Filed on behalf of: Kolon Industries, Inc.

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HS HYOSUNG ADVANCED MATERIALS CORP.,
Petitioner,
v.

KOLON INDUSTRIES, INC.,
Patent Owner.

Case IPR2025-00662
Patent 9,789,731

PATENT OWNER'S PRELIMINARY RESPONSE

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EXHIBIT LIST

Exhibit	Description
2001	RESERVED
2002	Civil Minutes – General, *Kolon Indus., Inc. v. HS Hyosung Advanced Materials Corp., et al.*, No. 8:24-cv-00415-JVS-JDE (C.D. Cal. Apr. 4, 2025), ECF No. 149
2003	Civil Minutes – General, *Kolon Indus., Inc. v. Hyosung Advanced Materials Corp., et al.*, No. 8:24-cv-00415-JVS-JDE (C.D. Cal. Aug. 21, 2024), ECF No. 68
2004	Proof of Service of Summons, Complaint, and related documents, *Kolon Indus., Inc. v. Hyosung Advanced Materials Corp., et al.*, No. 8:24-cv-00415-JVS-JDE (C.D. Cal. Mar. 5, 2024), ECF No. 15
2005	Hyosung Invalidation Trial Petition, dated Apr. 13, 2022 (original Korean document)
2006	Certified English translation of Hyosung Invalidation Trial Petition, dated Apr. 13, 2022
2007	RESERVED
2008	RESERVED
2009	Exhibit of Defendant Hyosung Advanced Materials Corp.'s Invalidity Contentions, *Kolon Indus., Inc. v. Hyosung Advanced Materials Corp., et al.*, No. 8:24-cv-00415-JVS-JDE (C.D. Cal. Mar. 17, 2025), ECF No. 146-7
2010	Patent L.R. 4-3 Joint Claim Construction and Prehearing Statement, *Kolon Indus., Inc. v. Hyosung Advanced Materials Corp., et al.*, No. 8:24-cv-00415-JVS-JDE (C.D. Cal. Feb. 20, 2025), ECF No. 133
2011	RESERVED
2012	RESERVED

Exhibit	Description
2013	RESERVED
2014	Letter from Kolon Industries, Inc. to Hyosung Advanced Materials, dated Feb. 4, 2021 (original Korean document)
2015	Certified English translation of Letter from Kolon Industries, Inc. to Hyosung Advanced Materials, dated Feb. 4, 2021 (certified English translation)
2016	RESERVED
2017	Declaration of Dr. David Brookstein in Support of Patent Owner's Preliminary Response ("Brookstein")
2018	*Curriculum Vitae* of David Brookstein, Sc.D.
2019	RESERVED
2020	B.C. Goswami, J.G. Martindale, F.L. Scardino, *Textile Yarns: Technology, Structure, and Applications* (1977) (excerpts)
2021–2027	RESERVED
2028	*HS Hyosung Advanced Materials Corp. v. Kolon Indus., Inc.*, IPR2025-00663 ('765 Patent), Paper 1 (Petition) (P.T.A.B. Feb. 27, 2025)
2029	Exhibit 1003 ([Corrected] Declaration of Jon Rust, Ph.D. in Support of Petition for Inter Partes Review of U.S. Patent No. 10,196,765) (Feb. 27, 2025), *HS Hyosung Advanced Materials Corp. v. Kolon Indus., Inc.*, IPR2025-00663
2030	*HS Hyosung Advanced Materials Corp. v. Kolon Indus., Inc.*, IPR2025-00664 ('663 Patent), Paper 1 (Petition) (P.T.A.B. Feb. 27, 2025)
2031	Exhibit 1003 ([Corrected] Declaration of Jon Rust, Ph.D. in Support of Petition for Inter Partes Review of U.S. Patent No. 9,617,663) (Feb. 27, 2025), *HS Hyosung Advanced Materials Corp. v. Kolon Indus., Inc.*, IPR2025-00664

Exhibit	Description
2032	U.S. Patent No. 6,799,618 B2 ("Reuter")
2033	U.S. Patent Application Publication No. 2014/0230947 A1 ("Zandiyeh")

I. Introduction

Patent Owner Kolon Industries, Inc. ("Patent Owner" or "Kolon") respectfully submits that the Board should deny institution of the *inter partes* review (IPR) of claims 1-7 of U.S. Patent No. 9,789,731 (the "'731 patent"). For at least the following reasons, the Petition fails to show a reasonable likelihood of prevailing as to any claim, and thus no IPR should be instituted.

First, Petitioner HS Hyosung Advanced Materials Corp. ("Petitioner" or "Hyosung") fails to cite, in any asserted Ground, a reference that discloses the claimed strength retention rate of 80% or more after a disc fatigue test is performed according to JIS-L 1017 method of Japanese Standard Association—a key limitation added to the independent claims during prosecution to overcome the prior art. Petitioner does not articulate any reasons that it would have been obvious to achieve this limitation either. Instead, Petitioner argues, without factual basis, that other strength tests in its cited prior art teach this limitation. Petitioner's allegations do not withstand even the slightest scrutiny: when comparing its cited tests to the claimed JIS-L 1017 disc fatigue test, it is facially apparent that the cited disclosures do not correspond to the claimed disc fatigue test. On this basis alone, Petitioner has failed to establish a reasonable likelihood of prevailing on any asserted Ground, and institution should therefore be denied.

Second, as to Grounds 1-3, Petitioner fails to establish a motivation to combine Tamura with Baldwin or Baek. Petitioner relies on references outside of its obviousness combination to support its motivation to combine arguments, but those references teach 3-ply cord—not the 2-ply cord the claims require—and thus fail to provide a motivation to combine Tamura with Baldwin or Baek to arrive at the claimed invention. For this additional reason, Petitioner has failed to establish a reasonable likelihood of prevailing on Grounds 1-3.

Third, none of Petitioner's prior art in Grounds 4-5 teaches 2-ply aramid and nylon hybrid fiber cord meeting the requirements of the independent claims. Instead, Petitioner's references relate to hybrid fiber cord having three or more plies, or hybrid fiber cords that do not meet the properties recited in the claims. Petitioner fails to identify any combination of prior art in Ground 4 that meets the expressly recited limitations of independent claims 1 and 4. For this reason as well, Petitioner has failed to establish a reasonable likelihood of prevailing on Grounds 4-5.

Because Petitioner has not established a reasonable likelihood of prevailing on any claim, the Board should deny institution.

II. Background

A. The '731 Patent (Ex.1001)

The '731 patent, entitled "Hybrid Fiber Cord and Method for Manufacturing the Same," issued on October 17, 2017, and claims priority to Korean Patent

Application KR 10-2012-0154933, filed December 27, 2012. Ex.1001, [30], [45], [54].

The '731 patent relates to 2-ply aramid and nylon hybrid fiber cord and a method for making it. The specification notes that improved vehicle performance and road conditions have brought about increased driving speeds, resulting in a need for tire cords capable of maintaining stability and durability of tires during high-speed driving. *Id.*, 1:27-42. The '731 patent acknowledges that nylon and aramid are major materials for previous tire cords for cap ply, but that each material individually has drawbacks. *Id.*, 1:43-67. Nylon tire cords result in flat spots and deformation in the tires, and aramid tire cords pose difficulty with tire molding. *Id.* To address problems with nylon- and aramid-only tire cords, Kolon and others tried to develop hybrid fiber cords, but prior art hybrid fiber cords had loop and shape non-uniformity, which made the properties of the hybrid fiber cords non-uniform and resulted in defective products. *Id.*, 2:37-39.

The '731 patent's advances include an improved 2-ply aramid and nylon hybrid fiber cord, and method of easily manufacturing it, that has more uniform physical properties than conventional hybrid fiber cord, and better strength and fatigue resistance than conventional hybrid fiber cord:

> An aspect of the present invention is to provide a hybrid fiber cord comprising a nylon filament and an aramid filament, which can be made more easily and has more uniform physical properties and better

> strength and fatigue resistance than the conventional hybrid fiber cords such that it can be used to make an ultra high performance tire.
>
> The other aspect of the present invention is to provide a method for easily manufacturing a hybrid fiber cord comprising a nylon filament and an aramid filament, which has more uniform physical properties and better strength and fatigue resistance than the conventional hybrid fiber cords such that it can be used to make an ultra high performance tire.

Id. 2:49-61.

B. Prosecution History (Ex.1002)

The application that ultimately became the '731 patent at first included nine claims. Claim 1 was the only independent apparatus claim, and recited:

> A hybrid fiber cord comprising:
> a nylon primarily-twisted yarn having a first twist number; and
> an aramid primarily-twisted yarn having a second twist number,
> wherein the first twist number is identical with the second twist number, and
> the nylon primarily-twisted yarn and aramid primarily-twisted yarn are secondarily-twisted together to have identical structures with each other.

Ex.1002, 603. Original dependent apparatus claims claimed a twist number range of 300-500 TPM (Claim 2); a breaking tenacity of 8.0 to 15.0 g/d, elongation at break of 7 to 15%, a strength retention rate of 80% or more after disc fatigue test performed

according to JIS-L 1017 method of Japanese Standard Association (Claim 4); and a dry heat shrinkage of 1.5 to 2.5% (Claim 5). *Id.*

Claim 6 was the only independent method claim, reciting:

> A method for manufacturing a hybrid fiber cord, the method comprising:
> a first step for primarily-twisting a nylon filament at a first twist number to produce a nylon primarily-twisted yarn;
> a second step for primarily-twisting an aramid filament at a second twist number to produce an aramid primarily-twisted yarn; and
> a third step for secondarily-twisting the nylon and aramid primarily twisted yarns together to produce a ply yarn in such a way that the nylon and aramid primarily-twisted yarns have identical structures with each other,
> wherein the first twist number is identical with the second twist number.

Id.

The examiner initially rejected then-pending claims 1-7 in a non-final office action as anticipated by Baldwin (U.S. Patent Application Publication No. 2009/090447, Ex.1007), and separately rejected claims 1 and 3-7 as anticipated by Le Clerc (U.S. Patent Application Publication No. 2014/0069563). The examiner asserted that Baldwin disclosed identical twist numbers falling within the claimed range, and asserted that the breaking tenacity, elongation at break, strength retention, and dry heat shrinkage claimed in the dependent claims were properties that resulted from following Baldwin's teachings:

> In regards to the breaking tenacity, elongation at break, strength retention, and dry heat shrinkage, these are all resultant properties of the specific materials in a specific orientation, all of which Baldwin teaches. Since the products are the same, the results would be the same. Baldwin also teaches the general method of performing the steps of twisting to result in the hybrid cord.

Id., 193. The examiner's reasoning was similar for Le Clerc. *Id.*, 193-94.

Patent Owner amended independent claims 1 and 6 to require twist numbers between 300 to 500 TPM, and that the first, second, and third twist numbers are identical with each other. *Id.*, 175-76. The examiner again rejected the claims, arguing this time that claims 1 and 3-6 were anticipated by each of Baldwin and Dehnert (U.S. Patent Application Publication No. 2004/0221937). *Id.*, 63-64. The examiner's Baldwin rejection reasoning remained the same, and the Examiner's reasoning for Dehnert was similar. *Id.*

In response to this final rejection, the applicant further amended independent claims 1 and 6 to require the secondarily-twisted yarn to have a strength retention rate of 80% or more after a disc fatigue test is performed according to JIS-L 1017 method of Japanese Standard Association and a dry heat shrinkage of 1.5 to 2.5%. *Id.*, 24-25. Patent Owner explained that neither Baldwin nor Dehnert taught or suggested these limitations and that these limitations were not properties that would result from following the references' teachings:

Applicant respectfully submits that Baldwin fails to teach or suggest a secondarily-twisted yarn coated with the adhesive that has a strength retention rate of 80% or more after a disc fatigue test is performed according to JIS-L 1017 method of Japanese Standard Association, and has a dry heat shrinkage of 1.5 to 2.5%, as recited in independent claims 1 and 6.

Specifically, **Baldwin discloses a shrinkage of 3.6%**, as illustrated in Fig. 10 above, and **Baldwin is silent as to a strength retention rate of the secondarily-twisted yarn**.

Additionally, the Office Action states that the claimed dry heat shrinkage and strength retention rate is a resultant property of the aramid and nylon yarns provided in the claimed orientation, which is taught by Baldwin. Applicant respectfully submits that the claimed dry heat shrinkage and strength retention rate is not solely a result of the materials used and their orientation, but is a result of the combination of the number of twists …, the weight ratio of the nylon primarily-twisted yarn to the aramid primarily-twisted yarn …, the particular aramid fiber and nylon fiber used …, the process impregnating the secondarily-twisted yarn with an adhesive solution …, the drying process … and the heat-treating process …. Therefore, **Applicant respectfully submits that one of ordinary skill in the art would recognize that the materials and twist numbers disclosed in Baldwin are not sufficient to disclose the claimed dry heat shrinkage and strength retention rate**. Accordingly, Baldwin fails to teach or suggest the limitations of independent claims 1 and 6.

…

> Applicant respectfully submits that Dehnert fails to teach or suggest a secondarily-twisted yarn coated with the adhesive has a strength retention rate of 80% or more after a disc fatigue test is performed according to JIS-L 1017 method of Japanese Standard Association, and has a dry heat shrinkage of 1.5 to 2.5%, as recited in independent claims 1 and 6.
>
> Specifically, **Dehnert merely discloses the residual strength after fatigue and forces of the cord at 2% and 6% elongation, without disclosing the claimed strength retention rate or dry heat shrink percentage** …. Accordingly, Dehnert fails to teach or suggest the limitations of independent claims 1 and 6.

Id., 29-31.[1]

In view of these amendments and arguments, the examiner allowed the claims. *Id.*, 11.

C. Person of Ordinary Skill in the Art

Solely for the purpose of this Preliminary Response, Patent Owner does not challenge Petitioner's proposed definition of a POSITA. *See* Pet. 19-20. Patent Owner's expert, Dr. Brookstein, exceeds Petitioner's proposed level of skill and accordingly possesses the qualifications and experience necessary to testify based

[1] Emphases added and internal quotation marks and citations omitted unless otherwise specified.

on the perspective of a POSITA. Brookstein (Ex.2017), ¶42. Patent Owner reserves the right to provide an alternative definition of a POSITA if an IPR is instituted.

D. Claim Construction

The prior art relied on in the Petition fails to disclose the subject matter of the challenged claims under any reasonable construction, including their plain meaning.[2]

III. Summary of Prior Art

A. Tamura (Ex.1006)

Tamura relates to reinforcement fabric for large-diameter rubber hose and focuses on the physical properties relevant to this application and the type of reinforcement fabric suitable for this application. Ex.1006, Abstract, [0009]-[0010]. Tamura explains that its "invention" is an improved "large-diameter rubber hose" with advantageous properties for hose manufacture and use:

> [T]he present invention provides a **large-diameter rubber hose** formed using vulcanized rubber reinforced by compounding fiber fabric and/or fiber cord, characterized in that the fiber fabric and/or

[2] Patent Owner reserves the right to advocate for claim constructions in the event the Board institutes review and to argue claim constructions, as appropriate, depending on the nature of the disputes that may be raised in other proceedings.

> fiber cord is composed of a composite fiber of aramid fiber and nylon fiber.
>
> …
>
> The large-diameter rubber hose of the present invention maintains sufficient adhesive strength between the rubber layer and the reinforcing material layer even after a long period of vulcanization and hardening, effectively preventing the rubber layer and the reinforcing material layer from peeling off during use, and furthermore, when a fluid is passed through the hose, the change in the hose diameter due to the pressure of the fluid is small …. In addition, since the composite fiber used in the present invention has high heat resistance, it is possible to shorten the vulcanization time by setting the vulcanization temperature high, thereby improving production efficiency.

Id., [0011]-[0012].

Tamura discloses certain properties of fiber reinforcement fabric relevant for hose reinforcements, including tensile force (N/piece) and elongation (%), and strength retention rate after buckling (%). *Id.*, [0033]-[0036], Table 1.

B. Baldwin (Ex.1007)

Baldwin, which was overcome during prosecution, as discussed above (Ex.1002, 28-31, 63-64), relates to a composite cable for use as reinforcement in an aircraft tire (Ex.1007, Abstract). Baldwin discloses composite cord having yarns with a certain linear density and a shrinkage of 3.6%. *Id.*, [0062], Table 10. Baldwin

provides preferred twist numbers for the aramid individually-twisted yarn, the nylon individually-twisted yarn, and the hybrid cord:

> Each aramid yarn is individually twisted in the Z direction. The twist may range from about 3 to about 16 tpi (twists/inch) [about 118 to about 630 TPM] in the Z direction, and more preferably about 6 to about 12 tpi [about 236 to about 472 TPM], and most preferably to about 10.7 tpi [421 TPM] in the Z direction.
>
> …
>
> The nylon 2 is individually twisted by a Z twist in the range of about 3 to about 16 [about 118 to about 630 TPM], more preferably from about 3 to about 7 [about 118 to about 276 TPM], and most preferably about 6.2 (tpi) [244 TPM]. The nylon and aramid yarns are plied together to form a cable with an S twist in the range of about 3 to about 16 tpi [about 118 to about 630 TPM], more particularly in the range of about 7 to about 10 [about 276 to about 394 TPM], and most preferably about 9.7 twists/inch [about 382 TPM].

Id., [0062]-[0063].

C. Baek (Ex.1008)

Baek, which Petitioner relies on as an alternative to Baldwin, relates to fiber cord having certain structural stability and adhesiveness qualities. Ex.1008, Abstract. Baek discloses 2-ply and 3-ply cords with specific twist number ranges:

> In the present invention, aramid ply of 500 to 2,000 denier and nylon ply of 500 to 2,000 denier can be applied, and the fiber cords of the present invention has a structure of two ply cord made by twisting

> on ply of aramid and one ply of nylon, three ply cord made by twisting one ply of aramid and two plies of nylon, or three ply cord made by twisting two plies of aramid and one ply of nylon. At this time, the desirable number of twists is 10 to 50 TPI (Twist Per Inch) [394 to 1,968 TPM].

Id., 4-2; *see also id.*, Table 1 (disclosing aramid cord and composite fiber cord twisted at 43 TPI [1,693 TPM]), Table 3 (disclosing aramid cord and composite fiber cord twisted at 35 TPI [1,378 TPM]).

D. Chung (Ex.1012)

Chung relates to 4- and 6-ply aramid and nylon hybrid tire cord. Ex.1012, Summary, Drawings 1-2; *id.*, 5. Chung explains how this 4- and 6-ply cord is twisted:

> The hybrid tire cord of the present invention comprises a step of performing a process of twisting nylon filaments and aramid filaments into a z-twist and an s-twist, immersing the twisted yarn obtained in an adhesive solution, and then drying and heat-treating it, and is characterized in that the nylon filament and the aramid filament are combined and then subjected to a z-twisted process at the same time, or the z-twist process is performed after they are combined.

Id., 6. The reported properties in Chung all relate to 4- and 6-ply hybrid tire cord. *Id.*, Embodiments 1-4, Tables 1-3; *id.*, 7-10.

E. Harikae (Ex.1013)

Harikae relates to a pneumatic radial tire having two fiber reinforcement layers: a shoulder cover layer and a center cover layer. Ex.1013, Abstract. The shoulder cover layer comprises 2-ply hybrid tire cord and the center cover layer comprises 3-ply hybrid tire cord. *Id.*, Table 1. Together, these cover layers provide support for a pneumatic radial tire. *Id.*

F. Yokokura (Ex.1014)

Yokokura relates to aramid-only tire cord. Ex.1014, Abstract. Yokokura explains that aramid-only cords are good for use in its disclosed pneumatic tires having reduced weight and improved durability. *Id.* Yokokura discloses properties for aramid-only tire cord and never mentions nylon, outside of two references when discussing background art. *Id.*, [0005], [0007], Table 1.

IV. Grounds 1-3: Petitioner Fails Show That Tamura In View Of Baldwin Or Baek Renders Obvious Claims 1 And 4

Petitioner alleges the combinations of Tamura and Baldwin or Tamura and Baek render the '731 patent's independent claims 1 and 4 obvious, citing Tamura for most claim limitations, and Baldwin or Baek as allegedly disclosing the identical structure requirement. Pet. 20. However, Tamura fails to disclose or render obvious the claimed strength retention rate recited in the independent claims—a key property identified in prosecution as missing from the prior art. *See supra* § II.B. Accordingly, Petitioner's Ground 1 arguments fail as to independent claims 1 and 4,

and thus Petitioner's Grounds 2 and 3 (which add other references) fail as to dependent claims 3 and 5.

A. Tamura does not disclose or suggest the claimed strength retention rate

Tamura does not disclose or render obvious at least the limitation of independent claims 1 and 4 that recites that the inventive hybrid fiber cord includes a "secondarily-twisted yarn" or "ply yarn" that, when "coated with the adhesive has a strength retention rate of 80% or more after a disc fatigue test is performed according to JIS-L 1017 method of Japanese Standard Association." Ex.1001, cls. 1, 4. The Petition labels this subject matter as limitations [1h] and 4[d]. Pet. 34, 40. Petitioner argues that Tamura discloses the claimed strength retention rate by pointing to Table 2 and paragraphs [0034]-[0035] of Tamura. *Id.* 34-37. Petitioner is plainly wrong. For several reasons, Tamura does not disclose or render obvious the claimed property.

Petitioner's first allegation relies on Table 2 of Tamura. *Id*. 34-35. But, as Petitioner's excerpt from Table 2 reveals, this table shows a "Strength retention rate **after buckling** (%)."

		Properties of heat-treated adhesive					
		Force (N/piece)	Elongation at breakage (%)	Dry heat shrinkage rate (%)	Strength (g/d)	Creep (%)	Strength retention rate after buckling (%)
Comparative Example	1	216	21.0	5.8	8.7	4.8	96
	2	216	17.7	6.1	7.3	1.9	87
Embodiment	1	325	10.5	2.5	12.0	0.5	90
	2	326	8.5	2.4	12.0	0.5	88
	3	328	10.0	2.6	12.1	0.6	91
	4	364	10.7	3.0	10.9	0.6	91
	5	390	11.5	3.2	9.9	1.0	90
	6	556	7.0	2.0	14.7	0.5	90

EX1006, TABLE 2 (excepted and color annotations added).

Pet. 35 (blue circle added by Patent Owner); Brookstein, ¶53. The claims, however, require a "strength retention rate of 80% or more after a ***disc fatigue test***" is performed—not a "buckling" test. *Compare* Ex.1001, cl. 1, *with* Ex.1006, [0034]-[0035], Table 2; *see* Brookstein, ¶53.

A disc fatigue test is a completely different test from a buckling test, which tests different properties. Brookstein, ¶54. A disc fatigue test involves evaluating the fatigue resistance of tire cords embedded in rubber blocks when subjected to repeated stretching and contracting rotations, while a buckling test involves evaluating resistance of a cord to buckling, which is a form of structural instability, when the cord undergoes repeated bending. *Id.* Petitioner and its expert, Dr. Rust, disregard this difference, misleadingly suggesting that the results for "Strength

retention rate after buckling" in Table 2 meet the claims' requirements. Ex.1007, Table 2. Petitioner asserts:

> Tamura discloses embodiments wherein the secondarily-twisted yarn coated with the adhesive has ***a strength retention rate of 80% or more and a dry heat shrinkage of 1.5-2.5%***.… As provided in TABLE 2 [above], embodiment 1 of Tamura includes a strength retention rate of 90% and a dry heat shrinkage of 2.5%; and embodiment 2 includes a strength retention rate of 88% and a dry heat shrinkage of 2.4%.

Pet. 34 (original emphasis). Dr. Rust repeats Petitioner's argument verbatim. Ex.1003, ¶102. But the "[s]trength retention rate after ***buckling***" in Tamura's Table 2 is not the "strength retention rate of 80% or more after a ***disc fatigue test***" that the claims require. *Id.*; Ex.1001, cls. 1, 4.

Petitioner's and Dr. Rust's omission of the claim language "after a disc fatigue test" is telling. They do not contend that a "[s]trength retention rate after buckling" has any relationship to a strength retention rate "after a disc fatigue test." Indeed, they do not even contend that a "[s]trength retention rate after buckling" above 80% renders a "strength retention rate of 80% or more after a disc fatigue test" obvious—let alone provide any rationale to support such a contention. Instead, they engage in more misdirection.

Petitioner turns to paragraphs [0034]-[0035] of Tamura to erroneously assert that "Tamura further explains that the disclosed strength retention rates were

determined ***after a disc fatigue test is performed according to JIS-L 1017 method of Japanese Standard Association*** …." Pet. 35 (original emphasis). Dr. Rust reiterates Petitioner's mistaken assertion verbatim. Ex.1003, ¶103. Petitioner's assertion is simply wrong. There is no mention of a disc fatigue test anywhere in Tamura's paragraphs [0034]-[0035]. Petitioner incorrectly treats Tamura's reference to performing other tests in accordance with JIS-L 1017 as disclosure of "a disc fatigue test … performed according to JIS-L 1017." Pet. 35. While Tamura refers to JIS-L 1017 to describe other types of tests in paragraph [0034]—tensile force, elongation, dry heat shrinkage, and creep—Tamura does not discuss any "disc fatigue test … performed according to JIS-L 1017" (Ex.1001, cls. 1, 4):

> Properties of heat-treated adhesive
>
> A reinforcing fiber fabric was immersed in an adhesive liquid (an aqueous solution of an epoxy compound and an RFL liquid), dried, and then heat-treated to prepare an adhesive heat-treated piece having 8% by mass of the adhesive liquid attached thereto. The adhesive heat-treated piece was evaluated by the following methods (1) to (4).
>
> (1) Tensile force (N/piece) and elongation (%)
>
> In accordance with JIS L1017, tests were carried out on one fiber cord at a gripping distance of 25 cm and a pulling speed of 30 cm/min, and the force and elongation at break were measured.
>
> (2) Dry heat shrinkage rate (%)

> According to JIS L1017 (Method B), the fiber cord with the yarn length accurately measured was left in a dryer set at 180°C for 30 minutes, then removed from the dryer and left for 30 minutes, after which the yarn length was measured and the dry heat shrinkage was calculated.
>
> (3) Strength (g/d)
>
> The force value measured in section (1) was converted from N units to g units, and was calculated by dividing by the total denier number of the fiber cord (0.9 d (denier) = 1.0 dt (decitex)).
>
> (4) Creep (%)
>
> In accordance with JIS L1017, the length of the fiber cord was accurately measured, and then a load of 0.88 cN/dt (for example, in the case of a structure in which two 1670 dt yarns are twisted together, 1670 x 2 x 0.88/100 = 29.4 N) was applied, and the yarn length was measured after leaving it at room temperature for 30 minutes, and the creep rate was calculated.

Ex.1006, [0034]. Tamura's paragraph [0035] refers to the "[s]trength retention rate after buckling" reported in Table 2—not a disc fatigue test—and does not refer to JIS-L 1017. *Id.*, [0035].

As Tamura's disclosure reflects, a reference to "JIS-L 1017" is by no means a reference to a "disc fatigue test" because many tests can be performed in accordance with this Japanese standard. JIS-L 1017 includes specifications for a wide range of tests besides a disc fatigue test including cord gauge, moisture percentage, fineness based on corrected mass, twist, breaking strength and

elongation, load at constant elongation, elongation percentage at constant load, resistance to incipient tension, strength after heating, dry-heat shrinkage, shrinkage stress in dry-heat condition, creep, water absorption, shrinkage after dipping in boiling water, dip pickup, solvent extract, fatigue strength by compression bending, and fatigue strength by extension-compression. Ex.1036, 6-28. It would have been readily apparent to a POSITA that JIS-L 1017 is simply a standard for a broad range of tests, and a reference to JIS-L 1017 provides no information about which particular test was used. Brookstein, ¶58.

Tamura, which discloses a long fabric reinforced rubber hose for transporting oil from tankers to port, focuses on properties relevant for these types of fabric reinforcement. Tamura is thus concerned with the percentage of the original strength that the fabric maintains after being bent many times, since a hose for transporting oil from tankers to port may be bent in use. *Id.*, ¶¶60-61. As Tamura describes, the "[s]trength retention rate after buckling" test involves dividing the strength of the fabric after bending it 200,000 times by its strength before bending, and multiplying by 100 to arrive at a percentage. Ex.1006, [0035]. Petitioner and Dr. Rust admit this, stating, "the reinforcing fiber fabric was subjected to a ***bending test***," where "the ***strength retention rate*** was calculated by dividing the strength ***after bending*** by the strength ***before bending***, multiplied by 100," showing the following equation:

$$\textbf{\textit{Strength Retention Rate}} = \frac{Strength\ after\ bending}{Strength\ before\ bending} x\ 100$$

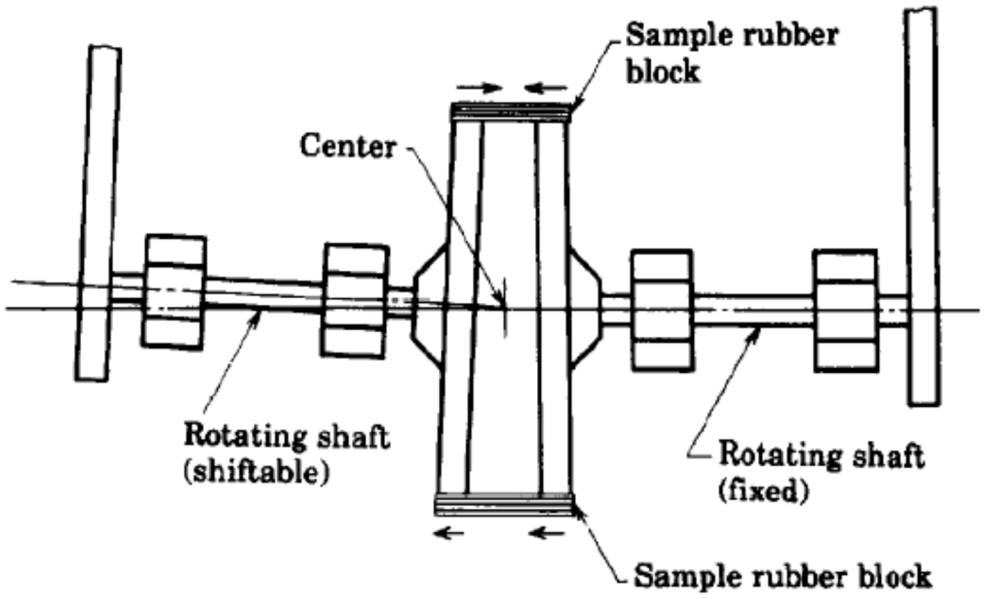
Pet. 36 (second bold/italics original emphasis; other emphases and annotations added); Ex.1003, ¶104 (same).

The '731 patent focuses on an entirely different type of strength retention property than Tamura because the '731 patent is directed to fiber cords that "can be used to make an ultra high performance tire." Ex.1001, Abstract, 1:6-14. Thus, the '731 patent is concerned with tire cord having "improved strength and fatigue resistance" when used in "the cap ply of the tire for high speed driving." *Id.*, 3:43-47; *see also id.*, Abstract. Unlike a hose that is subject to bending (i.e., static forces), a tire is subject to the dynamic stresses associated with driving. Brookstein, ¶¶62-63. Accordingly, the '731 patent discloses and claims improved fatigue resistance performance evaluated using a "disc fatigue test" that is entirely different from the bending test described in Tamura. Ex.1001, 9:49-10:32, cls. 1, 4; Brookstein, ¶¶62-63. Rather than bending the fiber cord as in Tamura's "bending test" (Ex.1006, [0035]), the disc fatigue test, as the '731 patent explains, involves "stretching and contracting" that occurs "while rotating the sample," where "the hybrid fiber cord and rubber were vulcanized together to produce [the] sample" (Ex.1001, 9:49-57).

As described in the standard itself, the claimed "disc fatigue test … performed according to JIS-L 1017 method of Japanese Standard Association" (*id.*, cls. 1, 4),

involves attaching the sample comprised of the hybrid fiber cord and rubber "on the periphery of 2 discs which have eccentric rotating shaft ax[e]s," as shown in the figure below:

Informative reference 1 Fig. 8. Disc-type fatiguing strength tester



Ex.1036, 28-29. This is an entirely different test than the than the bending test on which Petitioner and Dr. Rust rely, and the results of these disparate tests are by no means comparable. Brookstein, ¶64.

Accordingly, the fundamental assumption on which Petitioner's obviousness contentions rest—that "POSITA would have understood that the strength retention rates disclosed in TABLE 2 of Tamura (including the strength retention rates for embodiments 1 and 2) were determined ***after a disc fatigue test is performed according to JIS-L 1017 method of Japanese Standard Association***"—is

contradicted by the evidence. Pet. 37 (original emphasis). Petitioner's assertion is wrong because, as explained above, Tamura report results for a "bending test" (Ex.1006, [0035])—not a "disc fatigue test" (Ex.1001, cls. 1, 4).

Tamura thus does not disclose "a strength retention rate of 80% or more after a disc fatigue test is performed according to JIS-L 1017 method of Japanese Standard Association," as the independent claims require. Brookstein, ¶64. Indeed, there are enormous differences between Tamura's bending test and the claimed disc fatigue test. *Id.*, ¶¶65-67. As the '731 patent explains, the disc fatigue test involves subjecting the sample to "repeated … stretching and contracting steps for 8 hours at 80°C. while rotating the sample at 2500 rpm." Ex.1001, 9:52-57. This equates to 1.2 million stretching-contracting cycles at an elevated temperature. Brookstein, ¶66. By contrast, Tamura's bending test not only involves bending cycles, rather than stretching and contracting cycles, but also involves a far lower number of cycles (200,000). Ex.1006, [0035]; Brookstein, ¶66. Furthermore, Tamura does not disclose any elevated temperature for its test. *See* Ex.1006, [0035]; Brookstein, ¶66.

In addition, while the independent claims of the '731 patent require that the "secondarily-twisted yarn" or "ply yarn" "coated with the adhesive has a strength retention rate of 80% or more after a disc fatigue test is performed according to JIS-L 1017 method of Japanese Standard Association" (Ex.1001, cls. 1, 4), Tamura's bending test does not test the yarn itself. The sample in Tamura's bending test is a

"heat-treated adhesive strip" that was made by immersing a "reinforcing fiber ***fabric*** … in an adhesive liquid," where the fabric includes both the "fiber cords" and "a reinforcing fiber fabric" composed of "Polysonic" thread. Ex.1006, [0033]-[0035]; Brookstein, ¶69. Thus, the results in Table 2 were not obtained by testing aramid-nylon hybrid fiber cord, as the claim requires, but instead by testing a fabric that includes Polysonic thread. Brookstein, ¶69. This is another reason why the results in Tamura's Table 2 bear no relationship to the claimed properties. *Id.*

Petitioner does not argue that the results of the bending test in Tamura somehow would render the claimed "strength retention rate of 80% or more after a disc fatigue test is performed according to JIS-L 1017 method of Japanese Standard Association" property of the hybrid fiber cord obvious. Pet. 34-37. Nor does Dr. Rust present—let alone support—any such obviousness contention. Ex.1003, ¶¶102-105. Instead, Dr. Rust simply parrots Petitioner's incorrect assertion that the "strength retention rates" in Table 2 were determined using a disc fatigue test. *Id.*, ¶105. In any event, the results of Tamura's bending test for its fabric would not have been predictive of the results of the claimed disc fatigue test for the hybrid fiber cord, and a POSITA would not have considered the claimed "strength retention rate of 80% or more after a disc fatigue test is performed according to JIS-L 1017 method of Japanese Standard Association" obvious based on Tamura. Brookstein, ¶70.

Accordingly, Petitioner has failed to show a reasonable likelihood of establishing that Tamura discloses or renders obvious the limitations of either independent claim 1 or independent claim 4.

B. Petitioner failed to identify any reference that discloses the claimed strength retention rate, which was, in part, the reason the Examiner allowed the '731 patent during prosecution

Petitioner's only Ground 1 argument on the claimed strength retention rate is based on Tamura (Pet. 34-37), and as explained above, Tamura does not disclose this limitation. Further, as detailed above in the section summarizing the '731 patent's prosecution, the claimed strength retention rate was a key property identified by Patent Owner in distinguishing the prior art. That Petitioner attacks the same claim limitation that was a key distinction during prosecution without any new analysis or argument, and instead relies on another reference (Tamura), that is no better than the Baldwin reference distinguished during prosecution, reinforces Petitioner's failure to show a reasonable likelihood of success.

The '731 patent was allowed because, in part, Patent Owner pointed out that the references the examiner cited did not disclose or render obvious the claimed strength retention rate. *See* Ex.1002, 29-31 (Aug. 3, 2017 Office Action Response) (amending claims to add strength retention rate and dry heat shrinkage limitations and arguing "Baldwin fails to teach or suggest a secondarily-twisted yarn coated with the adhesive that has a strength retention rate of 80% or more after a disc fatigue

test is performed according to JIS-L 1017 method of Japanese Standard Association, and has a dry heat shrinkage of 1.5 to 2.5%, as recited in independent claims ….");
id., 11 (allowing the claims). Just as "Baldwin is silent as to the strength retention rate of the secondarily-twisted yarn," as claimed in the '731 patent, Tamura is (at best) equally silent about the claimed strength retention rate. *Id.*, 30.

Petitioner's failure to show that Tamura teaches (or suggests) a "strength retention rate of 80% or more after a disc fatigue test is performed according to JIS-L 1017 method of Japanese Standard Association," despite the importance of this limitation during prosecution, further supports that institution should be denied.

C. Petitioner failed to establish a motivation to combine Tamura with Baldwin or Baek to arrive at the claimed invention

Petitioner's Ground 1 also fails because Petitioner fails to show a reasonable likelihood of establishing that a POSITA would have been motivated to combine Tamura with Baldwin or Baek.[3]

First, Petitioner fails to show that a POSITA would have combined Tamura with Baldwin or Baek to achieve the claim requirements. Petitioner had to show "the reasons one of ordinary skill in the art would have been motivated to select the

[3] Petitioner's Ground 1 heading reads "Tamura in View of Baldwin **or** Baek" (Pet. 20), implying that Baldwin and Baek are alternatives, not that Petitioner proposes combining Tamura, Baldwin, **and** Baek together.

references and to combine them to render the claimed invention obvious." *In re Kahn*, 441 F.3d 977, 986 (Fed. Cir. 2006). The claimed invention requires "a 2-ply secondarily-twisted yarn consisting of 1-ply nylon primarily-twisted yarn and 1-ply aramid primarily-twisted yarn," where "the nylon primarily-twisted yarn and the aramid primarily-twisted yarn … have identical structures with each other in the hybrid fiber." Ex.1001, cls. 1, 4. Petitioner does not identify any evidence in Baldwin or Baek that would support combining either of their teachings with Tamura to achieve this claim limitation. Petitioner instead cites references other than Tamura, Baldwin, and Baek—i.e., Kerawalla and Westhoff—to contend that a POSITA would have been motivated to obtain "a balanced cord." Pet. 23-25.

Kerawalla and Westhoff, however, do not support a motivation to combine Tamura with Baldwin or Baek to achieve the "2-ply" aramid/nylon yarn that the claims require. Brookstein, ¶74. Petitioner's Kerawalla and Westhoff references describe **3-ply** hybrid fiber cords that are not composed of aramid and nylon. *See, e.g.*, Ex.1016, 2:21-24 ("**three ends** … of PPD-T yarn"); Ex.1017, 7:1-7 ("**three ends** of 1420 denier zero twist aramid type 2 yarn"). Indeed, consistent with Petitioner's tertiary references, the prior art taught the advantages of 3-ply or more hybrid fiber cords. Ex.2032 (Reuter), 5:4-16; Ex.2033 (Zandiyeh), [0009]. Thus, to the extent that a POSITA would have been motivated by Kerawalla's or Westhoff's teachings in combining Tamura with Baldwin or Baek, a POSITA would have been

motivated to create 3-ply cord—not the 2-ply cord that the claims require. Thus, Petitioner has failed to show a motivation to combine Tamura with Baldwin or Baek to achieve the claimed 2-ply hybrid fiber cord.

Second, Petitioner's motivation to combine arguments fail because Petitioner improperly picks and chooses, based on hindsight, specific aspects of the prior art to argue a motivation to combine, while disregarding others. *See Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1360 (Fed. Cir. 2017) ("we have held that it is error to fail to consider the entirety of the art" because "the prior art could contain one reference suggesting a combination and others critiquing or otherwise discouraging the same," and "[e]ven a single reference can include both types of statements"), *aff'd*, 950 F.3d 860 (Fed. Cir. 2020); *see also TQ Delta, LLC v. Cisco Sys., Inc.*, 942 F.3d 1352, 1360 (Fed. Cir. 2019) (rejecting expert testimony that "improperly 'relied on the [challenged] patent itself'" as a "roadmap") (original alteration).

As an example of Petitioner's picking and choosing, Petitioner cites Baldwin as alleging the "identical structures" limitation of the independent claims, relying on Baldwin's Figure 1 drawing and citations to caselaw. Pet. 32 (emphasis omitted). But the independent claims also require that the "twist number" of the nylon primarily-twisted yarn and aramid primarily-twisted yarn used to manufacture the cord are "identical," and Baldwin instructs a POSITA that its hybrid tire cord "**most**

preferably" has different first, second, and third twist numbers. Ex.1007, [0062]-[0063] (specifying about 10.7 twists per inch [421 TPM] is "most preferabl[e]" for the aramid yarn, about 6.2 twists per inch [244 TPM] is "most preferabl[e]" for the nylon yarn, and about 9.7 twists per inch [382 TPM] as "most preferabl[e]" for the hybrid yarn); Brookstein, ¶75. Moreover, both Baldwin and Baek teach twist numbers for manufacturing the cord outside the claimed "300 to 500 TPM" range (Ex.1001, cls. 1, 4): Baldwin teaches nylon at 6.2 twists per inch (244 TPM) (Ex.1007, [0062]-[0063]), and Baek teaches aramid and hybrid cord at 35 twists per inch (1,378 TPM) and 43 twists per inch (1,693 TPM) (Ex.1008, 4-2).

Third, Petitioner alleges a motivation to combine Tamura with Baldwin or Baek because "hybrid tire cords can be made faster and easier using direct cable machines, which operate at high speeds." Pet. 24. Petitioner cites Rowan (Ex.1015) and Fritsch (Ex.1023) to support this argument, where Rowan discusses a "balanced construction having a balanced configuration" and Fritsch discusses "constituent yarns" having a "twist number which is equal to … the twist number in the parent cabled cord." *Id.* But neither reference discusses the "identical structures" requirement of the claims, which is Petitioner's alleged basis for combining Tamura with Baldwin or Baek. Thus, Petitioner has failed to establish an adequate motivation to achieve the claimed invention on this basis.

Fourth, Petitioner asserts that "unbalanced[] cord constructions … often lead to uneven stress distribution within the tire and compromise tire performance," and "[a] POSITA would have appreciated that unbalanced cords have an internal torque that would add stress to the tire construction because the torque is a force attempting to untwist the cord [and] [a]s a result, with many torque forces acting together, the tire performance would be less stable." Pet. 24. Petitioner relies solely on Dr. Rust's *ipse dixit* testimony (Ex.1003, ¶77), which likewise fails to support its obviousness argument. *See Mirror Worlds Techs, LLC v. Meta Platforms, Inc.*, 122 F.4th 860, 875 (Fed. Cir. 2024) ("unsupported expert opinions do not create a genuine issue of material fact"); *K/S Himpp v. Hear-Wear Techs., LLC*, 751 F.3d 1362, 1366 (Fed. Cir. 2014) ("the Board cannot accept general conclusions about what is 'basic knowledge' or 'common sense' as a replacement for documentary evidence for core factual findings in a determination of patentability").

Furthermore, these statements are **directly contrary** to Petitioner's own statements in petitions challenging two of Patent Owner's other patents. For example, while Petitioner here criticizes unbalanced tire cords, in IPR2025-00664, challenging Patent Owner's U.S. Patent No. 9,617,663, Petitioner and Dr. Rust take a diametrically opposed position. There, Petitioner and Dr. Rust argue a motivation to combine, citing an alleged "**improvement with unbalanced configurations** …." *See* Ex.2030 (IPR2025-00664, Petition), 26; *see also id.*, 2 (contending that

"creat[ing] an **'unbalanced' tire cord**" will **"result[] in improved physical properties**"), 16 ("Fritsch's inventors discovered that 'modulat[ing] the tension on the individual plies' [during manufacturing] can result in an **'unbalanced configuration'** where one yarn is longer than the other when untwisted [and] [t]his **results in a cord with 'greater tensile strength retention**.'"), 29 (same as 26); Ex.2031 (IPR2025-00664, Ex.1003 (Rust Decl.)), ¶¶ 69, 96 (same). Petitioner makes similar contrary arguments in IPR2025-00663, challenging Patent Owner's U.S. Patent No. 10,196,765. *See, e.g.*, Ex.2028 (IPR2025-00663, Petition), 1-2 (contending that "creat[ing] an **'unbalanced' tire cord**" "**result[s] in improved physical properties**"), 23 (stating that a POSITA would have expected that "applying an **unbalanced configuration of hybrid cord** … [would] **yield the predictable result of improving the physical properties** of [a balanced tire] cord"); Ex.2029 (IPR2025-00663, Ex.1003 (Rust Decl.)), ¶¶ 80, 82, 87, 89, 95 (same). Petitioner's hindsight-biased approach, arguing that a POSITA would have been motivated to avoid an unbalanced configuration in this proceeding while simultaneously contending that a POSITA would have been motivated to implement an unbalanced configurations in other proceedings, cannot be reconciled, and further highlights the result-oriented, hindsight-biased nature of Petitioner's motivation to combine arguments.

Fifth, Petitioner's motivation to combine arguments conclude by incorrectly contending "Tamura, Baldwin, and Baek are analogous to each other and to the '731 patent. Each teaches a tire cord comprising a twisted aramid yarn and a twisted nylon yarn that are twisted together to form a hybrid cord." Pet. 25. Contrary to Petitioner's statement, Tamura is directed to large hoses and does not mention tires at all. *See generally* Ex.1006. Thus, one of the fundamental assumptions that Petitioner relies on is contradicted by the record and cannot support obviousness. *Adidas AG v. Nike, Inc.*, 963 F.3d 1355, 1359 (Fed. Cir. 2020) (affirming Board's finding of no motivation to combine, noting that "[f]undamental differences between the references are central to this motivation to combine inquiry"), *cert. denied*, 141 S. Ct. 1376 (2021).

For these additional reasons, Petitioner's Grounds 1-3 do not show a reasonable likelihood of prevailing as to the challenged claims.

D. Petitioner's Ground 1 analysis fails to show that the "nylon primarily-twisted yarn and the aramid primarily-twisted yarn … have identical structures with each other in the hybrid fiber"

Limitation 1[e] of claim 1 recites, among other things, "the nylon primarily-twisted yarn and the aramid primarily-twisted yarn are secondarily-twisted together at a third twist number which is identical with the first and second twist numbers and have identical structures with each other in the hybrid fiber." Ex.1001, cl. 1.

Claim 4 recites similar language in limitation 4[c]. *Id.*, cl. 4. Petitioner's Ground 1 analysis does not show that its prior art discloses or renders obvious this limitation.

First, Petitioner contends Tamura discloses that the nylon and aramid yarns "have identical structures with each other in the hybrid fiber," based on its conclusion that "Tamura … discloses a third step for secondarily-twisting the nylon and aramid primarily-twisted yarns together at a third twist number that is identical to the first and second twist number." Pet. 31. But the requirement that the "third twist number" be "identical with the first and second twist numbers" is distinct from the "identical structures" requirement. The twist number relationship between the individual plies and the hybrid cord alone does not determine the structure of the cord itself. *See* Ex.1001, 2:24-29, Fig. 1 (discussing the conventional method that resulted in hybrid cord with the nylon primarily-twisted yarn covered by the aramid primarily-twisted yarn, regardless of twist number). Petitioner's attempt to equate the same disclosure in Tamura to two separate claim requirements is improper. *See, e.g.*, *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999) (finding it improper to map same prior art element on multiple distinct claim elements).

Second, as an alternative, Petitioner points to "the figures provided in Baldwin and Baek" and summarily contends that a "POSITA would have understood the figures" to disclose this feature. Pet. 32. Petitioner cites only case law and its expert, who does nothing but parrot the Petition's statements; accordingly, his testimony is

due little or no weight. *See Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15-17 (P.T.A.B. Aug. 24, 2022) (precedential); *Tiktok Inc. v. NTECH Props., Inc.*, IPR2024-01339, Paper 9 at 16 (P.T.A.B. Feb. 25, 2025); *Facebook, Inc. v. Windy City Innovations, LLC*, 973 F.3d 1321, 1340-41 (Fed. Cir. 2020).

For these additional reasons, Petitioner's Tamura-based Grounds do not show a reasonable likelihood of prevailing sufficient to merit institution.

V. Ground 4: Petitioner Fails To Demonstrate That Chung In View Of Harikae And Further In View Of Yokokura Renders Obvious Claims 1-4 And 6-7

Petitioner argues that Chung in view of Harikae and Yokokura renders obvious claims 1-4 and 6-7 of the '731 patent. Pet. 62-81. Petitioner's arguments fail. In particular, none of Chung, Harikae, nor Yokokura are directed to 2-ply aramid and nylon hybrid fiber cord—as the claims require—and none of Petitioner's references disclose or suggest the claimed strength retention rate of 80% or more after a JIS-L 1017 disc fatigue test. Petitioner therefore has failed to show a reasonable likelihood of establishing that this combination of references renders the '731 patent claims obvious.

A. Chung fails to disclose multiple limitations of the challenged independent claims

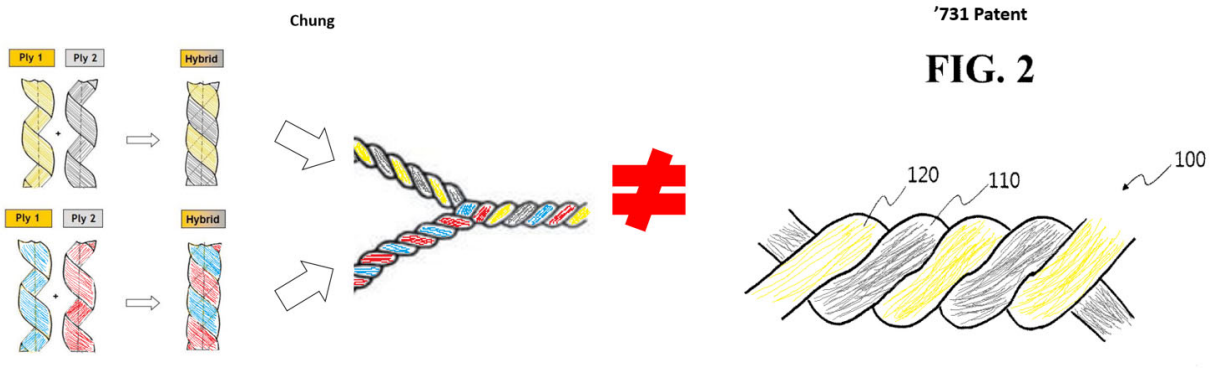
Petitioner relies solely on Chung as allegedly teaching (1) "a nylon primarily-twisted yarn having a first twist number of 300 to 500 TPM" (limitation 1[a], which corresponds to limitation 4[a]) (Pet. 63, 79), and (2) "2-ply secondarily-twisted yarn

consisting of 1-ply nylon primarily-twisted yarn and 1-ply aramid primarily-twisted yarn" (limitation 1[f], which corresponds to limitation 4[f]) (*id.* 72-73, 80). However, as explained below, Chung fails to disclose or suggest these claim limitations.

First, although limitations [1a] and 4[a] require "a nylon primarily-twisted yarn having a first twist number of 300 to 500 TPM," Petitioner erroneously relies on a twist number for the hybrid tire cord (i.e., the secondary twist), rather than a twist number for the nylon yarn. *Id.* 63. Chung discloses that the "twist count ***of the hybrid tire cord*** follows the fineness of nylon," so, "[f]or example, when the total fineness of the nylon filament is 840 denier, the appropriate twist count is 470 TPM (Twister Per Meter)." Ex.1012, 6. Petitioner mistakenly concludes that, since "the nylon filament" and "twist count" are mentioned in the same sentence, that the twist count applies to the nylon filament, but Chung makes clear that it is describing the twist count "of the hybrid tire cord" based on the "fineness" of the nylon filament. Pet. 63 (quoting Ex.1012, 5). Dr. Rust does the same. Ex.1003, ¶145. This disclosure in Chung, however, says nothing about the twisting or twist count of the nylon filament. Brookstein, ¶92. On at least this basis, Petitioner has failed to show a reasonable likelihood of prevailing on its Chung-based grounds (Grounds 4-5).

Second, Petitioner fails to show that Chung discloses "a 2-ply secondarily-twisted yarn consisting of 1-ply nylon primarily-twisted yarn and 1-ply aramid primarily-twisted yarn," as limitations 1[f] and 4[f] require. Petitioner's summary

of Chung cites Chung's claim 8, which makes this clear. Chung's "method of making the hybrid tire cord" first includes "**combining** nylon filaments and aramid filaments ***and then*** twisting them to produce a z-twisted yarn," and then "twisting **2 to 3 strands** of the [combined] z-twisted yarn to produce an s-twisted yarn." Pet. 56 (quoting Ex.1012, cl. 8). Chung's process, where nylon and aramid filaments are combined and z-twisted, and then multiple combined z-twisted yarns are s-twisted, does not produce a "2-ply secondarily-twisted yarn consisting of 1-ply of nylon primarily-twisted yarn and 1-ply of aramid primarily-twisted yarn," as claimed in the '731 patent. Instead, Chung's process creates **4-ply** and **6-ply** hybrid fiber cord comprising two or three strands of combined aramid/nylon filaments secondarily twisted together. Ex.1012, Table 1 (stating twisting method as "[c]ombining before twisting"); *see also id.*, Summary, 4, 7 (Embodiments 1-4), Drawings 1-4; Brookstein, ¶94. Below is a side-by-side comparison showing the difference between Chung's 4-ply hybrid fiber cord (adapted from the figure appearing at Pet. 15), and the claims of the '731 patent directed to 2-ply hybrid fiber cord (from Fig. 2 in the '731 patent).

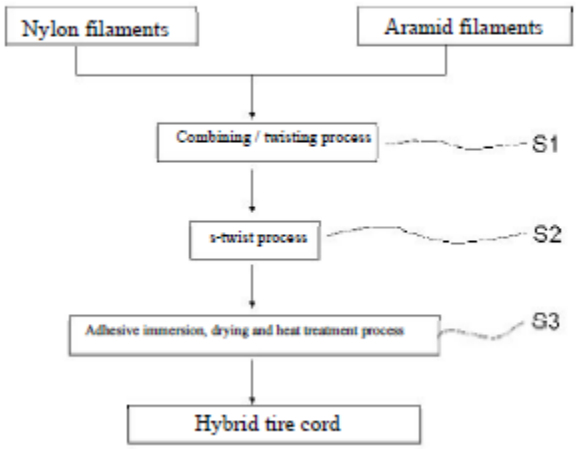


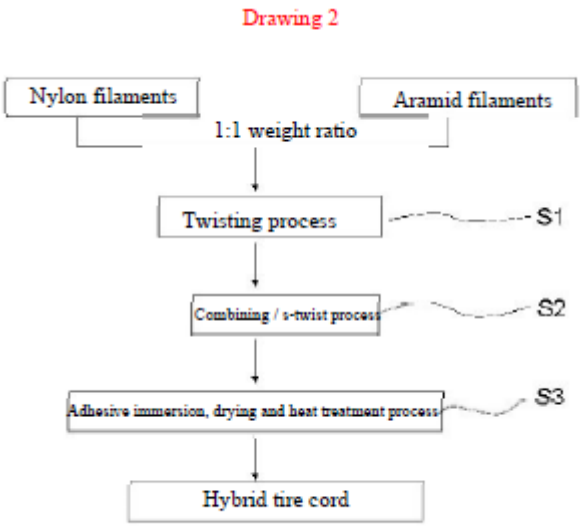
Pet. 15; Ex.1001, Fig. 2 (annotated); Brookstein, ¶94. A POSITA would have recognized that such a 4-ply cord in Chung is not the 2-ply cord recited in the '731 patent's claims. Brookstein, ¶94.

Petitioner's argument appears to be based on its misapprehension that Chung refers to z-twisted nylon yarn and z-twisted aramid yarn as separate "strands." Pet. 56, 73-74. This is wrong: the "strand" in Chung is nylon yarn and aramid yarn combined, and that combined strand is then z-twisted. Ex.1012, Summary, 5-6, 7-8 (Embodiments 1-4), Drawings 1-4, Table 1; Brookstein, ¶95. These strands composed of nylon and aramid yarns are then twisted with one or two additional strands to create the 4-ply and 6-ply s-twisted hybrid tire cord. Brookstein, ¶95. As Chung explains throughout: "The present invention relates to a hybrid tire cord and a method for manufacturing the same, and more particularly, to a hybrid tire cord in which *nylon filaments and aramid filaments are combined* at a weight ratio of 10:90 to 90:10 *and then formed into 2 or 3 plies* at a weight ratio of 2:1 to 1:2 …."). Ex.1012, Summary; *see also id.*, 7 (Embodiments 1-4) ("Nylon 66 filaments and p-

aramid (Kevlar) filaments … were *passed through a guide,* ***combined****, and then twisted to produce a z-twisted yarn*. *The above two strands of z-twisted yarn were subject to a twisting process* so that the twist count became 360 TPM, *thereby manufacturing the s-twisted yarn*."), Drawings 1-2 (showing nylon and aramid filaments combined and twisted in the first twisting process, then these aggregated nylon and aramid filaments further combined in the "combining / s-twist process"), Table 1 (stating twisting method as "[c]ombining before twisting"), cl. 8 ("a) *combining nylon filaments and aramid filaments and then twisting them to produce a z-twisted yarn*; b) *twisting 2 to 3 strands of the z-twisted yarn to produce an s-twisted yarn*; …."); *see also id.*, 10-11 (below).

Drawing 1





Brookstein, ¶95.

Thus, Chung's process results in a 4-ply or 6-ply hybrid fiber cord—not the 2-ply cord claimed in the '731 patent. A POSITA would have also recognized that the properties of Chung's 4- and 6-ply cords would not reflect properties of 2-ply hybrid fiber cord (e.g., dry heat shrinkage), as claimed by the '731 patent. *Id.*, ¶96.

Although Petitioner points to comparative examples 3 and 4 in its analysis of this limitation (*see* Pet. 72-73), Chung does not elaborate on the process by which these comparative examples were formed. In any event, a POSITA would have recognized that these examples expressly teach away from pursuing a 2-ply cord. *See Ricoh Co. v. Quanta Comput. Inc.*, 550 F.3d 1325, 1332 (Fed. Cir. 2008) (per curiam) (a "reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken

by the applicant"); Brookstein, ¶97. Table 3 of Chung states that the physical properties of Comparative Example 3 and 4 were "Immeasurable." Ex.1012, 9. These examples also had "twisting defects" and the "Quality of the yarn" was defective. *Id.* Chung also states that producing these cords "resulted in a deterioration in the quality of the yarn and twisting defects." *Id.*, 10. Petitioner's hindsight-biased picking-and-choosing of the Table 2 portion of Chung, while ignoring the portions of the reference (e.g., Table 3), that expressly **discourage** a POSITA from following these teachings, cannot establish obviousness of this limitation or the claims as a whole. *In re Enhanced Sec. Rsch., LLC*, 739 F.3d 1347, 1355 (Fed. Cir. 2014) (It is impermissible to "stitch together an obviousness finding from discrete portions of prior art references without considering the references as a whole.").

Petitioner's selective plucking of isolated disclosures in Chung is problematic for another reason. To allege disclosure of limitation [1f], Petitioner relies solely on Chung's comparative examples 3 and 4. *See* Pet. 72-73. But to allege disclosure of the claimed "dry heat shrinkage" rate in limitation [1h], Petitioner abandons reliance on Chung's Comparative Examples 3 and 4, ostensibly because Chung **could not measure** the dry heat shrinkage of those examples: Table 3 states that the dry heat shrinkage quality of those examples was "**Immeasurable**." Ex.1012, 9. Thus, even if Chung's Comparative Examples 3 and 4 disclosed the claimed "2-ply secondarily-

twisted yarn" in limitation [1f] (and they do not), Petitioner cannot establish that this "secondarily-twisted yarn" "has a dry heat shrinkage of 1.5-2.5%" as required by limitation [1h], and thus cannot show obviousness of the claims.

Accordingly, Petitioner has failed to show a reasonable likelihood of prevailing on Grounds 4-5 because Petitioner has failed to show that Chung teaches (1) "a nylon primarily-twisted yarn having a first twist number of 300 to 500 TPM" (limitation 1[a], which corresponds to limitation 4[a]) and (2) "2-ply secondarily-twisted yarn consisting of 1-ply nylon primarily-twisted yarn and 1-ply aramid primarily-twisted yarn" (limitation 1[f], which corresponds to limitation 4[f]).

B. Petitioner's combination fails to teach or suggest the claimed strength retention rate

On top of the above failures, Petitioner fails to show that its combination renders obvious the requirement in claims 1 and 4 that the "secondarily-twisted yarn coated with the adhesive has a strength retention rate of 80% or more after a disc fatigue test is performed according to JIS-L 1017 method of Japanese Standard Association" (limitations 1[h] and 4[d]). Ex.1001, cls. 1, 4. Petitioner asserts, "[t]o the extent Patent Owner argues that Chung does not teach that the secondarily-twisted (i.e., s-twisted) yarn has a strength retention rate of 80% or more after a disc fatigue test is performed according to JIS-L 1017 method of Japanese Standard Association, Yokokura discloses this limitation." Pet. 75. But Petitioner offers no evidence or argument at all to support that Chung teaches this limitation. *Id.* Chung

does not. Chung does not mention any disc fatigue test, or JIS-L 1017. Brookstein, ¶101. And Petitioner's reliance on Yokokura for this limitation fails too.

To begin with, Yokokura does not address the strength of a hybrid fiber cord composed of aramid and nylon, as the claims require. *Id.*, ¶102. Instead, as Petitioner admits, Yokokura addresses cords composed only of aramid—"reinforcement cords being para-aramid cords." Pet. 75 (quoting Ex.1014,[4] Abstract). Petitioner relies on the results for Examples 3-1 to 3-4 in Table 5. Those Examples all involved various aramid-only cords, as set forth at the top of Table 5, which Petitioner omits:

TABLE 5

	Comparative Example 3	Example 3-1	Example 3-2	Example 3-3	Example 3-4
Cap/Layer material	Aramid A	Aramid 1	Aramid 2	Aramid 3	Aramid 4
Cord structure (dtex)	1670/2	1670/2	1100/3	1670/2	1100/3
Embedding number (number/50 mm)	50	50	50	50	50
Modulus of elasticity E (cN/dtex) at 25° C. under a load of 49 N	299	200	231	184	296
Tensile strength T (cN/dtex)	13.7	15.1	17.4	14.4	17.6

[4] The Petition cites to Dr. Rust's *curriculum vitae*, "EX1004," but likely meant to cite to Yokokura, Ex.1014. Pet. 75.

Ex.1014, Table 5 (annotated); *see also id.*, [0076]. Indeed, Yokokura makes clear that "the sample tires according to the examples" "shown in Table 5 above" each had a "belt-reinforcement layer" that "was constituted of ***para-aramid cords***." *Id.*, [0088]. Thus, Yokokura provides no information about any strength retention rate for the aramid/nylon hybrid fiber cord the claims require. Brookstein, ¶¶102-103. While Petitioner admits that Yokokura addresses aramid-only cord, Petitioner does not address how, if at all, Petitioner contends this is relevant to the claimed hybrid fiber cord. Pet. 75-77. It is not. Brookstein, ¶¶102-103.

Moreover, Yokokura describes a different test from the claimed disc fatigue test, and Petitioner offers no basis to compare the results of Yokokura's test to those that would have been obtained using the claimed disc fatigue test. Yokokura discloses a "Driving Test on a Drum" that includes creating sample tires pressurized at room temperature and subjecting the sample tire to "a load as twice heavy as the load specified" by JIS-L 1017. Ex.1014, [0062]-[0063]. The tires are then "allowed to wheel at 60 km/h on a drum having a diameter of approximately 3 m until the travel distance reached 20,000 km." *Id.* Finally, after the driving test, the strength is measured according to JIS-L 1017. *Id.*, [0064].

Yokokura's "Driving Test on a Drum" is entirely different from the JIS-L 1017 disc fatigue test that the '731 patent claims require. The JIS-L 1017 disc fatigue test does not use a tire on a drum; it does not involve driving on a surface

(which is unspecified in Yokokura). Instead, the JIS-L 1017 disc fatigue test uses a "rubber block … on the periphery of 2 discs." Ex.1036, 28. The '731 patent specifies that the disc fatigue test is performed at an elevated temperature of 80°C, but there is no evidence that Yokokura's "Driving Test on a Drum" is performed at an elevated temperature. Ex.1001, 9:52-57. The '731 patent further specifies that the sample is "rotat[ed]" "at 2500 rpm." *Id.* In Yokokura's "Driving Test on a Drum," no sample is being rotated, and the tire containing the hybrid tire cord is spinning at a little over 100 rpm (60 km/h, or 1,000 m/minute divided by the circumference of the tire, which is 3π m (~9.14 m)). Brookstein, ¶106.

There is no apparent relationship between the results of Yokokura's "Driving Test on a Drum" and the claimed "strength retention rate of 80% or more after a disc fatigue test is performed according to JIS-L 1017 method of Japanese Standard Association." *Id.*, ¶107. Indeed, Petitioner and Dr. Rust identify none. Instead, they conflate the claimed disc fatigue test with Yokokura's "Driving Test on a Drum" and rely on the results of Yokokura's test as if they represent results obtained using the claimed disc fatigue test. Pet. 76 (referencing "a disc fatigue test (i.e., driving test on a drum) is performed according to JIS-L 1017 method of Japanese Standard Association" and highlighting the results of Yokokura's driving test on a drum); Ex.1003, ¶¶175-176 (same); *see also* Pet. 61 (also referencing "a disc fatigue test (i.e., driving test on a drum)"); Ex.1003, ¶141 (same). But Yokokura's test results

do not represent results obtained using the claimed disc fatigue test. Brookstein, ¶107.

Perhaps recognizing that its attempt to equate the claimed disc fatigue test with Yokokura's "Driving Test on a Drum" is mistaken, Petitioner adds the conclusory assertion that the claimed strength retention rate "could have been obtained through routine optimization of the prior art." Pet. 77; *see also id.* 61-62 ("achieving a strength retention rate of 80% or more would have been a matter of routine optimization, using standard procedures"). Petitioner fails to explain this purported "routine optimization"—what variables a POSITA allegedly would have sought to optimize, why it would have been routine to do so, or what "standard procedures" a POSITA would have used. *Id.* 61-62, 77 Dr. Rust likewise fails to do so. He simply parrots Petitioner's statements in the Petition, adding neither reasoning nor evidence to support Petitioner's conclusory assertion. Ex.1003, ¶¶141, 177. Petitioner's and Dr. Rust's point that a POSITA would know how to perform the JIS-L 1017 disc fatigue test (Pet. 61; Ex.1003, ¶141), has nothing to do whether it would have been obvious to design a hybrid fiber cord that would achieve the claimed strength retention rate after this test.

Furthermore, Dr. Rust's conclusory testimony regurgitating Petitioner's assertions merits little, if any, weight and cannot sustain Petitioner's burden. *See Mirror Worlds*, 122 F.4th at 875 ("unsupported expert opinions do not create a

genuine issue of material fact"); *K/S Himpp*, 751 F.3d at 1366 ("the Board cannot accept general conclusions about what is 'basic knowledge' or 'common sense' as a replacement for documentary evidence for core factual findings in a determination of patentability"); *Xerox*, IPR2022-00624, Paper 9 at 15-17 (according "little weight" to testimony that contains a verbatim restatement of a petition's conclusory assertions without additional supporting evidence or reasoning, also noting it is "particularly problematic in cases where, like here, expert testimony is offered not simply to provide a motivation to combine prior-art teachings, but rather to *supply a limitation missing from the prior art*").

Accordingly, for this additional reason, Petitioner fails to show a reasonable likelihood of prevailing on Grounds 4-5.

C. Petitioner's Ground 4 analysis fails to show that the "nylon primarily-twisted yarn and the aramid primarily-twisted yarn … have identical structures with each other in the hybrid fiber"

Limitation [1e] of claim 1 recites, among other things, "the nylon primarily-twisted yarn and the aramid primarily-twisted yarn are secondarily-twisted together at a third twist number which is identical with the first and second twist numbers and have identical structures with each other in the hybrid fiber." Ex.1001, cl. 1. Claim 4 recites similar language in limitation 4[c]. *Id.*, cl. 4. Petitioner's Ground 4 analysis does not show that its prior art discloses or renders obvious this limitation.

Petitioner contends Chung discloses this limitation, alleging "Chung discloses that 'the two types of filaments have ***similar*** structures.'" Pet. 71. Petitioner simply declares that a POSITA "would not have drawn a substantive distinction between 'similar structures' and 'identical structures.'" *Id.* 72. But Petitioner makes no effort to show that these "similar structures" would be similar enough to meet the claim requirement of "identical structures." Petitioner, and Dr. Rust, merely state that a POSITA "would have understood that no two textiles are 100 percent identical due to the inherent nature of the materials." *Id.* They, however, do not explain why the term "similar" in Chung should be interpreted to mean "as similar as possible," given the inherent variation in textiles, rather than "similar" but having differences sufficient to render them not "identical."

Thus, Petitioner has failed to show a reasonable likelihood of prevailing on Grounds 4-5 for this reason as well.

VI. Dr. Rust's Declaration Fails To Support His Opinions With Objective Evidence And Scientific Reasoning And Should Therefore Be Given Little To No Weight

The Petition cites Dr. Rust's Declaration (Ex.1003) throughout as supporting Petitioner's arguments, but Dr. Rust's Declaration does not provide any support or evidence that fills in the gaps in Petitioner's arguments, especially for critical claim limitations. Petitioner seeks to rely on expert testimony that merely regurgitates its attorney arguments to supplement teachings missing from the references themselves.

Indeed, aside from content on the expert's background, materials considered, and discussion of applicable legal standards, the declaration simply parrots the attorney arguments in the Petition, largely using exactly the same wording in the Petition, and adding no evidence to support Dr. Rust's opinions.

Dr. Rust's parroting of attorney arguments should be given (at most) "little weight" because his Declaration does nothing but "repeat[], *verbatim*, the conclusory assertion[s] for which it is offered to support." *Xerox*, IPR2022-00624, Paper 9 at 15-17 (original emphasis) (according "little weight" to testimony that contains a verbatim restatement of a petition's conclusory assertions without additional supporting evidence or reasoning, also noting it is "particularly problematic in cases where, like here, expert testimony is offered not simply to provide a motivation to combine prior-art teachings, but rather to *supply a limitation missing from the prior art*"); *see also Upjohn Co. v. MOVA Pharm. Corp.*, 225 F.3d 1306, 1311 (Fed. Cir. 2000) ("Lack of factual support for expert opinion going to factual determinations, however, may render the testimony of little probative value in a validity determination.") (quoting *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 294 (Fed. Cir. 1985)); *Facebook*, 973 F.3d at 1340-41 (affirming the Board's decision upholding a claim as "the Board considered Facebook's expert's testimony but determined that it did not add materially to Petitioner's unpersuasive attorney argument").

For example, Petitioner argues Baldwin or Baek meet the identical structure limitation, pointing to Dr. Rust's Declaration. But as shown below, Dr. Rust merely parrots the attorney argument in his Declaration, failing to provide any objective evidence or scientific reasoning to support that the same twist numbers equate to identical structures, which, as explained above, is factually inaccurate.[5] *Supra* § IV.C.

Petition 23-25	**Rust Decl. (Ex.1003), ¶¶74-78**
A POSITA would have been motivated to combine Tamura's teachings of twisted aramid and nylon yarns having *the same twist number* and the teachings of Baldwin and Baek disclosing twisted aramid and nylon yarns having *identical structures* to construct an [*sic*] aramid-nylon hybrid tire cords having aramid and nylon yarns with the same twist number and the same structure. EX1003, ¶¶ 74-78. … Further, Tamura, Baldwin, and Baek are analogous to each other and to the '731 patent. Each teaches a tire cord comprising a twisted aramid yarn and a twisted nylon yarn that are twisted together to form a hybrid cord. *See supra* §§ VIII.A and IV.C. And each is concerned with improving the strength, reliability, and performance of tires.	74. In my opinion, a POSITA would have been motivated to combine Tamura's teachings of twisted aramid and nylon yarns having *the same twist number* and the teachings of Baldwin and Baek disclosing twisted aramid and nylon yarns having *identical structures* to construct an aramid-nylon hybrid tire cords having aramid and nylon yarns with the same twist number and the same structure. … 78. Moreover, Tamura, Baldwin, and Baek are analogous to each other and to the '731 patent. These references each teach a tire cord comprising a twisted aramid yarn and a twisted nylon yarns that are twisted together to form a hybrid cord. And each is concerned with improving the strength, reliability, and performance of tires. EX1001, 2:49-54; EX1007, [0003]; EX1008, 4-3.

[5] The highlighted text is identical in the Petition and Dr. Rust's declaration.

EX1001, 2:49-54; EX1007, [0003]; EX1008, 4-3.	

As another example, Petitioner and Dr. Rust provide nearly identical explanations of the incorrect allegation that Tamura discloses the claimed strength retention rate of 80% or more.

Petition 34-36	**Rust Decl. (Ex.1003), ¶¶102-103**
Tamura discloses embodiments wherein the secondarily-twisted yarn coated with the adhesive has ***a strength retention rate of 80% or more and a dry heat shrinkage of 1.5-2.5%***. EX1003, ¶¶101-105. As provided in TABLE 2 below, embodiment 1 of Tamura includes a strength retention rate of 90% and a dry heat shrinkage of 2.5%; and embodiment 2 includes a strength retention rate of 88% and a dry heat shrinkage of 2.4%. Note, to the extent the Patent Owner argues the prior art must disclose the entire claimed range, Federal Circuit precedent states otherwise. *See, e.g., UCB, Inc. v. Actavis Labs. UT, Inc.*, 65 F.4th 679, 687 (Fed. Cir. 2023) ("If the prior art discloses a point within the claimed range, the prior art anticipates the claim."); *Pfizer*, 94 F.4th at 1347 ("[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation").	102. Tamura discloses embodiments wherein the secondarily-twisted yarn coated with the adhesive has ***a strength retention rate of 80% or more and a dry heat shrinkage of 1.5-2.5%***. EX1003, ¶¶101-105. As provided in TABLE 2 below, embodiment 1 of Tamura includes a strength retention rate of 90% and a dry heat shrinkage of 2.5%; and embodiment 2 includes a strength retention rate of 88% and a dry heat shrinkage of 2.4%. Note, to the extent the Patent Owner argues the prior art must disclose the entire claimed range, Federal Circuit precedent states otherwise. *See, e.g., UCB, Inc. v. Actavis Labs. UT, Inc.*, 65 F.4th 679, 687 (Fed. Cir. 2023) ("If the prior art discloses a point within the claimed range, the prior art anticipates the claim."); *Pfizer*, 94 F.4th at 1347 ("[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation").
Tamura further explains that the disclosed strength retention rates were	103. Tamura further explains that the disclosed strength retention rates were

determined ***after a disc fatigue test is performed according to JIS_L 1017 method of Japanese Standard Association***, as claimed. Specifically, Tamura teaches that "[i]n accordance with JIS-L 1017, tests were carried out on one fiber … and the force … [was] measured." EX1006, [0034]. According to Tamura, the force measured in accordance with JIS L 1017 "was converted from N units to g units," and the strength (g/d) "was calculated by dividing [the force (in grams)] by the total denier number of the fiber cord. EX 1006, [0034].	determined ***after a disc fatigue test is performed according to JIS_L 1017 method of Japanese Standard Association***, as claimed. In particular, Tamura demonstrates that "[i]n accordance with JIS-L 1017, tests were carried out on one fiber … and the force … [was] measured." EX1006, [0034]. According to Tamura, the force measured in accordance with JIS L 1017 "was converted from N units to g units," and the strength (g/d) "was calculated by dividing [the force (in grams)] by the total denier number of the fiber cord. EX 1006, [0034].

As a third example, Dr. Rust merely parrots Petitioner and fails to provide any objective evidence or scientific rationale to support his allegations that Yokokura's driving test on a drum meets the claims' strength retention rate test.

Petition 60-62	**Rust Decl. (Ex.1003), ¶¶139-141**
Third, to the extent Patent Owner argues that Chung does not teach that the secondarily-twisted (i.e., s-twisted) yarn has a strength retention rate of 80% or more after a disc fatigue test is performed according to JIS-L 1017 method of Japanese Standard Association, Yokokura discloses this limitation, and a POSITA would have been motivated to modify the cord of Chung and Harikae in view of Yokokura. As Yokokura explains, "[t]he higher the retention ratio is[,] the better the test result is." EX1014, [0082]. In addition, according to Kwon, if the strength retention rate of a tire	139. Third, if the Patent Owner argues that Chung does not disclose that the secondarily-twisted (i.e., s-twisted) yarn has a strength retention rate of 80% or more after undergoing a disc fatigue test is performed according to JIS-L 1017 method of Japanese Standard Association, Yokokura provides this teaching. A POSITA would have been motivated to modify the cord of Chung and Harikae in view of Yokokura. As Yokokura explains, "[t]he higher the retention ratio is[,] the better the test result is." EX1014, [0082]. Furthermore, Kwon, emphasizes the importance of a high strength retention

cord does not exceed 90%, "the ability to support the tire is reduced due to deterioration of physical properties during driving, resulting in deterioration of driving performance and, in severe cases, tire rupture." EX1021, [139].	rate, stating that if a tire cord's strength retention does not exceed 90%, "the ability to support the tire is reduced due to deterioration of physical properties during driving, resulting in deterioration of driving performance and, in severe cases, tire rupture." EX1021, [139].
…	…
In addition, performing a disc fatigue test (i.e., driving test on a drum) is according to the JIS L 1017 method of Japanese Standard Association to measure a strength retention rate is old and well known within the art. EX1003, ¶141. Further, the disk [*sic*] fatigue test process set forth in JIS- 1017 is well within the skill set of an [*sic*] POSITA. EX1003, ¶141. Finally, achieving a strength retention rate of 80% or more would have been a matter of routine optimization, using standard procedures, rendering predictable results. EX1003, ¶141. Indeed, a POSITA would have considered a high strength retention rate to be optimal, and would have tried to attain it via routine experimentation. Ex1003, ¶141; EX1014, [0082] ("[t]he higher the retention ratio is [,] the better the test result is"); EX1021, [139] (disclosing that if the strength retention rate of a tire cord does not exceed 90%, "the ability to support the tire is reduced due to deterioration of physical properties during driving, resulting gin deterioration of driving performance and, in sever cases, tire rupture").	141. In addition, performing a disc fatigue test (i.e., driving test on a drum) is according to the JIS L 1017 method of Japanese Standard Association to measure a strength retention rate is old and well known within the art. Moreover, the disk [*sic*] fatigue test process set forth in JIS- 1017 is well within the skill set of an ordinary artisan. Finally, achieving a strength retention rate of 80% or more would have been a matter of routine optimization, using standard procedures, rendering predictable results. In my opinion, a POSITA would have considered a high strength retention rate to be optimal, and would have tried to attain it via routine experimentation. EX1014 (Yokokura), [0082] ("[t]he higher the retention ratio is[,] the better the test result is"); EX1021 (Kwon), [139] (disclosing that if the strength retention rate of a tire cord does not exceed 90%, "the ability to support the tire is reduced due to deterioration of physical properties during driving, resulting in deterioration of driving performance and, in severe cases, tire rupture.").

Accordingly, because the evidence upon which Petitioner's case rests is conclusory and merely repeats Petitioner's attorney argument in the form of an expert declaration, it deserves little to no weight. For this additional reason, the Petition does not present a reasonable likelihood of prevailing sufficient to merit institution. In the face of such deficient evidence, a trial to determine whether Petitioner can show by a preponderance of the evidence that it has established unpatentability would waste the Board's resources, and institution should therefore be denied.

VII. Conclusion

For the reasons set forth above, the Board should deny the Petition for Inter Partes Review.

Respectfully submitted,

Dated: July 15, 2025

By: / Charles H. Sanders /

Charles H. Sanders (Reg. No. 47,053)
charles.sanders@lw.com
Latham & Watkins LLP
200 Clarendon Street
Boston, MA 02116
Telephone: 617.948.6000
Fax: 617.948.6001

Counsel for Patent Owner
Kolon Industries, Inc.

CERTIFICATE OF COMPLIANCE WITH 37 C.F.R. § 42.24

I hereby certify that this Patent Owner's Preliminary Response complies with the word count limitation of 37 C.F.R. § 42.24(b)(1) because the Patent Owner's Preliminary Response contains 11,942 words using Microsoft Word's counting feature, excluding the cover page, signature block, and the parts of the Patent Owner's Preliminary Response exempted by 37 C.F.R. § 42.24(b)(1).

By: / Charles H. Sanders /

Charles H. Sanders (Reg. No. 47,053)
charles.sanders@lw.com
Latham & Watkins LLP
200 Clarendon Street
Boston, MA 02116
Telephone: 617.948.6000
Fax: 617.948.6001

Counsel for Patent Owner
Kolon Industries, Inc.

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), I certify that on this 15th day of July, 2025, a true and correct copy of the foregoing **Patent Owner's Preliminary Response and all Exhibits** were served by electronic mail on Petitioner's lead and backup counsel at the following email addresses:

James M. Glass (Reg. No. 46,729)
jimglass@quinnemanuel.com
QUINN EMANUEL URQUHART & SULLIVAN, LLP
295 Fifth Avenue
New York, NY 10016
Tel: (212) 849-7000
Fax: (212) 849-7100

Quincy Lu (Reg. No. 76,954)
quincylu@quinnemanuel.com
PTAB@quinnemanuel.com
QUINN EMANUEL URQUHART & SULLIVAN, LLP
1109 First Avenue, Suite 210
Seattle, WA 98101
Tel: (206) 905-7000
Fax: (206) 905-7100

By: / Charles H. Sanders /

Charles H. Sanders (Reg. No. 47,053)
charles.sanders@lw.com
Latham & Watkins LLP
200 Clarendon Street
Boston, MA 02116
Telephone: 617.948.6000
Fax: 617.948.6001

Counsel for Patent Owner
Kolon Industries, Inc.