PVD-coating
- And many more...

ARRK
SPG Pre-Series Tooling & Prototyping

Automotive Low Volume Production

From 50 to 2000 parts or assemblies

Project Management:

Project Management & Logistics

- Planning, EDI & RFID labeling
- Pro-active approach with sense of ownership

Quality control

- Parts measurement 3D CMM, Tactile or scanning
- Process FMEA and control plan
- PPAP / EMPB & IMDS registration

Certificates

- ISO9001:2015 / ISO14001:2015
- ISO27001:2017 and TISAX-Label

ARRK
SPG Pre-Series Tooling & Prototyping

Aluminium Tooling

Prototype building requires more than mould technology. You also have to master the injection moulding process down to the finest detail, as well as the knowledge of materials.

Only when this triangle – mould, material and injection moulding process – is in balance will you be able to quickly achieve good, functional prototypes and low volume parts. We manufacture our moulds from aluminium in Benelux which are partly operated at our ARRK SPG facility.

Applied technologies:

- SQV – Sequential Valve Gating and Gas Injection
- Insert Moulding and 2-/3-Shot Moulding (hard/soft, multiple color)
- IMD – In Mould Decoration
- Blow Moulding
- EPP – expandable plastics and PUR-Foaming

Light-weight solutions

- MuCell® and Chemical foaming
- CRFP composite solutions
- Thermoplastic-prepreg overmoulding include Mitsui Tafnex™ CF-PP UD Tapes
- D-LFT Direct Long Fiber Thermoplastic moulding

Sustainable solutions

- Using high-flow PP compounds from Mitsui Chemicals
- Using PCR and bio-based material & additives

Areas of competence:

- Automotive Interior and Exterior
- Lighting including lenses
- Technical components (under bonnet)

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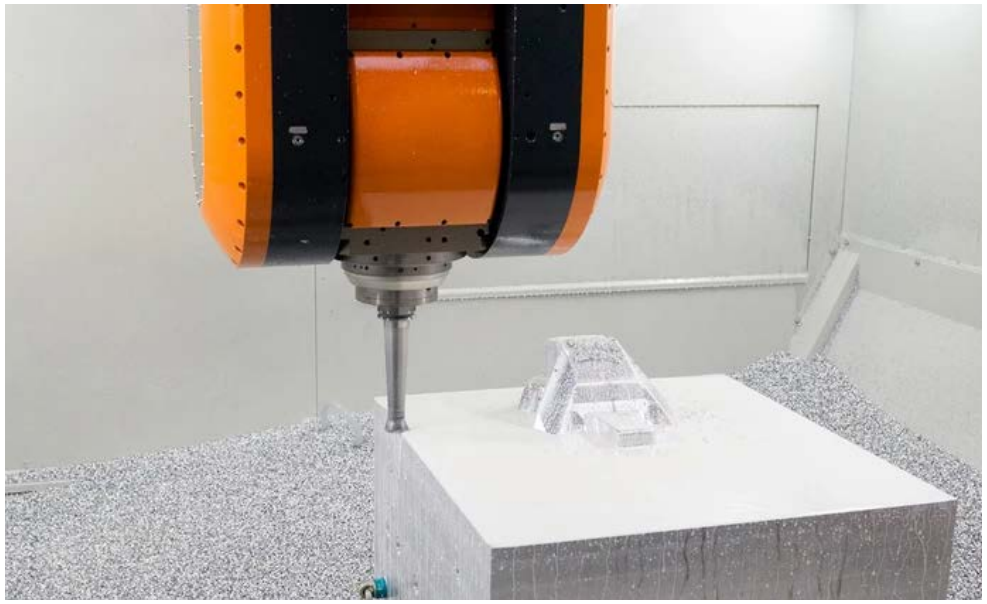

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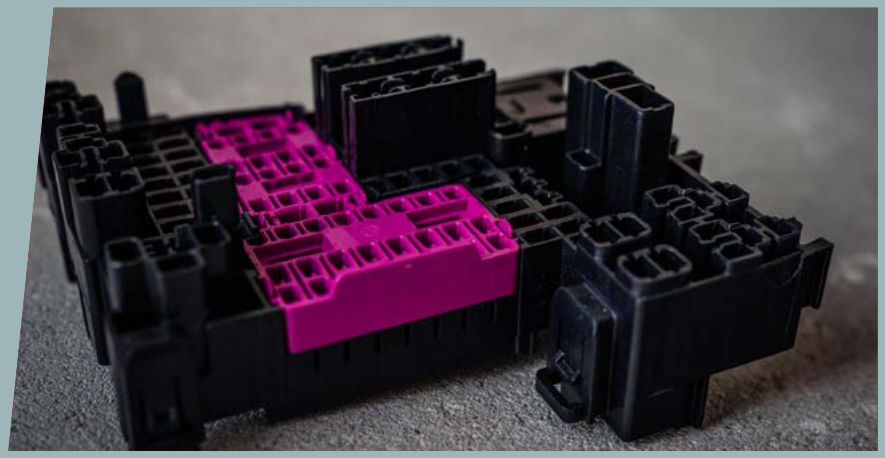
Steel Tooling

Steel prototype and low-volume tooling refer to custom-made, durable tools, made from steel for producing a small number of parts for product testing and validation before mass production. Besides that, we common use steel tooling for our low-volume niche projects. It is used when parts require high-performance characteristics, abrasive materials, or for validating the production process in regulated industries.

Compared to aluminum prototype tooling, steel offers greater longevity and is ideal for higher volumes or challenging materials, enabling cost-effective and time-efficient design iteration and testing. Steel tools are mainly used for smaller, delicate parts. We manufacture our steel moulds at our ARRK Far East facilities in China and Taiwan.

Applied technologies:

- Hot rod heating (>100°C) of mould plates for Engineering Plastics
- Insert Moulding and 2-/3-Shot Moulding (hard/soft, multiple color)
- Extrusion of plastics, silicone rubber and Aluminium
- Silicone Compression moulding
- HPDC – High Pressure Die Casting



Areas of competence:

- Automotive Interior and Exterior including LVP
- Lighting and Optics (high-gloss) including LVP
- Technical precision components including LVP

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High Pressure Die-Casting

High Pressure Die-Casting (HPDC) is a process in which molten metal is forced under pressure into a securely locked metal die cavity, where it is held by a powerful press until the metal solidifies. After solidification of the metal, the die is unlocked, opened, and the casting ejected.

Our strength & services:

- Rapid Tooling for protoypes and low-volume parts;
- Fast delivery & competitive pricing;
- Hot chamber (zinc alloys) up to 160T;
- Cold Chamber (aluminium alloys) up to 2500T;
- Wide range of secondary services like;
  - CNC-Machining
  - anodizing
  - painting
  - powder coating
  - plating
  - etc.
- Flow Simulation;
- Cleanliness & leakage testing.

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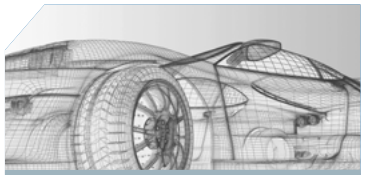
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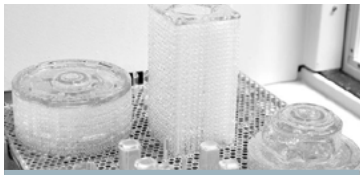
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