

SUPER-STRUCTURAL MATERIALS: A STEP FORWARD IN THE METAL REPLACEMENT

A great interest towards the use of high performance structural thermoplastics is promoted today by the need of winning technical solutions and the steady growth of metals prices.

The introduction of injection moldable high performance compounds featuring excellent mechanical properties involves, as a matter of fact, good advantages for both the production techniques and the preservation of environment and workers' health.

In order to be always proactive towards the Market, LATI has introduced new grades in its Special Materials range which can be considered a true reference in the most demanding structural applications.

Artificial ankle Latamid 66 H2 K/40 (PA66 + 40% carbon fibres)

Following the project requirements, LATI offers compounds specifically engineered to feature the best **load at break** and **elastic modulus** available today.

Following this path, it is plain that engineers can correctly address design operations from the very beginning when a correct metal replacement solution is required.

Unfavorable compromises, as the use of composite or metal components, inserts and mountings, can be saved up.

Besides, the wide range of LATI thermoplastic compounds also allows to select suitable neat resin leading to an adequate solution of the most critical environmental factors, from high temperature to chemical attack etching, through moisture exposure and adverse climatic conditions.

HIGH-MODULUS MATERIALS:

a brand new family of compounds offering outstanding elastic modulus, almost twice the value of ordinary glass or carbon fibers products.

Their formulation has been conceived to reinforce the thermoplastic matrix with high loads of special purpose **carbon fibers, as these generally used in the aerospace industry.**

The resulting materials allow to create parts offering very low deformations under load.

For these reasons, ultra-stiff materials are the ideal candidates for composites and metal alloys replacement in applications where their usage is planned more on the basis of non-deformability rather than high load at break or toughness.

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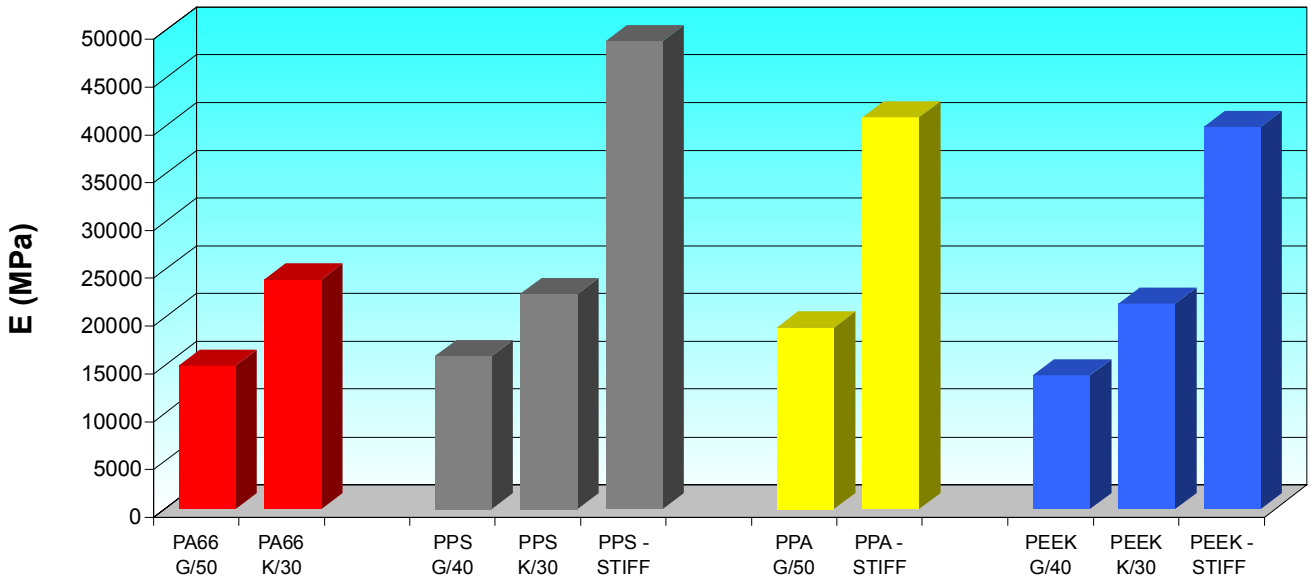
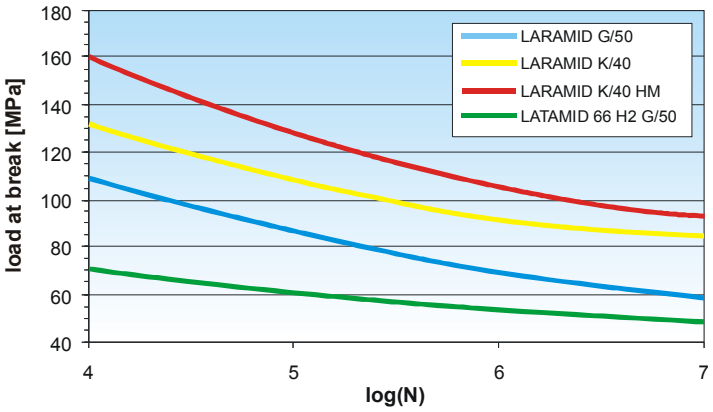
Elastic Modulus E (MPa) : Stiff vs G vs K



Material: G=Glass fiber K=Carbon fiber

A virtually not deformable compound can perfectly fit in different industrial sectors where the compliance with tolerances and geometrical dimensions is mandatory, such as aerospace, precision mechanics, electronics, textile machines, military, pneumatics, special valves, etc.

Fatigue resistance for various compounds PPA based - bending 30 hz -



Ultra-stiff materials are exclusively offered on high performance resins: **PPA, PPS, PAs** and **PEEK.**

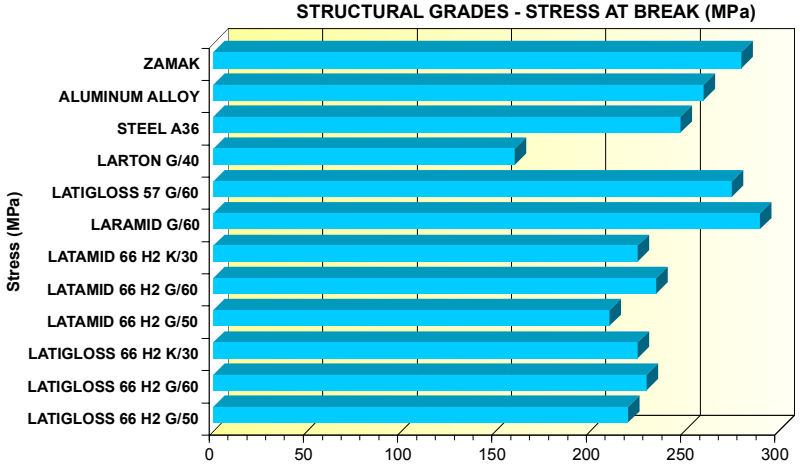
HIGH LOAD-AT-BREAK MATERIALS:

metals are often used where heavy mechanical stresses are expected, such as shear, bending or torsion stress.
The capability of sustaining very high loads is part of LATI proposal, achievable by the usage of reinforced products with high contents of glass fiber.

The well-established proposals are the ones based on **PA6, PA66 and PPS reinforced compounds with 40, 50 or 60% of glass fiber**.

These products feature a very interesting performance/cost ratio.

STRUCTURAL GRADES - STRESS AT BREAK (MPa)



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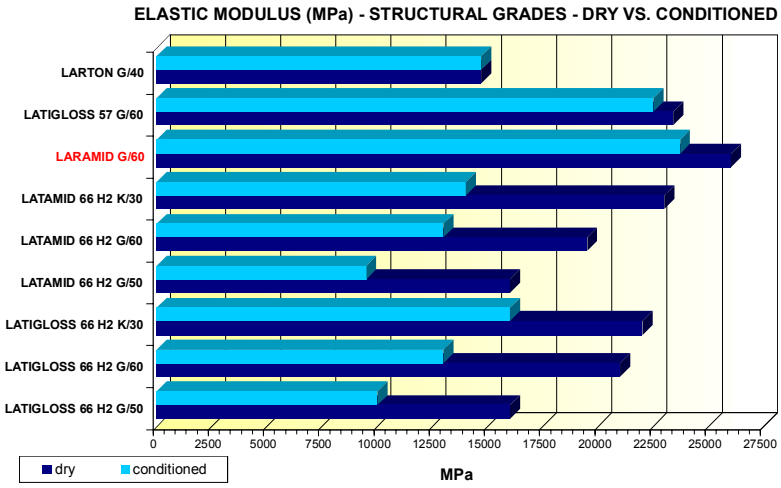
Nevertheless polyamides show issues related to moisture uptake and working temperatures, as well as PPS is limited from well known little elongation at break and poor toughness.

In order to get round these disadvantages, LATI has introduced the **LARAMID G/60**, a PPA based grade reinforced with 60% of a special glass fiber whose mechanical performances are extremely high.

As a matter of fact LARAMID G/60 is able to reach a **load at break of 280 MPa**, offering a strength 25% higher than the ordinary PA66 compounds with the same formulation and 40% higher then similar grades based on PPS.



Furthermore, the remarkable elongation at break shows the compound capability to support imposed deformations without occurring into yielding phenomena. An interesting application is represented by parts in the pipe-and fitting sector, plumbing, frame structures, etc.

Besides, the base resin offers peculiar advantages as **very low moisture absorption**, high chemical inertia towards organic products as well as the most of acids and bases, **highly remarkable thermal** performance allowing the compound to behave without any change well above 150°C (continuous use temperature).

For these reasons LARAMID G/60 is the best candidate for the replacement of aluminum and its alloys, steel or as the ideal substitute of brass in the manufacturing of valves and pipe fittings, as well as under for parts dealing with the under-the-hood environment in the automotive sector, electronics, ecc.

IMPROVED AESTHETIC STRUCTURAL MATERIALS:

nowadays more and more extreme mechanical applications have to offer an improved aesthetic of the molded parts.

For this reason LATI has introduced in the market a range of tailor-made structural compounds named LATIGLOSS, whose peculiarity is a special formulation allowing them to provide a glossy and defect-free surface finish.

LATIGLOSS are PA6 and PA66 based compounds reinforced with 30-60% of glass or 30% carbon fibers, a feature boosting upwards mechanical performances but not generating any longer the typical fiber streak marks that trouble the ordinary reinforced products.

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With **LATIGLOSS** materials not only a **better surface finish** is easily achievable, but even the dimensional **stability gets improved** thanks to a better and more homogeneous shrinkage.

Besides, special versions with improved flammability behavior are today available and grades for water and food contact applications are on-the-go.

The surface finish that can be obtained with the improved aesthetic structural materials makes hard to compare LATIGLOSS with a standard high reinforced product.

The appearance is in fact perfectly regular even for colored versions, low roughness gives better sliding to moving parts but, above all, it gives the opportunity to avoid aesthetical optimization of the molded items as painting, metallization or over-molding techniques.

Nevertheless the LATIGLOSS grades are anyway suitable for aesthetical post-manufacturing processes, as shown by the recent chomium plating tests (rif., picture).

The right trade-off between mechanic, thermal and aesthetic properties, the good dimensional stability and the ease of transformation can identify the LATIGLOSS family as the perfect substitute of more expensive compounds like semi-aromatic polyamides or similar blends, specially as long as working conditions do not require any specific mechanical performance at high temperature.

The cost-related advantages must not be identified just in the cost of the neat resin, but can also be found in the easier and cheaper molding process.

Latigloss chromium-plated version

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