Federal Court  Cour fédérale

Date: 20190306

Docket: T-1930-13

Citation: 2019 FC 277

Ottawa, Ontario, March 6, 2019

PRESENT: The Honourable Mr. Justice Manson

BETWEEN:

TENSAR TECHNOLOGIES, LIMITED AND TENSAR CORPORATION LLC AND TENSAR INTERNATIONAL CORPORATION AND NILEX INC.

Plaintiffs

and

ENVIRO-PRO GEOSYNTHETICS, LTD.

Defendant

JUDGMENT AND REASONS

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I. The Pleadings

[1] This action concerns the validity and infringement of Canadian Patent 2,491,858 [the '858 Patent, or the Walsh Patent], entitled "Geogrid or Mesh Structure", which is owned by Tensar Technologies, Limited.

[2] The following dates are applicable to the '858 Patent:

i. Priority filing date (based on GB0214931.8): June 27, 2002;
ii. Patent Cooperation Treaty [PCT] filing date: June 27, 2003;
iii. PCT date of publication: January 8, 2004; and
iv. Issue date: April 13, 2010.

[3] The Plaintiffs in this action are Tensar Technologies, Limited [Tensar Technologies], Tensar Corporation LLC [Tensar LLC], Tensar International Corporation [Tensar International], and Nilex Inc. [Nilex]. The Defendant is Enviro-Pro Geosynthetics Ltd. [Enviro-Pro, or the Defendant].

[4] The Plaintiffs assert that the Defendant has manufactured or had manufactured for it, offered for sale and sold in Canada geogrid products sold under the brand name TRI-GRID [the Tri-Grid Products] which infringe product claims 6 to 8 and 11 to 13 of the '858 Patent, and which were made according to and in infringement of method claims 18 to 31 of the '858 Patent.

[5] The Defendant asserts that the Tri-Grid Products do not infringe any of the claims of the ‘858 Patent, and counterclaims that the ‘858 Patent is invalid because the claims in issue in the ‘858 Patent would have been obvious at the relevant claim date to a person skilled in the art.

[6] At trial, the Plaintiffs abandoned the allegation of inducing and procuring infringement. The Defendant abandoned anticipation as a validity attack, yet maintained that the Gillette Defence still applied; this is discussed below.

[7] The following issues are left for the Court to decide:

A. Validity: Are any of claims 6 to 8, 11 to 13, or 18 to 31 of the ‘858 Patent obvious having regard to one or more of three prior art references:
    i. US Patent 3,386,876 [the Wyckoff Patent];
    ii. US Patent 4,374,798 [the Mercer ‘798 Patent]; and
    iii. US Patent 5,269,631 [the Mercer ‘631 Patent].
B. Infringement: Are any of claims 6 to 8, 11 to 13, or 18 to 31 of the ‘858 Patent infringed by the manufacture, use and sale of the Tri-Grid Products in Canada by Enviro-Pro?

II. Summary of the Results in this Action

[8] The results in this action are:

A. Validity: Claims 6 to 8, 11 to 13, and 18 to 31 of the ‘858 Patent are not obvious and are valid.
B. Infringement: Claims 6 to 8, 11 to 13, and 18 to 31 are not infringed by the Defendant.

III. Background

A. *The Parties*

[9] Tensar Technologies is a corporation organized and existing under the laws of the United Kingdom.

[10] Tensar LLC is a limited liability company organized and existing under the laws of the state of Georgia, United States.

[11] Tensar International is a corporation organized and existing under the laws of the state of Georgia, United States.

[12] Tensar Technologies is the listed owner of the ‘858 Patent.

[13] Tensar LLC is licensed by Tensar Technologies to manufacture its multiaxial geogrids in the United States, and sells geogrid products in Canada in association with the trademarks TENSAR and TRIAX [the TriAx Products] through its exclusive distributor, Nilex, a corporation organized and existing under the laws of the province of Alberta.

[14] Enviro-Pro was a corporation organized and existing under the laws of the province of Alberta. Enviro-Pro is now known as Key-May Industries Ltd, as a result of an amalgamation

filed on December 1, 2016. By agreement of counsel, any ruling made in this matter will apply to Key-May Industries Ltd. Hereafter, any mention of Enviro-Pro is in reference to the corporate entity once known as Enviro-Pro Geosynthetics Ltd. and now known as Key-May Industries Ltd.

[15] Enviro-Pro sells multiaxial geogrids in Canada. Enviro-Pro started distributing and offering for sale multiaxial geogrids under the trademarks TRI-GRID 140 and TRI-GRID 160 in Canada in August 2013.

[16] The Tri-Grid Products of Enviro-Pro are manufactured in China by TMP Geosynthetics [TMP].

B. *Technology Background*

(1) Polymers

[17] The ‘858 Patent relates to geogrids and mesh structures made of plastics materials, or polymers. The type of polymer used in the ‘858 Patent is an isotactic polypropylene. Polymers are made up of macromolecules.

[18] Polymers have two phases of morphology: the crystalline phase and the amorphous phase. Both phases are randomly oriented unless they are stretched. When a polymer is stretched, molecules tend to orient in the direction of the stretch and the polymer strength increases in the direction of the stretching.

(2) History of geogrids

[19] Beginning in the 1960s, products manufactured from synthetic polymer materials, termed geosynthetics (such as textiles, strips, straps, webbing, nets, meshes, and grids), found widespread use in the construction industry to reinforce, contain, and filter particulate matter.

[20] Early geosynthetics were made by weaving, knitting, or heat-bonding synthetic fibres together.

[21] In the late 1970s, Frank B. Mercer of Netlon Ltd. (a predecessor corporation to Tensar International) invented a process for the production of uniaxially and biaxially stretched grids possessing strands and integral crossbars (for a uniaxial grid) or integral junctions (for a biaxial grid):

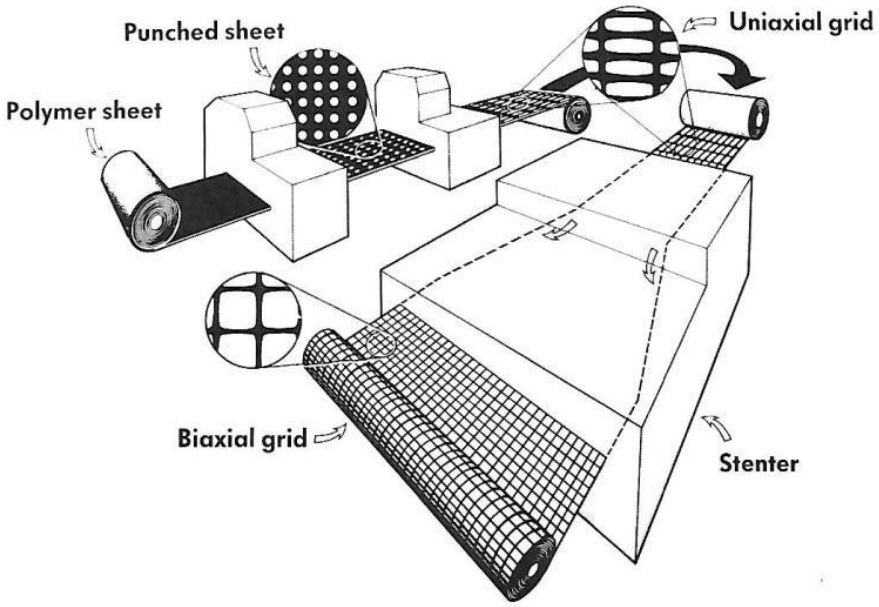


Figure 10 from Expert Report of Alan McGown (Claim Construction and Infringement)

[22] Dr. Mercer termed these products “geogrids”. As depicted in the above figure, these geogrids were produced by:

i. punching holes into a sheet of polymer;

ii. drawing out the sheet in one direction to form a uniaxial grid with strands or ribs and integral crossbars; and

iii. subsequently, if desired, drawing out the sheet in a second direction to form a biaxial grid with strands or ribs connected with integral junctions.

[23] Ever since the early 1980s and up until the late 2000s, geogrids used in stabilisation structures have been essentially biaxial geogrids, consisting of two sets of perpendicular strands or ribs. A biaxial geogrid with ribs and integral junctions is depicted below:

Figure 12 from Expert Report of Alan McGown (Claim Construction and Infringement)

[24] A geogrid, as a heavier product with greater tensile stiffness (the ability to resist a force or stress) and greater junction strength, is more effective in reinforcing particulate matter than earlier woven or knitted geosynthetics.

[25] Uniaxial geogrids are intended for applications where tensile stiffness is principally required in one direction. Biaxial geogrids are intended for applications where tensile stiffness is required in at least two directions.

[26] One novel feature of these geogrids was that the stretching of the strands extended to some degree into the junctions and crotches (the curved regions where the strands meet the junction), and thereby resulted in greater stiffness, strength, and durability.

C. *The '858 Patent*

[27] The named inventor in the '858 Patent is Anthony Thomas Walsh, an employee of Tensar.

[28] The invention claimed in the '858 Patent relates to a geogrid made by stretching and biaxially orienting a plastics starting material provided with a hexagonal array of holes, and to a method of making said geogrid products.

[29] The '858 Patent defines "oriented" as "molecularly-oriented". The '858 Patent also states that "[i]n general, when an oriented strand is referred to, the preferred direction of orientation is longitudinal of the strand."

[30] The ‘858 Patent refers to the Mercer ‘798 Patent as disclosing “uniax and biax structures of the general type with which the present invention is concerned”, but goes on to say that such mesh structures “do not have great stability in the diagonal direction”.

[31] The ‘858 Patent also refers to the Wyckoff Patent as disclosing “a mesh structure having triangular mesh openings and formed by stretching and orienting a plastics starting material which was provided with an array of holes”.

[32] The summary of the invention is set out at pages 3 and 3a of the ‘858 Patent specification:

> According to an aspect of the present invention, there is provided a geogrid made by stretching and uniaxially orienting a plastics starting material which was provided with an array of holes, the geogrid comprising transverse bars interconnected by substantially straight oriented strands…
>
> According to another aspect of the present invention, there is provided a geogrid made by stretching and biaxially orienting a plastics starting material which was provided with an array of holes, the geogrid comprising:
>
> a first set of substantially straight oriented strands extending at an acute angel to a first direction;
>
> a second set of substantially straight oriented strands extending at an acute angle to the first direction and , as considered in a second direction at right angles to the first direction, alternate (angled) strands of the two sets being angled to the first direction by substantially equal and opposite angles;
>
> further substantially straight oriented strands extending in said second direction; and
>
> junctions each interconnecting four of the angled oriented strands and two of the further oriented strands, at substantially each junction the crotch between each pair of adjacent strands

> being oriented in the direction running around the crotch, whereby there is continuous orientation from the edge of one strand, around the crotch and to the edge of the adjacent strand.

[33] The ‘858 Patent goes on to describe a method of producing geogrids at pages 3a and 3b of the ‘858 Patent specification.

[34] Two independent claims, claims 6 and 18 of the ‘858 Patent, and certain claims dependent thereon, are at issue in this proceeding. Claim 6 reads:

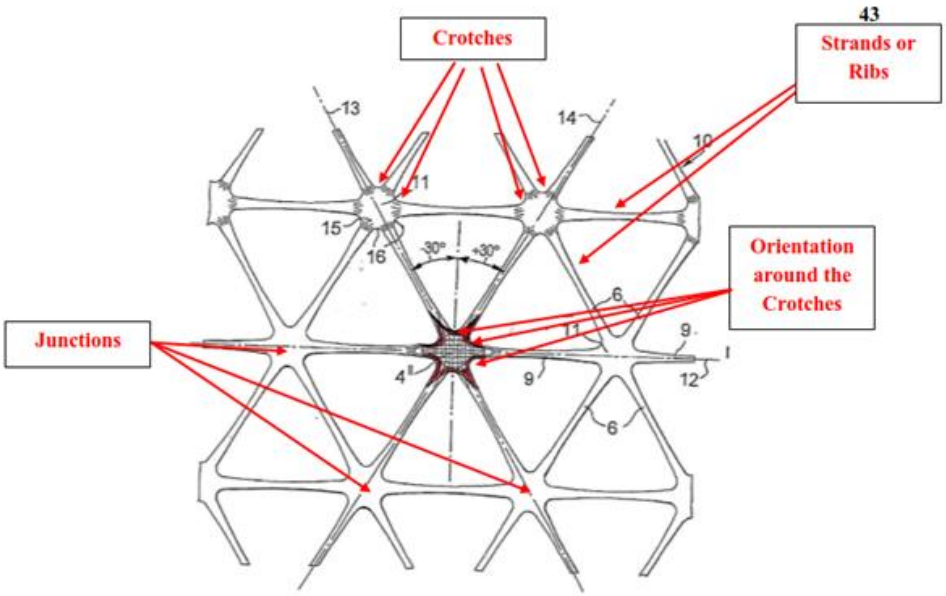
> A geogrid made by stretching and biaxially orienting a plastics starting material which was provided with an array of holes, the geogrid comprising:
>
> > a first set of substantially straight oriented strands extending at an acute angle to a first direction;
> >
> > a second set of substantially straight oriented strands extending at an acute angle to the first direction and, as considered in a second direction at right angles to the first direction, alternate (angled) strands of the two sets being angled to the first direction by substantially equal and opposite angles;
> >
> > further substantially straight oriented strands extending in said second direction; and
> >
> > junctions each interconnecting four of the angled oriented strands and two of the further oriented strands, at substantially each junction the crotch between each pair of adjacent strands being oriented in the direction running around the crotch, whereby there is continuous orientation from the edge of one strand, around the crotch and to the edge of the adjacent strand.

[35] Claim 18 reads:

> A method of making a biaxially oriented plastics material geogrid, comprising:
>
> > providing a plastics sheet starting material which has holes in an array of hexagons of substantially identical shape and size so that substantially each hole is at a corner of each of three hexagons, there being within the hexagon no holes of a size greater than or equal to the size of the first-mentioned holes;
> >
> > applying a stretch in a first direction to stretch out strand-forming zones between adjacent holes on the sides of the hexagons and form oriented strands from such zones; and
> >
> > applying a stretch in a second direction substantially at right angles to said first direction to stretch out strand-forming zones between adjacent holes on the sides of the hexagons and form oriented strands from the latter zones, whereby centre portions of the hexagons form junctions interconnecting the oriented strands, the stretching being applied to such an extent that the orientation of the strands extends into substantially each junction so that at substantially each junction, the crotch between each pair of adjacent strands is oriented in the direction running around the crotch, whereby there is continuous orientation from the edge of one strand, around the crotch and to the edge of the adjacent strand.

[36] The ‘858 geogrid is termed a triaxial or multiaxial (hereafter, the term multiaxial will be used) geogrid, because it has stiffness and strength in multiple directions. Figure 26 of the Expert

Report of Dr. Alan McGown (Claim Construction and Infringement), below, which annotates figure 4 of the '858 Patent, depicts such a multiaxial geogrid:



IV. Plaintiffs' Fact Witnesses

A. *Robert Briggs*

[37] Mr. Briggs is general counsel for Tensar International. Mr. Briggs testified to the corporate history of Tensar, as well as to the nature of the current Tensar corporate structure:

i. Tensar Limited is a passive holding company, which holds intellectual property but has no employees or existing operations;

ii. Tensar LLC produces Tensar products in Atlanta, Georgia; and

iii. Tensar International is an engineering, marketing, and sales entity.

[38] Mr. Briggs advised that Nilex is an Alberta corporation and the exclusive distributor of TriAx Products in most of Canada.

[39] Up until the mid-2000s, Tensar was engaged in the business of producing and selling uniaxial and biaxial geogrids. Litigation involving Tensar’s biaxial products began in the 1980s and extended into the early 2000s, as competitors attempted to sell similar products. During this time period, most of the company's research and development spending was focused on finding incremental improvements to the biaxial product, such as by increasing production efficiency or finding additional uses for the biaxial product.

[40] In or around 2008, Tensar introduced a multiaxial grid product to market, first in the United Kingdom and shortly thereafter in the United States and Canada.

[41] The TriAx Products gained rapid acceptance in the Canadian market. Since coming to market with the TriAx Products, Tensar has engaged in considerable litigation relating to alleged infringement of the TriAx Products. Much of this litigation has occurred in China, and involved TMP.

[42] On cross-examination, Mr. Briggs agreed that while Dr. McGown is not an employee of Tensar, he has been associated with Tensar for many years and has received payments from Tensar for many years.

B. *Anthony Walsh*

[43] Mr. Walsh is a technology manager for Tensar International, and resides in the United Kingdom. He is also the inventor of the ‘858 Patent. Mr. Walsh earned a bachelor’s degree in physics in 1981, and a master’s degree in polymer engineering in 1991.

[44] Beginning in 1981 up until 2000, Mr. Walsh worked at a material production company engaged in the production of various materials, including armament materials used to line the inside of military vehicles. Mr. Walsh testified that these lining materials were manufactured to have strength in multiple directions, in order to withstand the impact of explosive devices.

[45] In May of 2001, Mr. Walsh was hired as technology manager at Tensar in the United Kingdom. At this time, Tensar was engaged in the production of uniaxial and biaxial geogrids. He was motivated to attempt production of a multiaxial geogrid from his past experience producing armament lining materials, and questioned why Tensar continued to produce a biaxial product for an application where it was required to have strength in more than two directions.

[46] The development process of this new, multiaxial product, included:

i. hiring a technician;
ii. producing between 10 and 30 different prototype geogrids;
iii. receiving inspiration for a hexagonal hole array from nature, specifically the honeycomb pattern used by bees;

iv. arriving at a finished product with triangular apertures;

v. consulting with civil engineers within Tensar, as well as many other groups within the company, to determine whether the new product was commercially viable; and

vi. developing punch tools and other basic equipment in order to produce the new product on a large scale.

[47] Before engaging in commercial production, Tensar undertook large-scale testing of the new multiaxial product, which revealed a number of beneficial characteristics, including:

i. The multiaxial product did a better job than a biaxial product of enabling the aggregate to interlock and become strong;

ii. The multiaxial product required less raw aggregate to achieve the same results; and

iii. The multiaxial product could be produced at a greater speed, because rips in the product that occurred during the production process were more isolated and therefore less costly.

[48] Mr. Walsh produced a technical report he co-authored, entitled “Junction and Crotch Analysis of TAIAN Modern Tri-Grid Sample Obtained from Enviro-Pro in Canada” [the Tensar International Limited Report], which created a detailed thickness contour map from a sample of Enviro-Pro’s Tri-Grid Products, in an attempt to assess the level and direction of polymer orientation. This analysis was conducted using a micrometer, a standard piece of equipment for measuring thickness.

[49] Mr. Walsh stated that Tensar launched the TriAx Products in the United Kingdom in 2007.

(1) Cross-Examination of Mr. Walsh

[50] During cross-examination, Mr. Walsh stated that he was not aware of the Mercer ‘798 Patent, the Mercer ‘631 Patent [collectively, the Mercer Patents], or the Wyckoff Patent during his design process. Despite the fact that the Mercer ‘798 Patent is mentioned in the ‘858 Patent, it was not until many years later, when Tensar became involved in litigation surrounding the TriAx Products, that he became aware of the Mercer Patents. Mr. Walsh stated that he merely supplied Tensar’s patent agents with technical information, and that it was the patent agents who drafted the ‘858 Patent with reference to the Mercer ‘798 Patent and the Wyckoff Patent.

[51] Mr. Walsh also acknowledged the similarities between the hexagonal pattern of holes described in the Wyckoff Patent and the array of holes he chose to employ, but maintained that he was not aware of the Wyckoff Patent at the time he developed his new product.

[52] Mr. Walsh indicated that he had no knowledge at the time of his invention of what molecular orientation meant, nor did he appreciate at the time how the drawing of the polymer in the junction contributed to the multiaxial product.

[53] Mr. Walsh confirmed that the Tensar International Limited Report is an internal report which he prepared in his role as an employee of that company. He acknowledged that in the Tensar International Limited Report, he conducted no tests which would analyze the Tri-Grid Products at a molecular level. Rather, the tests conducted looked at the resulting molecular properties shown by the surface properties of the Tri-Grid Products.

[54] Mr. Walsh also acknowledged that there are areas of varying thickness in the junctions of the Tri-Grid Products.

V. Plaintiffs' Expert Witness (Dr. Alan McGown)

[55] Dr. Alan McGown is an Emeritus Professor of Civil Engineering at the University of Strathclyde in Glasgow, United Kingdom, as well as the managing director of his own civil engineering consulting company, McGown Consultants Ltd. He received a PhD in 1974, and a DSc for research contributions to geotechnical engineering and geosynthetics in 1993, both from the University of Strathclyde.

[56] Dr. McGown produced two reports in relation to this matter. His first report, entitled "Expert Report of Professor Alan McGown (Claim Construction and Infringement)", is dated June 30, 2017. His second report, entitled "Expert Report of Professor Alan McGown (Validity)", is dated September 4, 2017.

[57] Dr. McGown has over 45 years of experience in academic research, development work, and consultancy relating to the testing, specification, design, manufacturing and methods of use of geogrids, nets, textiles and meshes which are made from synthetic materials for various uses, including in the construction industry. More specifically, Dr. McGown is qualified as an expert in the development of polymer grids with integral junctions for use in retaining walls, steep slopes, embankments, roads, railways, airfields and similar applications.

[58] Dr. McGown has consulted for Tensar in the past, and this involvement is ongoing. He stated that he is nonetheless able to act impartially and assist the Court, and that his prior involvement with Tensar has no impact on the opinions expressed in his reports. His positions on the person of ordinary skill in the art [the POSITA], common general knowledge of the POSITA, infringement, and obviousness, are discussed below.

VI. Defendant's Fact Witness (Jeff Prodahl)

[59] Mr. Prodahl works in business development for Enviro-Pro, with responsibilities relating to sales, product procurement, and exploring potential new products for the company. Mr. Prodahl has worked for Enviro-Pro since in or around 2006.

[60] At the time Mr. Prodahl joined Enviro-Pro, the company was involved in a number of different ventures, only one of which was the sale of geosynthetics in the construction industry. In the late 2000s, the company began to focus on the sale of geogrid products, initially selling biaxial geogrid products.

[61] Sales of biaxial geogrid products were initially strong, but suffered when Tensar's competitive TriAx Products entered the Alberta marketplace in the early 2010s.

[62] In 2012, Enviro-Pro reached out to TMP in China, which had previously manufactured and supplied them with biaxial geogrids, and inquired about producing a geogrid that could compete with the TriAx Products. In an email dated November 29, 2012, a representative of

TMP proposed to Mr. Prodahl that they develop a multiaxial product by following the Wyckoff Patent, so as to avoid infringing Tensar's products.

[63] Mr. Prodahl stated that Enviro-Pro consulted with their patent attorney at this time, and were advised that if the manufacturer used the Wyckoff method of manufacture, Enviro-Pro would avoid infringement of the Walsh Patent. Enviro-Pro then instructed TMP to produce a sample of a multiaxial product by exactly following the Wyckoff Patent.

[64] Upon receipt of a sample, Enviro-Pro consulted with Allan Parker, an engineer and consultant with experience using the TriAx product. Mr. Parker was provided with the Wyckoff Patent, but not a sample of the Enviro-Pro product. Mr. Parker provided an opinion that the TriAx product was manufactured entirely in accordance with the Wyckoff Patent. On cross-examination, Mr. Prodahl agreed that Mr. Parker did not appear to appreciate the differences between biaxial and multiaxial geogrids.

[65] Mr. Prodahl also sent the sample product to TRI/Environmental, Inc. [TRI], along with a sample of the TriAx product. However, Mr. Prodahl testified that he did not draw any conclusions from the report prepared by TRI.

[66] Enviro-Pro began selling the Tri-Grid Products in August of 2013. Shortly after sales began, Tensar initiated this action.

VII. Defendant's Expert Witness (Dr. Phillip Choi)

[67] Dr. Phillip Choi is a Full Professor in the Department of Chemical and Materials Engineering at the University of Alberta. In 1995, he earned a PhD in Chemical Engineering from the University of Waterloo. Since that time, he has worked in polymer research and development, in both industry and academia. He has published a textbook relating to polymer science and engineering, as well as numerous book chapters, journal articles, and one United States patent, all in polymer-related topics.

[68] Dr. Choi is qualified as an expert in the field of polymer science and polymer (plastics) engineering, with considerable academic qualifications in these general fields as well as practical industry experience relating to research, development, design, testing and applications of polymer materials and products. He has been qualified as an expert to give evidence in respect of polymer science and polymer engineering, including general principles of polymer molecular structures and behaviour of molecules in polymers in relation to products made of polymers, including mesh structures.

[69] Dr. Choi produced two reports in relation to this matter. His first report, entitled "Expert Report in the matter of Tensar Technologies, Limited et al v Enviro-Pro Geosynthetics Ltd.", is dated July 4, 2017. His second report, entitled "Rebuttal Report in the matter of Tensar Technologies, Limited et al v Enviro-Pro Geosynthetics Ltd.", is dated August 29, 2017.

VIII. Claim Construction

[70] Claim construction is a matter for the Court alone, and should be done prior to considering issues of infringement and validity (*Whirlpool Corp v Camco Inc*, 2000 SCC 67 at para 43 [*Whirlpool*]; *Pfizer Canada Inc v Canada (Minister of Health)*, 2005 FC 1725 at para 10, aff`d on other grounds, 2007 FCA 1). The same interpretation of the claims applies to both infringement and validity (*Whirlpool*, above at para 49).

[71] The Supreme Court of Canada has outlined the canons of claim construction in three decisions: *Whirlpool*, at paragraphs 49 to 55; *Free World Trust v Électro Santé Inc*, 2000 SCC 66 at paragraphs 44 to 54 [*Free World Trust*]; and *Consolboard Inc v MacMillan Bloedel (Saskatchewan) Ltd*, [1981] 1 SCR 504 (SCC) at paragraph 27 [*Consolboard*]. These decisions state:

i. claims are to be read in an informed and purposive way with a mind willing to understand, viewed through the eyes of the person skilled in the art as of the date of publication having regard to the common general knowledge;
ii. adherence to the language of the claims allows them to be read in the manner the inventor is presumed to have intended, and in a way that is sympathetic to accomplishing the inventor’s purpose, which promotes both fairness and predictability; and
iii. the whole of the specification should be considered to ascertain the nature of the invention, and the construction of claims must be neither benevolent nor harsh, but should instead be reasonable and fair to both the patentee and the public.

A. *Relevant Date*

[72] The relevant date for claim construction of the '858 Patent claims is the PCT date of publication of January 8, 2004.

B. *Person of Skill in the Art (POSITA)*

[73] As outlined by Justice Binnie in *Whirlpool*, at paragraph 53:

> … the patent specification is not addressed to grammarians, etymologists or to the public generally, but to skilled individuals sufficiently versed in the art to which the patent relates to enable them on a technical level to appreciate the nature and description of the invention: H. G. Fox, *The Canadian Law and Practice Relating to Letters Patent for Inventions* (4th ed. 1969), at p. 185. The court, writes Dr. Fox, at p. 203, must place itself
>
> > in the position of some person acquainted with the surrounding circumstances as to the state of the art and the manufacture at the time, and making itself acquainted with the technical meaning in that art or manufacture that any particular word or words may have.

[74] The POSITA has been described as:

> [A] hypothetical person possessing the ordinary skill and knowledge of the particular art to which the invention relates, and a mind willing to understand a specification that is addressed to him. This hypothetical person has sometimes been equated with the "reasonable man" used as a standard in negligence cases. He is assumed to be a man who is going to try to achieve success and not one who is looking for difficulties or seeking failure.
>
> (*Free World Trust*, above at para 44, quoting Harold G. Fox, *The Canadian Law and Practice Relating to Letters Patent for Inventions*, 4th ed. (Toronto: Carswell, 1969) at 184)

[75] Dr. McGown suggested that the POSITA would combine, through experience, two branches of engineering:

i. mechanical, chemical or textile engineering with a specialisation in synthetic materials or several years' experience with synthetic textile and related materials manufacturing systems [the Production Engineer]; and
ii. civil or military engineering with a specialisation in geotechnical or pavement engineering or 5 to 7 years' experience with the use of synthetic textile, meshes, nets and grids in the construction industry [the Applications Engineer].

[76] The Production Engineer is principally concerned with the methods of processing the starting material and the effects of these on the properties of the final products. The Applications Engineer is principally concerned with the physical and mechanical properties of the final products, their intended functions, and their long term durability and operational efficiency in various applications.

[77] Dr. McGown stated that the POSITA would either be a Production Engineer with enough experience in industry (5 to 7 years) to have the knowledge of an Applications Engineer, or vice versa.

[78] Dr. Choi stated that the POSITA would include plastics products design engineers, production engineers who are involved in the production of plastics products, and technologists who are involved in plastics production and testing.

[79] Dr. Choi also stated in his report that usually such an individual would have a bachelor's degree or a technologist diploma along with about five to ten years of experience in their jobs. They would have knowledge on a limited range of physical and mechanical properties of plastics, and have the technical know-how to handle plastics. However, they would only have a limited knowledge of the molecular structure-property relationships of plastics, which instead fall into the domain of polymer (plastics) research and development scientists/engineers who have master's and doctoral degrees.

[80] Dr. Choi stated in his report that the POSITA would not have the applications-related knowledge and experience of the Applications Engineer contemplated by Dr. McGown. However, during direct examination, Dr. Choi agreed that the POSITA would have access to applications-related knowledge, such as principles of interlock and how particulate matter interacts with a geogrid, through interactions with other individuals in their workplace. On cross-examination, Dr. Choi agreed that such applications-related knowledge would be necessary to the development of a geogrid. Dr. Choi's position on the POSITA has been shown to be too limited.

[81] Having considered the evidence of both experts and the principles outlined above, I prefer, and adopt, Dr. McGown's view of the POSITA, as given the nature of the geogrid invention of the '858 Patent, I believe the POSITA must have knowledge of the applications to which a geogrid product may be applied. Much of the disclosure in the '858 Patent relates to elements falling either partially or wholly within the purview of an Applications Engineer. Dr.

McGown's definition recognizes that the '858 Patent relates both to methods of processing synthetic polymers and to the mechanical properties of the final products and their intended uses.

[82] Having considered all of the evidence before the Court, I find that:

a. A POSITA, in the context of the '858 Patent, would combine, through experience, two branches of engineering:
    i. mechanical, chemical or textile engineering with a specialisation in synthetic materials or several years' experience with synthetic textile and related materials manufacturing systems, but with limited knowledge of the molecular structure-property relationships of plastics or polymers [the Production Engineer]; and
    ii. civil or military engineering with a specialisation in geotechnical or pavement engineering or 5 to 7 years' experience with the use of synthetic textile, meshes, nets and grids in the construction industry [the Applications Engineer].
b. The Production Engineer is principally concerned with the methods of processing the starting material and the effects of these on the properties of the final products, here, production of polymer mesh or geogrid products, with limited knowledge of the molecular structure-property relationships of plastics or polymers. The Applications Engineer is principally concerned with the physical and mechanical properties of the final products, their intended functions, and their long term durability and operational efficiency in various applications, here, the application and use of meshes and geogrids for construction applications.
c. The POSITA would either be a Production Engineer with enough experience in industry (5 to 7 years) to have the knowledge of an Applications Engineer, or vice versa.

C. *Common General Knowledge*

[83] Common general knowledge does not amount to all information in the public domain. Rather, common general knowledge is the knowledge generally known at the relevant time by the person skilled in the field of art or science to which the patent relates (*Bell Helicopter Textron Canada Limitée v Eurocopter, société par actions simplifiée*, 2013 FCA 219 at paras 63-65).

[84] The assessment of common general knowledge is governed by the principles found in *Eli Lilly & Co v Apotex Inc,* 2009 FC 991 at paragraph 97 [*Eli Lilly*], aff'd 2010 FCA 240, citing *General Tire & Rubber Co v Firestone Tyre & Rubber Co*, [1972] RPC 457 (UKHL) at 482-483:

i. Common general knowledge is distinct from what in patent law is regarded as public knowledge. Public knowledge is theoretical and includes each and every patent specification published, however unlikely to be looked at and in whatever language it is written. Common general knowledge, in contrast, is derived from a common sense approach to the question of what would be known, in fact, to an appropriately skilled person that could be found in real life, who is good at his or her job.

ii. Individual patent specifications and their contents do not normally form part of the relevant common general knowledge, although there may be specifications which are so well known that they do form part of the common general knowledge, particularly in certain industries.

iii. Common general knowledge does not necessarily include scientific papers, no matter how wide the circulation of the relevant journal or how widely read the paper. A

disclosure in a scientific paper only becomes common general knowledge when it is generally known and accepted without question by the bulk of those engaged in the particular art.

iv. Common general knowledge does not include what has only been written about and never, in fact, been used in a particular art.

[85] A POSITA's common general knowledge cannot be assumed; rather, it must be proven with fact evidence on a balance of probabilities. As quoted from Simon Thorley et al., *Terrell on the Law of Patents*, 16th ed (London: Sweet & Maxwell, 2006) by the Court in *Eli Lilly*, above at paragraph 100:

> Proof of common knowledge is given by witnesses competent to speak upon the matter, who, to supplement their own recollections, may refer to standard works upon the subject which were published at the time and which were known to them. In order to establish whether something is common general knowledge, the first and most important step is to look at the sources from which the skilled addressee could acquire his information.
>
> The publication at or before the relevant date of other documents such as patent specifications may be to some extent prima facie evidence tending to show that the statements contained in them were part of the common knowledge, but is far from complete proof, as the statements may well have been discredited or forgotten or merely ignored. Evidence may, however, be given to prove that such statements did become part of the common knowledge.

[86] The parties agree that the Wyckoff Patent and the Mercer Patents formed part of the prior art and the common general knowledge as of the claim date, namely January 8, 2004 (for claim construction) and June 27, 2002 (for obviousness).

[87] Additionally, at the relevant dates, the POSITA would have had the following common general knowledge:

i. basic features of polymers at the molecular level;
ii. there is some molecular orientation inherent to the stretching of a polymer when it is drawn beyond its yield point in the direction of the stretch;
iii. “continuous” means uninterrupted;
iv. “orientation” means molecular orientation;
v. the direction of orientation is relative to a reference direction;
vi. various methods are used to make geometric polymer structures, including geogrids, by way of uniaxial or biaxial stretching; and
vii. when a section of a starter polymer undergoes a reduction in thickness, that is an indication that stretching has occurred and that some degree of orientation is present.

D. *Prior Art*

(1) Mercer ‘798 Patent

[88] The Mercer ‘798 Patent, entitled “Production of Plastic Mesh Structure”, was issued on February 22, 1983. The named inventor is Frank B. Mercer.

[89] The Mercer ‘798 Patent describes a process of biaxially stretching a starting sheet punched with an array of square or rectangular holes to produce a grid with “oriented strands which are interconnected by orientated junctions which have orientated crotches between the strands...”

(2) Mercer ‘631 Patent

[90] The Mercer ‘631 Patent, entitled “Plastics Material Mesh Structures”, was issued on December 14, 1993. The named inventors include Frank B. Mercer. The Mercer ‘631 Patent relates to “a method of producing an integral biaxially-molecularly-oriented plastics material mesh structure…”

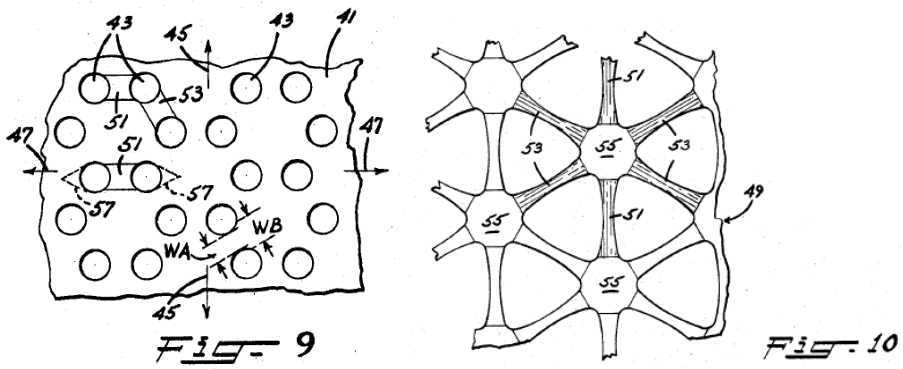
[91] Importantly, the Mercer ‘631 Patent introduces the term “continuous orientation”. In particular, at column 19, lines 42-45, the results of biaxial stretching are described as “forming an oriented junction and continuously oriented crotches connecting respective main and transverse strands”. At column 21, lines 39-42, the patent references “respective main and transverse strands being interconnected by continuously oriented crotches with the orientation in the direction running around the respective crotches”.

(3) Wyckoff Patent

[92] The Wyckoff Patent, entitled “Non-Woven Net Manufacture”, was issued on June 4, 1968. It relates to “the manufacture of reticulated structures and particularly non-woven nets and like structures from thermoplastic polymeric materials”.

[93] There are two elements of the Wyckoff Patent that are relevant. First, Figure 9 of the Wyckoff Patent, below, depicts a starter sheet punched with a hexagonal array of holes. When

biaxial stretching is applied to this starter sheet, the result is a multiaxial grid with triangular apertures, depicted in Figure 10 of the Wyckoff Patent, below.



Figures 9 and 10 of the Wyckoff Patent

[94] Second, although the ribs of the multiaxial geogrid described in the Wyckoff Patent have been stretched, no stretching is applied to the junctions. This lack of stretching in the junctions is emphasized repeatedly in the patent specification, and is described in lines 14-15 of column 2 as helping to "arrest forces which tend to tear the finished web during use".

E. *Claim Terms Needing Construction*

[95] The parties agree that all elements of the claims in suit are essential.

[96] With respect to infringement of independent claim 6, the parties agree that all aspects of the claim are part of the Defendant's TRI-GRID 140 and TRI-GRID 160 geogrids, except for the following:

> 6. (…) at substantially each junction the crotch between each pair of adjacent strands being oriented in the direction running around the crotch, whereby there is continuous orientation from the edge

> of one strand, around the crotch and to the edge of the adjacent strand.

[97] With regards to infringement of claim 18, the Defendant admits all steps and elements of the method of claim 18 were used in their manufacturing process, except for the following:

> 18. (…) the stretching being applied to such an extent that the orientation of the strands extends into substantially each junction so that at substantially each junction, the crotch between each pair of adjacent strands is oriented in the direction running around the crotch, whereby there is continuous orientation from the edge of one strand, around the crotch and to the edge of the adjacent strand.

[98] The parties disagree specifically about the meaning of "continuous orientation from the edge of one strand, around the crotch and to the edge of the adjacent strand" as stated in both claims 6 and 18.

[99] The parties agree that if claim 6 is valid and infringed, then claim 18 is also valid and infringed. The parties also agree that if one of the Tri-Grid Products (TRID-GRID 140 or TRI-GRID 160) infringes, the other product infringes.

[100] The experts agreed that:

i. orientation is defined in the '858 Patent and means molecular orientation;

ii. in both claims, the direction of the continuous orientation is important;

iii. a reference point is required when referring to the direction of orientation, and that reference point in both claims is the curvature of the crotch;

iv. there is some orientation inherent to the stretching of a polymer beyond its yield point;

v. 100 percent crystallization of a polymer is practically impossible;

vi. to achieve orientation in the direction running around the crotch, the molecules in the crotch must align predominantly in a direction tangential to the curvature of the crotch; and

vii. "continuous" means "uninterrupted".

[101] The experts disagreed with respect to how "continuous" (or, equivalently, "uninterrupted") should be interpreted in the context of molecular orientation.

[102] Dr. Choi stated that an interruption in the continuity of molecular orientation can occur in two ways. First, an interruption can occur if there is a significant amount of amorphous phase molecules interrupting the directional orientation of the crystalline phase molecules. Dr. Choi suggested that in order to achieve continuous orientation, there needs to be a significant percentage of the crystalline phase; the percentage of the crystalline phase required to achieve continuous orientation depends on the properties and strength that are desired in the final product.

[103] Second, molecular orientation can be interrupted by the direction in which the lamellae orient. Lamellae refer to a bundle of closely packed macromolecules that have formed into a pattern within the crystalline phase of the polymer. Dr. Choi stated that all the lamellae would have to be oriented in the direction running around the crotch in order for orientation to be

continuous. If the lamellae were not oriented tangentially to the edge of the curvature of the crotch, that would constitute discontinuity.

[104] Dr. Choi's interpretation is problematic for several reasons. First, as outlined above, claims are to be read in an informed and purposive way with a mind willing to understand (*Whirlpool*, at para 49). Dr. Choi admitted in cross-examination that adopting his interpretation of “continuous orientation”, it would be impossible to produce a geogrid with such “continuous orientation”. Such an interpretation negates a purposive construction; a person skilled in the art with a mind willing to understand would not interpret “continuous orientation” in a way that makes it impossible to produce a geogrid with “continuous orientation”.

[105] Second, if one adopts Dr. Choi's construction of “continuous orientation”, one is being invited to find that the use of this term, in both the Mercer ‘631 Patent, relied on as prior art by the Defendant, and in the ‘858 Patent, is meaningless or cannot be understood by a POSITA at the relevant date or, for that matter, at any time. There is no validity attack based on lack of utility or insufficiency of the disclosure of the ‘858 Patent.

[106] Third, Dr. Choi's interpretation involves an overly technical analysis of the patent. Dr. Choi admitted in cross-examination that his interpretation of “continuous orientation” is based on his own experience as an expert in polymer science, not that of a POSITA.

[107] Fourth, Dr. Choi's analysis focuses almost exclusively on claims 6 and 18 of the ‘858 Patent, and appears to ignore the remainder of the specification of the patent. As outlined above, claims must be construed in an informed and purposive manner, and this entails reviewing the whole of the specification to ascertain the nature of the invention. While Dr. Choi did state in cross-examination that he reviewed the entirety of the ‘858 Patent, his analysis does not reflect an appreciation of the claims in light of the ‘858 Patent disclosure.

[108] Dr. McGown interpreted “continuous orientation” to mean a degree of orientation caused by the polymer being reduced either uniformly or non-uniformly in thickness from the original starting material at every point around the crotches. In other words, if there is some degree of stretching around the crotch area resulting in some reduction in thickness around the crotch area, then there is continuous orientation around the crotch.

[109] Dr. McGown based this interpretation in part on various excerpts from the ‘858 Patent and the Mercer Patents. I accept that these excerpts suggest that a certain degree of thickness reduction, relative to the starting polymer material or starter sheet, occurring throughout the crotch, may show at least some, if not continuous, molecular orientation through the crotch, and that the thickness reduction need not be uniform throughout the crotch.

[110] However, “continuous orientation” must mean something more than the definition put forward by Dr. McGown. The mere presence of a reduction in thickness relative to the starter sheet, no matter how small, in the area running around the crotch, cannot and does not establish continuous orientation.

[111] The word “continuous” was first introduced to qualify molecular orientation in geogrids in the Mercer ‘631 Patent, issued in 1993. In column 19 of the Mercer ‘631 Patent, at lines 42 to 45:

> … thereby forming an oriented junction and continuously oriented crotches connecting respective main and transverse strands, …

[112] Similarly, at column 20, line 66, to column 21, line 1 of the Mercer ‘631 Patent:

> … respective main and transverse strands being interconnected by continuously oriented crotches with the orientation in the direction running around the respective crotches, …

[113] The term “continuous orientation” was then adopted in the description of the invention of the ‘858 Patent, by the same patent agent or attorney who drafted the Mercer ‘631 Patent.

[114] The addition of the word “continuous” must be given a purposive construction in the context of the invention of the ‘858 Patent; under Dr. McGown's interpretation, the term “continuous orientation” is equivalent to the use of the word “orientation” without any qualification, or at least with a meaning that merely “some” orientation suffices to amount to continuous orientation. That is, according to Dr. McGown, as long as there is stretching into the junction and crotch areas, there is molecular orientation, and therefore there is continuous orientation in the direction running around the crotch. Under Dr. McGown's definition, as long as the material running around the crotch consistently shows some reduction in thickness, no matter how small the reduction, that will suffice to show continuous orientation in the direction running around the crotch. This interpretation equates the word “continuous”, with respect to molecular

orientation around the crotch, to consisting of an indeterminate degree and direction of orientation. That is simply too broad and not a purposive interpretation, given the context of the '858 invention described and claimed.

[115] While I reject Dr. Choi's interpretation, his evidence can be given some weight with respect to the fact that any interpretation of “continuous orientation” must account for both the degree of orientation (the percentage of crystalline phase molecules in relation to the percentage of amorphous phase molecules) and the direction of orientation (the direction in which the lamellae are aligned).

[116] Dr. McGown was asked in cross-examination if there was a percentage of amorphous phase molecules in the crotch area which would indicate to him that there was no continuous orientation. He seemed to indicate that if there was more than 80 percent amorphous phase molecules in the crotch area, there would not be continuous orientation:

> MR. McDONALD: Yes. All right. And in your view, 50 percent is -- there's 50 percent amorphous phase at the crotch area, that does not cause discontinuity or interruption.
>
> MR. McGOWN: Not unless the amorphous material separated out from the macro molecules which are in the crystalline state.
>
> MR. McDONALD: Right. What if there was -- what if there was 60 percent amorphous? What if there was 70 percent amorphous? Is there a number of amorphous-phase molecules in the crotch area, at which point you'd say there is no continuity?
>
> MR. McGOWN: In this sort of situation, you're dealing in the range 20 to 80 percent, and we're around about the middle of that, 40 to 60, 70; I don't think you would find material in that portion of the product with mixtures much different from that.

[117] Dr. McGown was also asked in cross-examination about the direction of orientation, and could not provide a definite answer as to the percentage of the molecules that must be aligned in order for the orientation in the direction running around the crotch to be uninterrupted:

> MR. McDONALD: Right. And does this mean to you that the molecules in the crotch area must be oriented around the curve of the crotch?
>
> MR. McGOWN: Predominantly. If you like, I go back to my expression "mainly". This is not 100 percent orientation; this is the direction of the orientation to the degree to which it has been achieved.
>
> MR. McDONALD: Okay, I appreciate that. What I'm asking about is not a percentage of orientation, I'm asking about a direction. And the direction here, I want you to confirm, is that it must be oriented around the curve of the crotch?
>
> MR. McGOWN: In the same manner as the number, as I just described, the direction is predominantly around the semi-crystalline material. There will be some molecules which are not oriented because we cannot achieve 100 percent orientation, so the predominant orientation is around the crotch in the direction around the crotch.

[118] The language at issue, appearing in both claims 6 and 18, is excerpted here for convenience:

> …there is continuous orientation from the edge of one strand, around the crotch and to the edge of the adjacent strand.

[119] As outlined in both claims 6 and 18, "continuous orientation" is present from the edge of one strand, around the crotch and to the edge of the adjacent strand.

[120] I find that the term “continuous orientation” means, at the very least, that (1) a predominant amount or substantial percentage of the molecules around the crotch are oriented in a direction tangential to the curvature of the crotch, and (2) a predominant amount or substantial percentage of the molecules oriented around the crotch are in the crystalline phase.

IX. The Law – Principles of Obviousness and Infringement

A. *Obviousness*

[121] As outlined in subsection 43(2) of the *Patent Act*, RSC 1985, c P-4, a patent is presumed to be valid. The burden of proof rests on Enviro-Pro to establish the alleged obviousness of the claims of the '858 Patent on a balance of probabilities.

[122] The test for obviousness was outlined by the Supreme Court of Canada in *Apotex Inc v Sanofi-Synthelabo Canada Inc*, 2008 SCC 61 at paragraph 67 [*Sanofi*]:

> (1) (a) Identify the notional “person skilled in the art”;
>
> (b) Identify the relevant common general knowledge of that person;
>
> (2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it;
>
> (3) Identify what, if any, differences exist between the matter cited as forming part of the “state of the art” and the inventive concept of the claim or the claim as construed;
>
> (4) Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

[123] Prior to *Sanofi*, above, the definition of obviousness was set out in *Beloit Canada Ltd v Valmet Oy*, (1986), 64 NR 287, 8 CPR (3d) 289 (FCA) [*Beloit*], and involved considering whether the skilled person would have come directly and without difficulty to the solution taught by the patent in question.

[124] In *Sanofi*, the Court introduced at the fourth step the "obvious to try" test, where a court may consider whether the claimed invention was "obvious to try". Not every case will require an application of the "obvious to try" test; it may be appropriate in instances where the art in question encompasses advances made as a result of experimentation (*Sanofi*, at para 68).

[125] The Court in *Sanofi* provided a non-exhaustive list of factors to consider in determining whether the invention was "obvious to try" (*Sanofi*, at paras 69-70):

> [69] If an "obvious to try" test is warranted, the following factors should be taken into consideration at the fourth step of the obviousness inquiry. As with anticipation, this list is not exhaustive. The factors will apply in accordance with the evidence in each case.
>
> > 1. Is it more or less self-evident that what is being tried ought to work? Are there a finite number of identified predictable solutions known to persons skilled in the art?
> >
> > 2. What is the extent, nature and amount of effort required to achieve the invention? Are routine trials carried out or is the experimentation prolonged and arduous, such that the trials would not be considered routine?
> >
> > 3. Is there a motive provided in the prior art to find the solution the patent addresses?
>
> [70] Another important factor may arise from considering the actual course of conduct which culminated in the making of the invention. It is true that obviousness is largely concerned with how a skilled worker would have acted in the light of the prior art. But

> this is no reason to exclude evidence of the history of the invention, particularly where the knowledge of those involved in finding the invention is no lower than what would be expected of the skilled person.

[126] The "obvious to try" test is not meant to replace all previous inquiries, and other inquiries remain possible (*Bristol-Myers Squibb Canada Co v Teva Canada Limited*, 2017 FCA 76 at para 60 [*Atazanavir*]).

[127] As outlined in the recent decision of *Apotex Inc v Pfizer Canada Inc*, 2019 FCA 16 at paragraph 32, the "obvious to try" test must be approached with caution:

> [32] Following *Sanofi*, our Court in *Atazanavir* echoed the Supreme Court's consideration of obviousness by reiterating that the "obvious to try" test must be approached with caution as it remains one factor amongst many that may assist in the obviousness inquiry (*Atazanavir* at para. 38; *Sanofi* at paras. 64-65). Our Court in *Atazanavir* explained that the "obvious to try" test introduced by *Sanofi* had in no way displaced other tests, including the test set out in *Beloit*. Our Court expressly recalled that while the Supreme Court introduced the "obvious to try" test, it favours "an expansive and flexible approach that would include 'any secondary considerations that [will] prove instructive'" (*Atazanavir* at para. 61, referring to *Sanofi* at para. 63). As a result, a categorical approach to the obviousness inquiry and the elaboration of a "hard and fast rule" was specifically deemed inappropriate and rejected by our Court (*Atazanavir* at para. 62).

[128] When an expert is hired for the purpose of testifying, a court must be wary of his or her hindsight bias (*Bridgeview Manufacturing Inc v 931409 Alberta Ltd (Central Alberta Hay Centre)*, 2010 FCA 188 at para 50 [*Bridgeview*]). It is not fair for a person claiming to have invented a combination invention to break the combination down into its parts and find that,

because each part is well known, the combination is therefore obvious (*Bridgeview*, above at para 51).

[129] The obviousness inquiry should be undertaken on a claim-by-claim basis (*Zero Spill Systems (International) Inc v Heide*, 2015 FCA 115 at para 85). If an independent claim is found to not be obvious, then dependent claims therefrom cannot be obvious. In contrast, if an independent claim is held to be obvious, the Court must go on to consider each dependent claim for obviousness.

B. *Infringement*

[130] Under section 42 of the *Patent Act*, the patentee and their legal representatives have the exclusive right, privilege and liberty of making, constructing, and using the invention and selling it to others. Subsection 55(1) of the *Patent Act* provides that a person who infringes a patent is liable for all damages sustained by the patentee by reason of the infringement.

[131] The burden of proving infringement is on the party that alleges it (*Monsanto Canada Inc v Schmeiser*, 2004 SCC 34 at para 29).

[132] To determine whether any claim of a patent is infringed, a court must purposively construe the claims of the patent and then determine whether the allegedly infringing product falls within the scope of those claims (*Free World Trust*, at paras 48-49).

[133] In *Free World Trust*, at paragraph 31, the Court outlined the following propositions regarding infringement:

> (a) The *Patent Act* promotes adherence to the language of the claims.
>
> (b) Adherence to the language of the claims in turn promotes both fairness and predictability.
>
> (c) The claim language must, however, be read in an informed and purposive way.
>
> (d) The language of the claims thus construed defines the monopoly. There is no recourse to such vague notions as the "spirit of the invention" to expand it further.
>
> (e) The claims language will, on a purposive construction, show that some elements of the claimed invention are essential while others are non-essential. The identification of elements as essential or non-essential is made:
>
> > (i) on the basis of the common knowledge of the worker skilled in the art to which the patent relates;
> >
> > (ii) as of the date the patent is published;
> >
> > (iii) having regard to whether or not it was obvious to the skilled reader at the time the patent was published that a variant of a particular element would not make a difference to the way in which the invention works; or
> >
> > (iv) according to the intent of the inventor, expressed or inferred from the claims, that a particular element is essential irrespective of its practical effect;
> >
> > (v) without, however, resort to extrinsic evidence of the inventor's intention.
>
> (f) There is no infringement if an essential element is different or omitted. There may still be infringement, however, if non-essential elements are substituted or omitted.

[134] As stated above, in this case, the parties have agreed that all elements of the claims in issue are essential.

X. Anticipation and the Gillette Defence

[135] At trial, the Defendant abandoned anticipation as a validity attack, except to the extent that anticipation relates to the Gillette Defence. The Gillette Defence is made out when the alleged infringer can establish that the allegedly infringing product is based on the teachings of a prior art and therefore the alleged infringer is merely doing something that is already known (*Gillette Safety Razor Co v Anglo-American Trading Co Ltd* (1913), 30 RPR 465 (HL)).

[136] Enviro-Pro argues the Gillette Defence should apply because in manufacturing their Tri-Grid Products they simply followed the Wyckoff Patent. I disagree.

[137] The Wyckoff Patent repeatedly emphasizes that the orientation in the strands of the grid should not extend into the junction; the Tri-Grid product does just that. The language of the Wyckoff Patent repeatedly mentions the presence of undrawn junctions in the patented product. The importance of the undrawn junctions is emphasized in the language of column 2, lines 6-15 of the Wyckoff Patent, which states that the undrawn junctions prevent the patented product from tearing during use:

> In general, the reticulated structure or web of the present invention includes a plurality of ribs, at least certain of which are uniaxially oriented and separated from adjacent ribs by undrawn film areas. The oriented ribs possess maximum strength along the direction in which the molecules thereof are oriented, while the undrawn film areas between the ends of adjacent noncolinear ribs assist in confining the applied drawing forces to the intended ribs and serve to arrest forces which tend to tear the finished web during use.
>
> [Emphasis mine]

[138] The independent method claims in the Wyckoff Patent, in particular claims 14 and 16, which relate to biaxial stretching, also emphasize that the stretching should be conducted "without inducing stretching in the film portions between the ends of the adjacent ribs" (i.e. the crotches).

[139] This language leads a POSITA to understand, as is reasonably expressed by Dr. Choi in his first expert report, that stretching into the junctions "is discouraged in Wyckoff, as it seeks to have undrawn junctions". In contrast, the Tri-Grid Products do exhibit stretching into the junctions. Additionally, there is insufficient evidence before the Court to establish that the manufacturer for Enviro-Pro, TMP, actually followed the Wyckoff Patent so as to avoid possible infringement. Further consideration of the issue of infringement is discussed below.

[140] As a result, Enviro-Pro's argument with respect to the Gillette Defence fails.

XI. Obviousness

[141] The Defendant alleges that claims 6 and 18 of the '858 Patent were obvious to the POSITA as of the claim date of June 27, 2002, on the basis that the Mercer '631 Patent and the Wyckoff Patent together disclose all of the essential elements of claims 6 and 18, and thereby render claims 6 and 18 obvious.

[142] The Defendant submits that the inventive concept of the '858 Patent, and particularly claims 6 and 18, is the continuous molecular orientation in the direction running around the

crotch, applied to a triangular geometric polymer structure. The Plaintiffs submit that the inventive concept of the ‘858 Patent is a multiaxial geogrid with stiffness and strength in multiple directions and materials with nearly equal stiffness and strength in all radial directions.

[143] The Plaintiffs seek to limit the inventive concept of the ‘858 Patent to geogrids. However, one need only look at the title of the ‘858 Patent, “Geogrid or Mesh Structure”, to see that the inventive concept is defined in broader terms. This is supported by language in the ‘858 Patent on page 1, which states that “[t]he present invention relates in general to geogrids, though there is some applicability to mesh structures in general”.

[144] I find that the inventive concept of the ‘858 Patent is a triangular geometric polymer structure with continuous molecular orientation in the direction running around the crotch. Such a structure will have stiffness and strength in multiple directions and materials with nearly equal stiffness in all radial directions. While the predominant application and use for the ‘858 invention as disclosed does relate to geogrids, it is not as limited as is suggested by the Plaintiffs.

[145] The Defendant argues that there are no differences between the state of the art and the inventive concept as disclosed and claimed in the ‘858 Patent. First, the Mercer ‘631 Patent relates to the same field of endeavor as the invention claimed in the ‘858 Patent, and teaches continuously oriented crotches with the orientation in the direction running around the crotch. Indeed, language in the Mercer ‘631 Patent is extremely similar – “respective main and transverse strands being interconnected by continuously oriented crotches with the orientation in the direction running around the respective crotches”.

[146] Second, the Wyckoff Patent relates to the same field of endeavour as the ‘858 Patent, and teaches the use of a hexagonal array of holes in a polymer starting material to produce a multiaxial polymer structure with a triangular hole geometry.

[147] On this basis, the Defendant argues that the Mercer ‘631 Patent and the Wyckoff Patent together disclose all the essential elements in claim 6 of the ‘858 Patent. Specifically, the Wyckoff Patent discloses all of the essential elements of claim 6, with the exception of the emphasized text below:

> 6. A geogrid made by stretching and biaxially orienting a plastics starting material which was provided with an array of holes, the geogrid comprising:
>
> a first set of substantially straight oriented strands extending at an acute angle to a first direction;
>
> a second set of substantially straight oriented strands extending at an acute angle to the first direction and, as considered in a second direction at right angles to the first direction, alternate (angled) strands of the two sets being angled to the first direction by substantially equal and opposite angles;
>
> further substantially straight oriented strands extending in said second direction; and
>
> junctions each interconnecting four of the angled oriented strands and two of the further oriented strands, <u>at substantially each junction the crotch between each pair of adjacent strands being oriented in the direction running around the crotch, whereby there is continuous orientation from the edge of one strand, around the crotch and to the edge of the adjacent strand.</u>
>
> [Emphasis added]

[148] The Defendant submits that the limitation expressed in the emphasized text above is disclosed in the Mercer ‘631 Patent.

[149] Given the substantially similar language in claim 18 of the ‘858 Patent, the Defendant argues that together the Mercer ‘631 Patent and the Wyckoff Patent also render claim 18 obvious.

[150] I accept that the Mercer ‘631 Patent and the Wyckoff Patent together seem to disclose the essential elements of claims 6 and 18 of the ‘858 Patent. However, in this case there is a significant difference between the state of the art and the inventive concept disclosed and claimed in the ‘858 Patent. While the Wyckoff Patent teaches the use of a hexagonal array of holes in a polymer starting material to produce a multiaxial polymer structure with a triangular hole geometry, it also expressly teaches away from allowing orientation to extend into the crotches of the polymer structure. Similarly, while the Mercer ‘631 Patent teaches continuous orientation in the crotches occurring in the direction running around the crotch, it does so only in the context of a biaxial structure.

[151] The difference between the state of the art and the inventive concept in claim 6 of the ‘858 Patent is a triangular geometric polymer structure with continuous molecular orientation in the direction running around the crotch, resulting in a structure with stiffness and strength in multiple directions and materials with nearly equal stiffness in all radial directions.

[152] The question becomes whether this difference would have been obvious to the POSITA, or whether it required any degree of invention. In a matter such as this, where the art in question encompasses advances made as a result of experimentation, this question is best answered by an application of the “obvious to try” test outlined in *Sanofi,* at paragraphs 69-71.

[153] As an initial comment, I approach the testimony of Dr. Choi regarding obviousness with significant caution, and apply little if any weight to his position that claim 6 of the ‘858 Patent is obvious.

[154] Dr. Choi was provided with the Mercer Patents and the Wyckoff Patent, and he conducted no independent search of his own. While Dr. Choi stated on cross-examination that he reviewed the entirety of the patent, he did not say so in his report, and his analysis appears to ignore the disclosure. This is not the proper approach for an expert to take. As outlined by Justice Barnes in *Astrazeneca Canada Inc v Apotex Inc*, 2015 FC 322 at paragraph 231:

> [231] I have particular concerns about the approach Dr. Kibbe took to his assessment of the prior art. He did no independent prior art search and, instead, relied upon a set of documents produced by Apotex [p 4505]. An expert who carries out an obviousness analysis largely or solely on the strength of prior art references selected by retaining counsel runs a real risk of offering a hindsight opinion. A thorough prior art review necessarily includes a search for all of the available relevant literature whether it supports inventiveness or not. It requires consideration of relevant art in the larger context of other possible pathways to the patent solution or to ideas that point away from that solution.
>
> [Emphasis added]

[155] Dr. Choi provided exactly the sort of hindsight opinion that Justice Barnes warned against. He broke claims 6 and 18 into their components, and then searched for these components in the prior art that counsel for the Defendant provided him. This is evidenced in the following passage from Dr. Choi’s direct examination:

> MR. McDONALD: Dr. Choi, I'd like to have you explain to the Court your analysis on obviousness.

Now, this is at pages 6 and 7 of your report, which I know the Court has read, but could you just take us through your entire analysis, beginning with what you believe to be the inventive concept of the Walsh patent?

DR. CHOI: When I look at Claims 6 and 8 of the Walsh patent, I think the -- there are so-called two inventive concepts involved here.

The first one is about the orientation -- continuous orientations running from one strand around the crotch in the direction around the crotch and to the edge of the other -- the adjacent strand. This is the inventive concept of these claims.

The other one I look at is, okay, you start out with a hexagonal pattern, holes pattern in a plastic sheath, and after biaxial stretching, then you end up with a triangular grid. Those are the -- I would look at are inventive concepts.

And then -- and then I look at it, so I say what can I -- when I do a pattern search then I will find Mercer '631, '798 and also the Wyckoff, too, because those patterns also reference Wyckoff. So I would have -- I mean, back in 2004 I would have knowledge about -- common knowledge about this.

So then I -- okay. I said, well, I could -- the '631 pattern told me about the continuous orientation, so around the crotch, and then I -- when I see the Wyckoff Figure 9, Figure 10 in the Wyckoff patent, I said, "Wow, this is what I want that to generate, a triangular one that would have a better product that might withstand stress from different directions."

Then I said, "Well, how about I combine these two and do the process and then create a mass structure that is both, I'd say, the same as what Walsh patent is all about."

And so when I look at this, the so-called two inventive concepts involved in the Walsh patent, it's not that inventive because I could get the information from some previous prior art and as a common knowledge.

So I said, well, anyone who said, wow, would have a continuous oriented crotch is better, okay, and here's -- we have the starting holes pattern in the Wyckoff. I said, "Okay, so let me do this, and then I can create this triangular mass structures." That's how I looked at it, yeah.

[Emphasis added]

[156] The risks of hindsight bias are aptly stated by Justice Sharlow in *Apotex Inc v Bayer AG*, 2007 FCA 243 at paragraphs 24-25:

> [24] …The traditional warning about hindsight is found in *Beloit* (at page 295, per Hugessen J.A.):
>
> > Every invention is obvious after it has been made, and to no one more so than an expert in the field. Where the expert has been hired for the purpose of testifying, his infallible hindsight is even more suspect. It is so easy, once the teaching of a patent is known, to say, "I could have done that"; before the assertion can be given any weight, one must have a satisfactory answer to the question, "Why didn't you?"
>
> [25] This does not mean that the trier of fact is required as a matter of law to reject an expert's hindsight analysis. After all, the evidence of a party alleging invalidity for obviousness is necessarily based to some degree on hindsight because it is addressed to a hypothetical question about a point of time in the past. However, as a factual matter, an allegation of obviousness may be weakened if the evidence does not explain, directly or by inference, why the claimed invention was not discovered by others.

[157] Applying the "obvious to try" test outlined by the Court in *Sanofi,* I note that the fourth factor, the actual course of conduct, is inherently tied to the second factor, the extent, nature, and amount of effort required to achieve the invention. I will consider these two in combination.

[158] Considering the second and fourth factors, I find that significant effort was required to achieve the invention. The Court had the benefit of hearing from the inventor of the '858 Patent, Mr. Walsh, who described his lengthy process of experimentation, and the difficulty involved in developing a production process for a multiaxial geogrid. While an inventor's testimony will not always be available, and when available should not be determinative, in this case Mr. Walsh's

evidence supports the conclusion that significant effort would be, and was, required to achieve his invention, and that routine trials would not, and did not, suffice.

[159] Considering the first factor, I find that it was not more or less self-evident that what was being tried ought to work. Significant experimentation was required. Additionally, Dr. McGown, Mr. Briggs, and Mr. Walsh gave evidence that, despite the fact that the Wyckoff and Mercer Patents had been around for many years, up until Tensar's introduction of the '858 Patent research and development efforts in the geogrid industry were focused on making marginal improvements to the existing biaxial technology. Had the many benefits of a multiaxial product been self-evident, surely they would have been recognized and put into practice years earlier. Instead, it took an individual such as Mr. Walsh, with experience using multiaxial polymer products in other industries, months of experimentation to produce the '858 invention.

[160] Considering the third factor, I find that there was no motive in the prior art to find the solution that the patent addresses. While the Wyckoff Patent teaches the use of a hexagonal array of holes in a polymer starting material to produce a multiaxial polymer structure with a triangular hole geometry, it repeatedly emphasizes the importance of maintaining unoriented junctions and specifically teaches away from the inventive concept of the '858 invention.

[161] Additionally, Dr. McGown described how, in 1979, he was part of a multi-disciplinary research team, consisting of experts from academia, industry, and government, which examined both biaxial geogrids and the Wyckoff Patent, and concluded that the structures taught in the Wyckoff Patent were not suitable for the construction industry.

[162] While I recognize that the factors suggested in *Sanofi* are not exhaustive, I am satisfied upon review of the above factors that the difference between the state of the art and the inventive concept in claim 6 of the ‘858 Patent would not have been obvious to the POSITA. By the same logic, I find that claim 18 is not obvious.

[163] Given that broad, independent claims 6 and 18 are not obvious, the dependent claims thereon are also not obvious.

XII. Infringement

[164] The Plaintiffs submit that the Defendant’s Tri-Grid Products infringe product claims 6 to 8 and 11 to 13 of the ‘858 Patent, and that the Tri-Grid Products were made according to and in infringement of method claims 18 to 31 of the ‘858 Patent.

[165] The Plaintiffs put forward the evidence of Dr. McGown to establish infringement of claim 6 and the associated dependent claims. Dr. McGown relied upon two reports.

[166] First, Dr. McGown relied on “Report on Two Geogrid Structures”, dated January 26, 2017 [the University of Bristol Report], which was prepared by two researchers at the University of Bristol under the instruction of Dr. McGown. In the University of Bristol Report, the authors conducted a three-dimensional analysis of the size and shape of the junctions in the Tri-Grid Products and the TriAx Products, based on photographs of small pieces of each product.

[167] Second, Dr. McGown relied on the Tensar International Limited Report, dated November 6, 2015, which was conducted by Mr. Walsh in his capacity as an employee of Tensar. In the Tensar International Limited Report, Mr. Walsh (1) used a micrometer to measure the thickness at various points on a sample of the Tri-Grid Products, and (2) took photos of the sample using a scanning electron microscope (SEM).

[168] On the basis of this analysis, Dr. McGown concluded that the Tri-Grid Products infringed claims 6 to 8, 11, and 13 of the ‘858 Patent. Dr. McGown concluded that he could not know whether claim 12 was infringed, presumably due to a lack of knowledge regarding the production process used in manufacturing the Tri-Grid Products.

[169] For the reasons that follow, I find that the reports relied on by Dr. McGown fail to establish infringement of claim 6. As a result, the dependent product claims in suit, claims 7, 8, and 11 to 13, are also not infringed.

[170] Both experts agreed that a reduction in thickness indicates that stretching has occurred, and that where stretching has occurred there is some amount of molecular orientation. The Tensar International Limited Report shows a thickness reduction in the crotch of the Tri-Grid sample tested, and therefore that there is some orientation in the crotch of the Tri-Grid Products.

[171] What neither the Tensar International Limited Report nor the University of Bristol Report can establish is either the degree or direction of the orientation in the crotch of the Tri-Grid

Products. While a thickness reduction in an area of polymer may be used to infer that some stretching has occurred, and therefore that there is some degree of orientation, it does not establish the degree or direction of orientation. Similarly, the experts agreed that the SEM photograph analysis in the University of Bristol Report looked only at the surface-level features of the Tri-Grid sample, and therefore cannot establish the degree or direction of molecular orientation in the sample.

[172] As stated above, in order for there to be continuous molecular orientation around the crotch, it must be established that there is a predominant or substantial degree of uninterrupted molecular orientation around the crotch. There is no such evidence before the Court.

[173] To show infringement of claim 18 and the asserted dependent claims thereon, the Plaintiffs rely on the *Saccharin* doctrine, which states that a process patent can be infringed by the importation, and use and sale in Canada, of a product manufactured abroad by another person using the patented process (*Eli Lilly and Company v Apotex Inc*, 2010 FCA 240 at para 18).

[174] As a result of my conclusion regarding claim 6, the Plaintiffs have also failed to establish infringement of claim 18 and the dependent method claims, claims 19 to 31.

A. *Defendant's Evidence*

[175] In addition to the evidence put forward by the Plaintiffs, which fails to establish infringement on a balance of probabilities, the Defendant also put forward evidence which supports, albeit to a limited degree, a finding of non-infringement.

[176] Dr. Choi relied on two tests, a Differential Scanning Calorimetry test [the DSC test] and a Wide Angle X-Ray Scattering test [the WAXS test], which were conducted using a sample of the Tri-Grid Products. Dr. Choi also performed an Attenuated Total Reflectance Fourier Transform Infrared Spectroscopy test [the FTIR test]. However, due to irregular testing results, Dr. Choi did not draw any conclusions from the results of the FTIR test.

[177] Dr. Choi employed the DSC test to determine the form of unit cell present in the Tri-Grid sample as well as the degree of crystallinity. The DSC test uses the melting temperature of the crystalline phase of a polymer to determine the degree of crystallinity in that polymer at a particular location.

[178] The DSC test measured the degree of crystallinity in two samples taken from the crotch areas to be 51.5 percent and 53.6 percent, respectively. This indicated that there was almost 50 percent amorphous material in the crotch area. On this basis, Dr. Choi concluded that not all of the crystallites were oriented in the direction tangential to the curvature of the crotch, due to interruptions from the amorphous phase.

[179] Dr. Choi employed the WAXS test to determine the orientation of different crystalline planes within the crystalline phase. The WAXS test is conducted by directing an x-ray beam into the sample. The beam reacts to the molecules within the polymer and scatters in a direction; the degree of crystallinity in the sample affects the extent to which the beam is scattered.

[180] Dr. Choi stated that the WAXS test results show, based on the changes in the amount of scattering, that there are different degrees of crystallinity in the molecules around the crotch, as well as asymmetry in how the crystalline planes are directionally oriented around the crotch. On this basis, Dr. Choi concluded that the WAXS test demonstrated that the sample did not exhibit continuous molecular orientation in the direction running around the crotch.

[181] On the basis of these tests, Dr. Choi concluded that there was no continuous molecular orientation in the direction running around the crotch of the Tri-Grid sample.

[182] The Plaintiffs challenge the methodology employed by Dr. Choi because he failed to measure the degree of crystallinity in the starter sheet material used to manufacture the Tri-Grid sample. The experts agreed that that the degree of crystallinity may vary from one starter sheet to another. The Plaintiffs therefore argue that the failure to measure the degree of crystallinity in the starter sheet reduces the usefulness of Dr. Choi's approach.

[183] When questioned on this point in cross-examination, Dr. Choi stated that because he was measuring the relative amount of crystallites in the samples at different locations in relation to

the amount of crystallites at the junction of the sample, which was subjected to the least amount of stretching, he did not need to measure the condition of the starter sheet. I accept that Dr. Choi did not err by failing to measure the degree of crystallinity in the starter sheet.

[184] However, there is considerable uncertainty regarding the location of the subsamples employed by Dr. Choi, and this uncertainty significantly reduces the weight I can give to Dr. Choi's tests.

[185] Dr. Choi conducted both the DSC and WAXS tests using seven subsamples taken from varying locations on the Tri-Grid sample; two of the subsamples are depicted in the excerpt below from Figure 1 of Dr. Choi's first report:

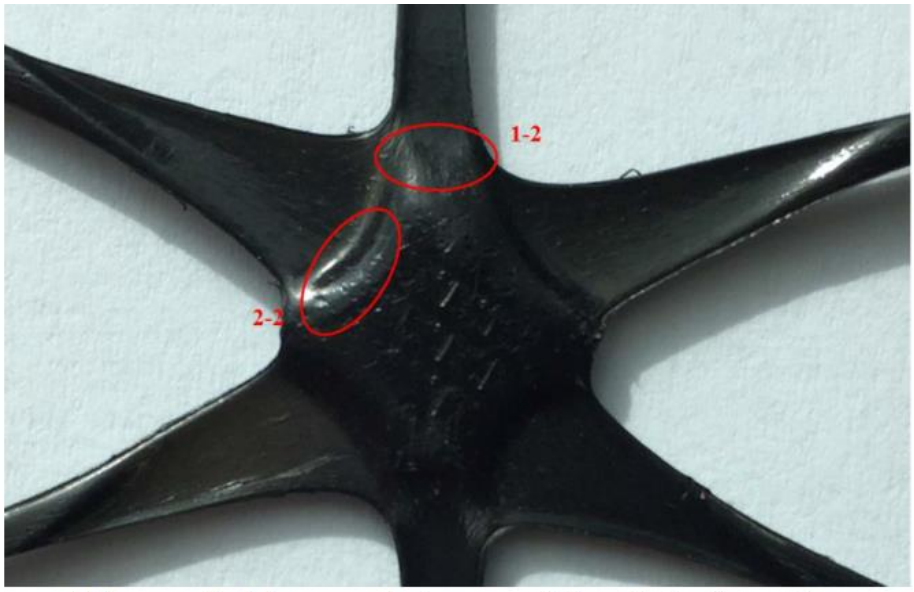


Figure 1. Nomenclatures of the Sub Samples

[186] In direct examination, Dr. Choi identified subsamples 1-2 and 2-2, shown above, as being taken from the crotch area of the sample. However, it was pointed out to Dr. Choi on cross-examination that in the above figure, the circle drawn to represent the 2-2 subsample does not cover any of the crotch area, and the circle drawn to represent the 1-2 subsample is largely drawn on an area that does not cover the crotch area.

[187] Dr. Choi responded by indicating that in preparing the report, the graduate student under his supervision had mistakenly drawn the circles in the wrong places. Dr. Choi indicated by way of a green highlighter the areas from which he and his research assistant had actually drawn the 1-2 and 2-2 subsamples. The highlighted areas drawn by Dr. Choi did cover the crotch area of the sample, although both highlighted areas also went well beyond the crotch area.

[188] As a result, there is significant uncertainty regarding the locations from where the subsamples tested by Dr. Choi were taken, and whether he was in fact testing subsamples from the crotch. Therefore his results should be given minimal weight. Nonetheless, the tests offer some limited additional support for the conclusion that the Tri-Grid Products do not exhibit continuous orientation in the direction running around the crotch.

XIII. Costs

[189] Given that I find there is no infringement of the claims in issue, costs are awarded to the Defendant and are to be assessed at the middle of Column IV of Tariff B.

JUDGMENT in T-1930-13

THIS COURT'S JUDGMENT is that:

1. Claims 6 to 8, 11 to 13, and 18 to 31 of the '858 Patent are not obvious and are valid;

2. Claims 6 to 8, 11 to 13, and 18 to 31 of the '858 Patent are not infringed by the Defendant;

3. Costs are awarded to the Defendant and are to be assessed at the middle of Column IV of Tariff B.

"Michael D. Manson"
Judge

FEDERAL COURT

SOLICITORS OF RECORD

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