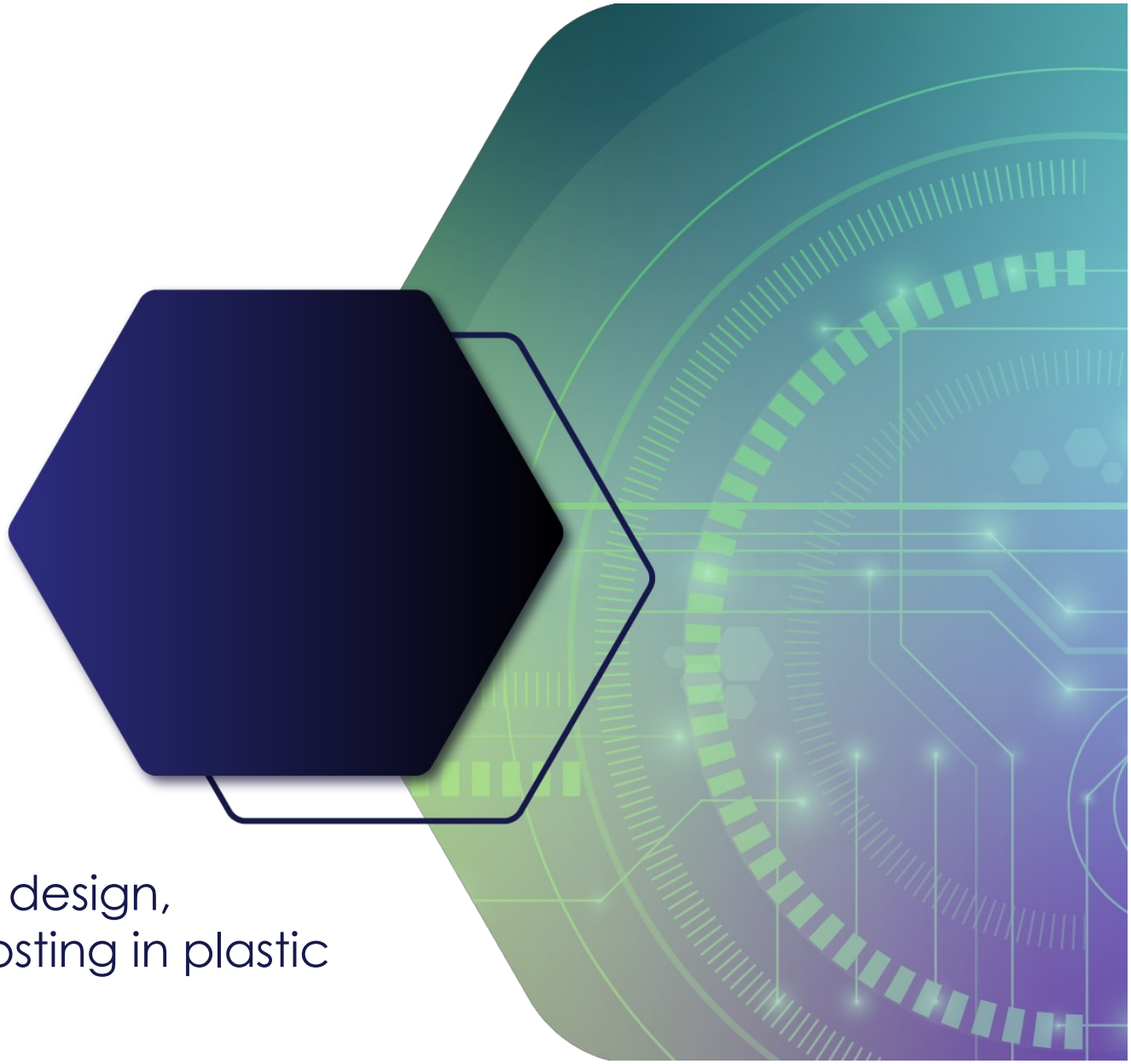
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GEN-MOULD

Generative AI for mould design, process planning and costing in plastic injection and forging


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ORGANISATION PROFILE

Erkba R&D Engineering (Erkba Arge Mühendislik Ltd. Şti.) – engineering SME in the Bilişim Vadisi Technology Development Zone, Kocaeli, Türkiye. Founded in 2020 with TÜBİTAK support.

Team: engineers and software developers supported by academic advisors in software/electronics and mechanics/materials.

Technical areas:

- Manufacturing simulation (hot/cold forming, welding, plastic injection) and engineering analysis
- Industrial AI, 3D model similarity, image processing, VR/AR and custom industrial software
- Electronics, robotics and automation; in-house CNC, laser cutting, injection moulding, press and 3D printing

Products: patented AI platform that generates cost and process plans from 3D part models (sheet-metal module in industrial use; injection and forging modules in testing); maintenance management and digital factory software.

R&D expertise: successfully completed a Eureka project as coordinator; many national and international grants (TÜBİTAK, KOSGEB, Erasmus+); granted patent and 10+ IP applications; 50+ industrial references incl. Togg, Magna, TÜBİTAK BİLGEM and Ulus Metal.

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PROPOSAL INTRODUCTION (I)

Vision: turn a 3D part model into a manufacturable mould and process plan in hours instead of weeks. An AI platform automatically generates mould geometry, process parameters and cost for plastic injection and forging, validated with physics-based simulation.

Motivation: quoting and mould design still depend on a few experienced engineers, spreadsheets and trial-and-error. Quotes take days, estimates vary between engineers, and several tool tryouts are needed before the first good part – causing scrap, energy use and delays. Experienced mould designers are retiring and know-how is being lost. Existing quoting tools estimate cost but do not design the mould; simulation tools validate a design but need one to exist first.

Content: developments planned in the project

- Industrial dataset of parts, moulds, process and cost data from partner manufacturers
- AI models for manufacturability analysis, process route selection and cost estimation
- Generative mould module: core/cavity and parting surface (injection), preform and die cavity (forging), CAD export
- Physics-based validation loop with injection and forging simulation, feeding results back to the AI
- SaaS / on-premise platform with CAD and ERP integration, piloted at partner sites

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PROPOSAL INTRODUCTION (II)

Expected outcome: a TRL 8 platform with two modules (plastic injection and forging) validated on real parts at industrial pilot sites; automatic mould geometry export ready for CAE; a validated cost model; an industrial training dataset and benchmark; protected IP and an exploitation plan.

Impacts: expected market impact

- Quotation and mould design lead time cut from days to hours, with more consistent estimates
- Fewer tool tryouts, less scrap, material and energy use – supporting green manufacturing
- Engineering know-how captured and reusable across the organisation
- Commercialisation via SaaS licences to mould makers, moulders and forging companies in Europe and Türkiye
- Industrial partners gain early access, a say in development and a competitive edge

Schedule: indicative start Q3 2027, duration 30 months (to be aligned with the consortium).

PARTNERS

Current consortium:

- **Erkba** – Coordinator & AI developer
- **Aybit Teknoloji** – Software partner
- **ARaymond** – Plastic injection partner
- Further Turkish manufacturers already providing part and mould data for model training

Partner search:

- **Plastic injection mould makers / moulders** – end user, data provider and pilot site
- **Plastic injection campanies**– end user, data provider and pilot site
- **Forging companies (hot or cold forging)** – end user, data provider and pilot site
- **Simulation software provider (injection and/or forging CAE)** – physics-based validation of AI outputs
- **Optional: research organisation** active in manufacturing AI or forming processes

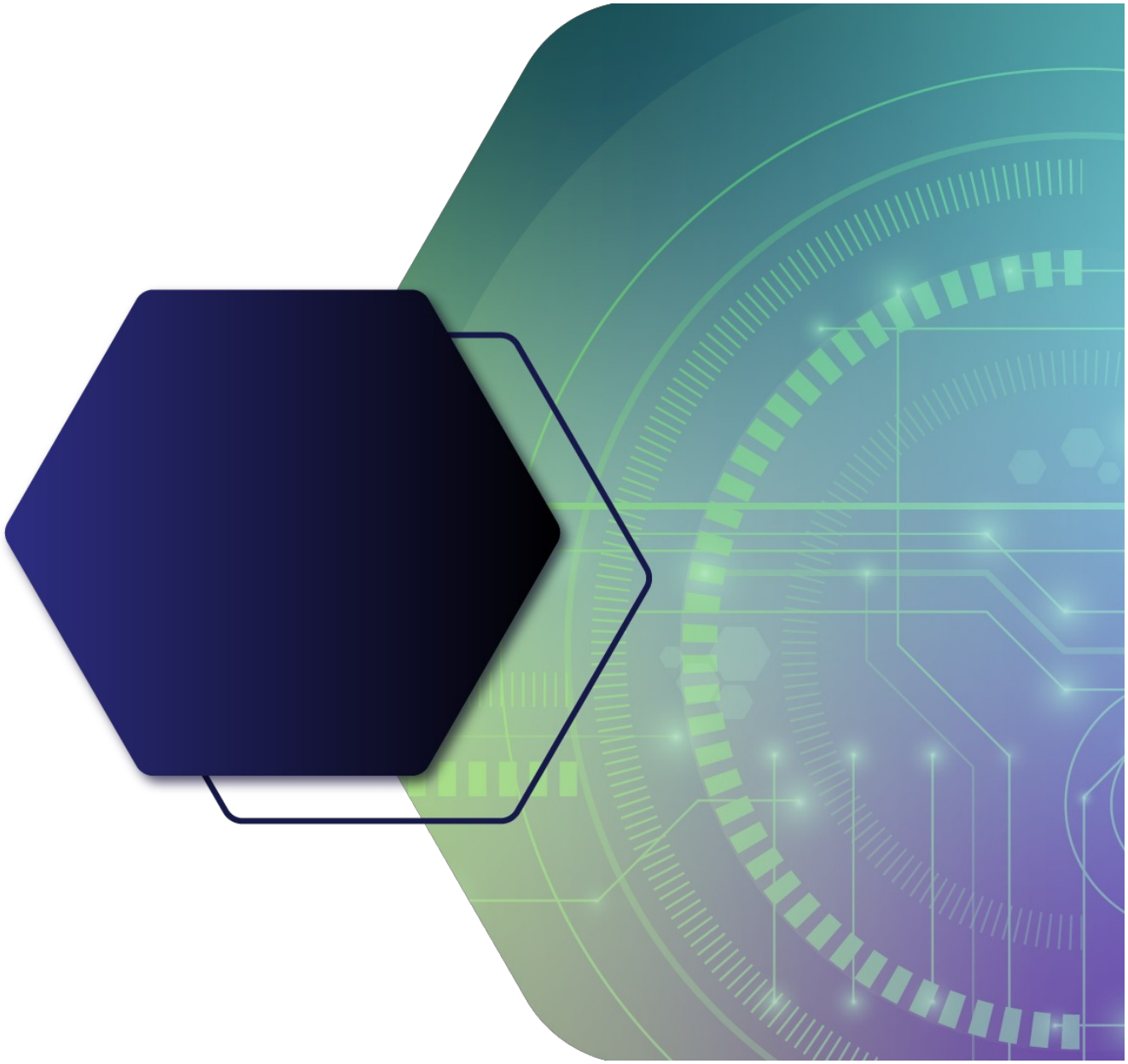
Countries: any SMART country

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