



THE NEW SHAPE
OF PLASTICS

METAL REPLACEMENT

Plastics Engineering, Innovation and Sustainability

OPPORTUNITIES

The METAL REPLACEMENT most important opportunities are:

Performance

Mechanical, electrical, thermal, chemical, tribological, low noise and vibrations, etc.

Structural lightweighting - Size reduction

Polymers lower density, design criteria and functional integration.

Time reduction

Time to Market and Lead Time:
less production steps, faster cycle time,
greater flexibility.

Cost reductions

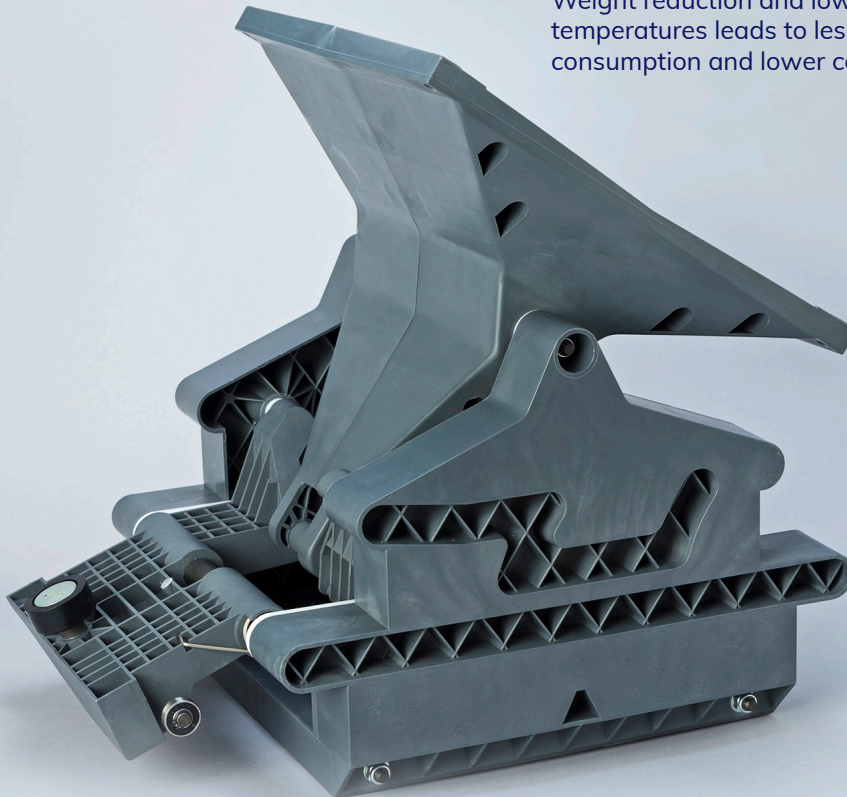
Function integration (reduction of the number of components and processing phases), logistics and raw materials.

Design

Greater freedom of shape, ergonomics, aesthetics (surface, colorability, transparency), complex geometry, function integration.

Environmental Sustainability

Weight reduction and lower melting temperatures leads to less energy consumption and lower carbon footprint.



METAL REPLACEMENT IS SUSTAINABLE

The emerging environmental issues are encouraging Companies to take urgent and responsible decisions in Product and Process Innovation.

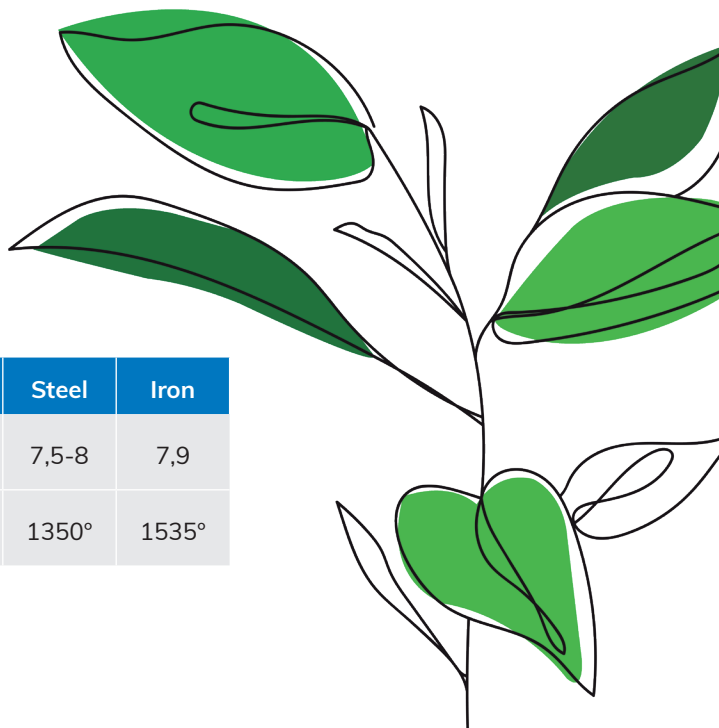
In recent years, in line with the Sustainable Development Goals of the UN 2030 Agenda, we have redefined our business model in order to support our Customers in product innovation aimed at Circular Economy and Carbon Footprint reduction.

Metal Replacement is a tangible solution to this demand, representing an important opportunity to increase Product Sustainability, and we are proud to collaborate with Customers in such important projects.

Several parameters help to highlight the sustainability of polymeric materials compared to metals and alloys, for example: density, melting point, product kwh/kg, carbon dioxide produced/product kg, energy saving/weight reduction.

In particular, density and melting point are very intuitive and representative of the sustainability of Metal Replacement. Below is the comparison between High Performance Polymers (HPP) and some Metals and Metal alloys which enable understanding the huge gap in terms of energy consumption, during the production and manufacturing phases:

	HPP	Aluminum	Bronze	Brass	Steel	Iron
Density kg/dm ³	1,4-1,8	2,7	8,8	8,4-8,7	7,5-8	7,9
Melting point	260°	660°	830°- 1070°	1015°	1350°	1535°



CASE HISTORY 1

Gears Ø300 and Ø240

Industry: Cable transport

Material replacement: from steel to PARA 50GF and PA66 20T-20GF

Project requirements:

Dimensional and geometrical stability

Wear resistance under high torque

Maintain mechanical properties in temperature range from -30° to +60°

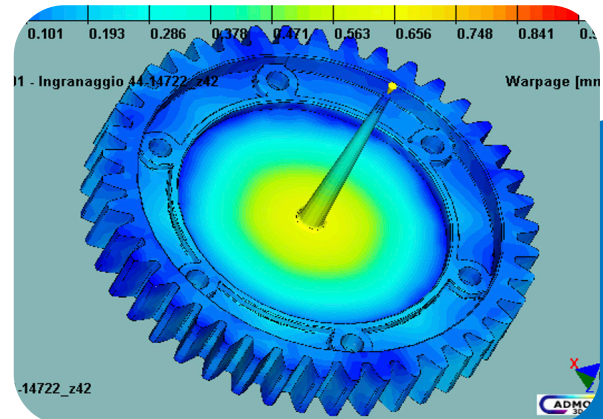
Achieved results:

25% cost reduction

Lead Time reduction

Order flexibility for 12 different versions

75% weight reduction



Some High-Performance Polymers ideal for Metal Replacements are: PA12, PA46, PA-MXD6, PARA, PA-PACM12, PVDF, PPS, PPA, PAI, PEI, LCP, PEEK. They can be used in formulations of compounds with fillers, reinforcements and functional additives such as: glass fibers and spheres, carbon fibers, graphite, aramid, stainless steel, magnets, PTFE, silicone, molybdenum disulphide, flame retardants, food contact, etc.

CASE HISTORY 2

Gripping system

Industry: Food Packaging Machinery

Material replacement: from Stainless Steel to PARA 50% GF with PEEK 10% PTFE - 10% Carbon - 10% Graphite

Project requirements:

Dimensional tolerances +/- 0.02mm.

Maintain the same functional stress as the stainless-steel gripping system.

Life test at 80M cycles.

Increase the speed from 60K to 80K packs/h through weight reduction.

Achieved results:

Test suspended at 100M cycles without breakage and wear. Performance greater than 25% of the required improvement.

Reached 130K pieces/h. Target performance = 35%, reached performance = 116%.

Unexpected advantage: maintenance interventions reduced by 50%.



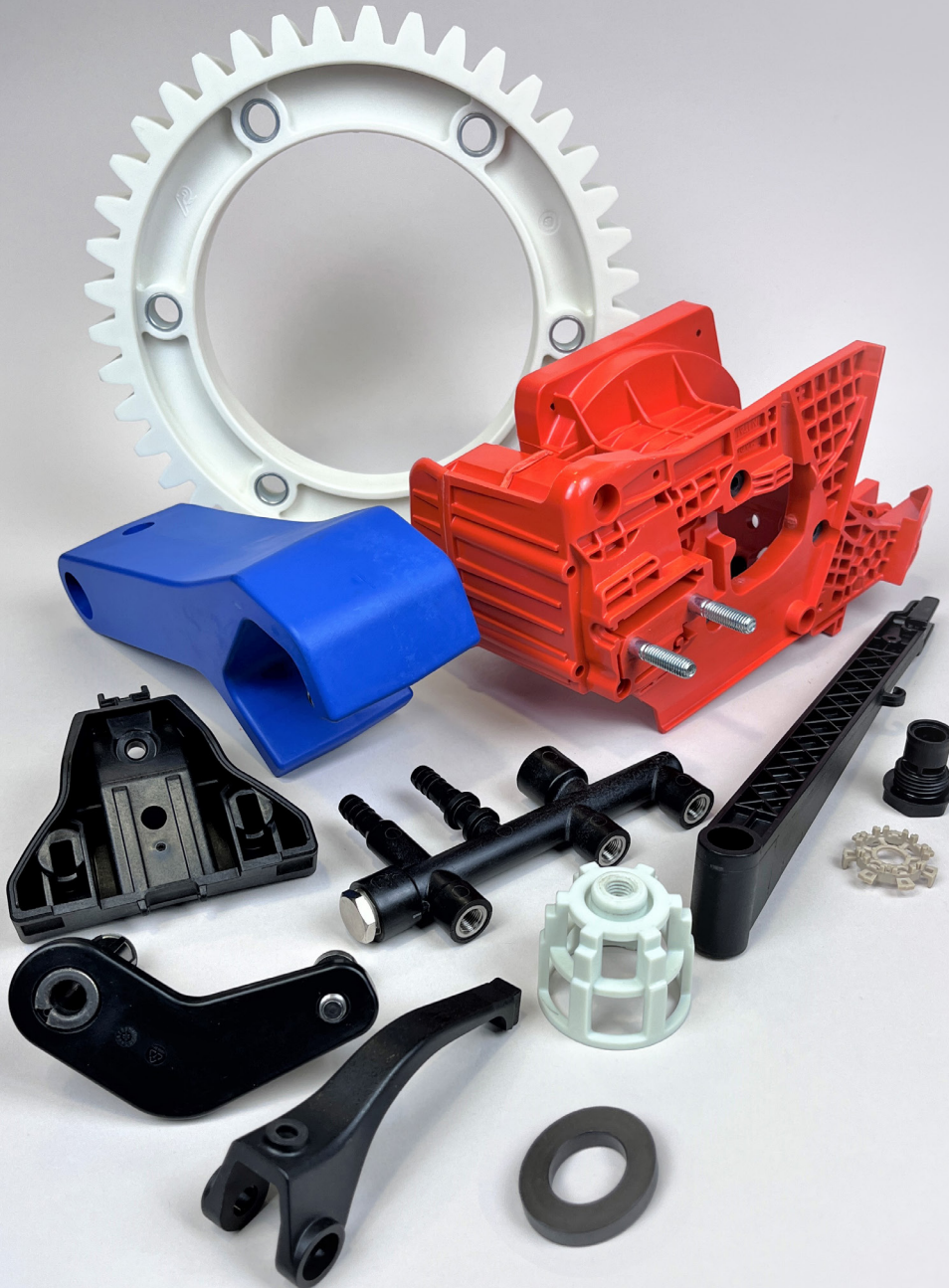
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HIGH TECHNOLOGY NETWORK



Since 2011 we have been accredited as a Research Laboratory of the Emilia-Romagna High Technology Network. Our Industrial Research activity is aimed at Product Innovation with a focus on two areas: Metal Replacement Projects with polymers for engineering applications; Projects for replacement of traditional materials with Recycled and Expanded polymers, Biopolymers, for more sustainable applications.



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METAL REPLACEMENT
is a field of activity in which we ventured with great passion in the early 80s and since then we have developed hundreds of projects for many sectors and applications, also very challenging.

Polymers for engineering applications, cutting-edge design and production technologies, combined with advanced know-how and experience, enable the development of Metal Replacement projects with a scientific method.

Our goal is the creation of engineered products based on the Customer's requirements, with the contribution of solutions that improve performance and/or increase the competitiveness of the products themselves.