

# 3M™ Nextel™ 610 Towpreg

Experimental Product

## Overview

Oxide-oxide ceramic matrix composites (CMC) exhibit higher continuous use temperatures compared to titanium and offer weight savings compared to other high temperature metallic alloys, making them attractive in many aerospace and industrial applications. However, these materials only have limited adoption, due in part to high material and processing costs. The 3M™ Nextel™ 610 Towpreg experimental product combines Nextel 610 Spread Tow with an oxide ceramic matrix and is designed for direct use in automated composite processing, including automated fiber placement (AFP) and filament winding. This provides a much lower cost pathway to oxide-oxide CMC part fabrication (relative to low denier fabric prepregs) by pairing a cost-effective, high denier fiber with a high yield processing method such as AFP.

## Properties

The Nextel 610 Towpreg experimental product is a Nextel 610 Spread Tow impregnated with an oxide ceramic slurry that has a controlled width and slurry content. The slurry contains oxide particles that form the composite matrix and organic additives that provide excellent tack while burning out cleanly during consolidation and sintering. Unlike typical oxide ceramic prepreg materials, the Nextel 610 Towpreg does not require freezer storage and has an out-time during layup of days to weeks. The product is packaged on a release liner and is ready to use on standard automated fiber placement equipment with minor modifications. Table 1 lists typical physical properties of the Nextel 610 Towpreg. Table 2 lists typical physical and mechanical properties of a sintered composite panel fabricated with Nextel 610 Towpreg. Note that this product is currently experimental and only available with Nextel 610 fibers, a nominal width of 0.25 in (6.35 mm), and an alumina matrix. Other product variants, with different fiber (Nextel 720), width (0.5, 1.0 in, etc.), and matrix compositions are possible in future products. Please contact us with specific interests.



Nextel Towpreg (white) on polyethylene liner (red).

**Table 1. Typical physical properties of the Nextel 610 Towpreg**

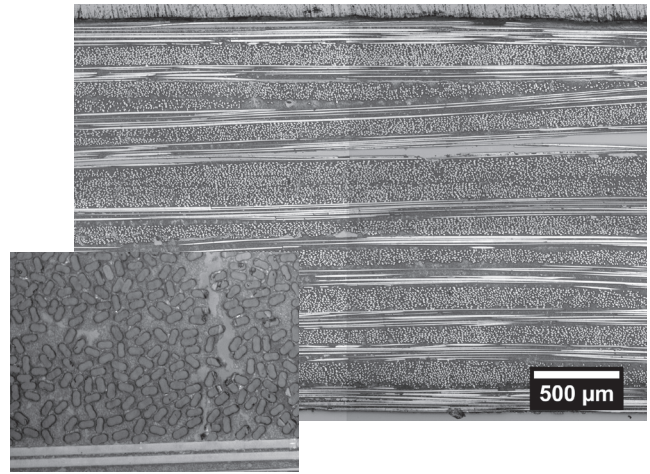
Fiber	Nextel 610
Denier (g/9,000m)	10,000
Nominal width (mm)	6.35
Nominal thickness (um)	200
Slurry content (wt%)	51
Oxide particle composition	alumina
Liner	polyethylene

Towpreg properties are representative and not for specification purposes

**Table 2. Typical physical and mechanical properties of a sintered composite panel made from Nextel 610 Towpreg**

<b>Fiber orientation</b>	0/90 cross-ply
<b>Ply count</b>	20
<b>Per ply thickness (mm)</b>	0.11
<b>Fiber content (vol%)</b>	41.3
<b>Areal density (gsm)</b>	303
<b>Tensile strength (MPa)</b>	290
<b>Tensile modulus (GPa)</b>	108
<b>Flex strength (MPa)</b>	382
<b>Flex modulus (GPa)</b>	122
<b>Interlaminar shear strength (MPa)</b>	20

Towpreg properties are representative and not for specification purposes



Representative image of a sintered composite panel cross section made from Nextel 610 Towpreg. The inset in the lower left shows a magnified view of a ply.

## Contact

For additional details and sampling, please contact:

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