

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

OMEGA LINER COMPANY, INC.,

Petitioner

v.

BUERGOFOL GmbH

Patent Owner.

CASE NO.: IPR2023-01372
U.S. PATENT NO. 9,657,882

DECLARATION OF DR. PATRICK BRANT

I, Dr. Patrick Brant, do hereby declare:

1. I am making this declaration at the request of Buergofol, GmbH (“Buergofol” or “Patent Owner”) to support Patent Owner’s response to the Petition, the Expert report of Dr. MacLean, and the Decision to Institute trial in this IPR proceeding.
2. I have been retained as a consultant by Imperium Patent Works LLP, who represent the Patent Owner, to provide opinions relating to documents cited in these proceedings, and to provide opinions with respect to how a person having ordinary skill in the art would have understood the documents I have reviewed. I am being compensated for my work in this matter at my standard hourly rate. My compensation in no way depends on the outcome of this proceeding.

I. Experience and Education

3. My current curriculum vitae (“CV”) is attached as EX2002, and my qualifications are described below. As seen in my CV, I have authored or co-authored over 75 refereed publications, and am a named inventor or co-inventor on over 150 granted United States patents.
4. I received my PhD in Inorganic Chemistry in 1977 from the University of Arizona, Tucson, Arizona. I began my career as a research chemist for the Naval Research Laboratory, and then was employed by ExxonMobil Chemical

Company (EMCC) for 37 years. I held various leadership positions at EMCC throughout my career, including my 11 years as the Chief Polymer Scientist, Global R&D, the highest technical position in EMCC.

5. During my 37 years at EMCC, I gained extensive experience and knowledge in all aspects of polyolefin technology, from catalytic formation of the polymer itself, basic structure-property-processing relationships, formulation of polymer mixtures and additives, and the application of these polymers, mixtures, additives, etc., in the film and molding applications. Of relevance to the technology related to U.S. Patent No. 9,657,882 (the “’882 patent”), I provide the following list of my more relevant experience:

- Adhesion and design of polyolefin-based hot melt and pressure sensitive adhesives; roles of polymer, wax, tackifier, and functional polymer components in same;
- Stretch cling film design and development of quantitative model for cling;
- Surface functionalization of polyolefins; characterization of same by X-ray photoelectron spectroscopy (XPS), secondary ion mass spectrometry (SIMS), and a variety of other tools;
- design, and control of polymer surfaces and interfaces, and troubleshooting or problem-solving aberrant performance of same; and
- manager of a central research function on Adhesion and Interfacial Science staffed with 6 Ph.D.’s and supporting

technicians. This function focused significantly on hot melt and pressure sensitive adhesive performance and design, tackifier and wax syntheses for the same, and functionalized, reactive polymers.

6. Examples of the types of surface and interface studies with which I have experience, both with fabricated articles of commerce as well as model lab prepared systems include: 1. Extent of surface enrichment of additives, such as slip agents, waxes, antioxidants; 2. Surface functionalization via corona discharge treatment (CDT), flame treatment, and plasma methods; 3. Surface application of, or contamination from, agents such as poly(dimethylsiloxane); 4. Environmental contaminants; 5. Tie layer or adhesion promoter design, including interfacial failure analysis; 6. Polymer interface adhesion in polymer blends; and the design and use of compatibilizers to enhance adhesion and dispersion of the blend components; 7. Polymer-filler or inorganic particle adhesion through polymer grafting to a filler, again to enhance dispersion and mechanical benefits achieved through filler addition; and 8. Impact of resin design for sealing and bonding in flexible packaging.
7. Since retiring from ExxonMobil Chemical Company, I have worked as a consultant and advisor. Presently, I am an independent consultant working with a start-up company called A2O in Vancouver, B.C. I am advising a post-doctoral student on a new polymer grafting strategy and new high throughput

approach to evaluate variables governing grafting of polyolefins to inorganics and other high modulus materials. I am working to secure funding and approval to deploy a new polymerization platform for plugging abandoned oil and gas wells, as well as for emergency use to stop uncontrolled release of oil and gas from wells that have lost containment. Finally, I am working to commercialize a new coupling agent chemistry applied primarily to dispersion of nanoparticles in polymer matrices.

II. Documents Considered

8. In preparing this Declaration, I considered the following materials:

- Petition for *Inter Partes* Review IPR2023-01372;
- Declaration of Dr. Stephen MacLean (expert for Petitioner), EX1003;
- U.S. Patent No. 9,657,882, “Tubular Film and the Use Thereof” (‘882 patent), EX1001;
- Declaration of Gregor Schleicher, EX2003;
- Declaration of Dr. Abdel-Kader Boutrid, EX2004;
- European Patent No. EP2777925, EX2005
- Certified English language translation of EX2005 - Reply dated March 17, 2015 to European Patent Office during prosecution of EP2777925, EX2006;
- U.S. Patent No. 8,794,269 (Hummel), EX2008;

- Declaration of Translator regarding improper translations of EX1005 (Hummel) and EX1008 (Schuhmann), EX2009;
- Material Data Sheet for Envalior Durethan® CI 31 F 000000 Copolyamide PA6/6I, EX2010;
- Material Data Sheet for EMS-Grivory Grilon® CA6 E PA, EX2011;
- Liewchirakorn, *et al.*, “Practical Approach in Developing Desirable Peel-Seal....,” *Packag. Technol. Sci.*, (2017), EX2012;
- Omega-Liner™ Product Information 2022 dated 9/21/2022, EX2013; and
- Wypych, G., Handbook of Antiblocking, Release, and Slip Additives 3rd Edition (2014), pp. 61-64, 80-83, EX2016.

III. Person of Ordinary Skill in the Art

9. I have been informed and understand that the level of ordinary skill in the art is based on factors such as the education level of the inventor, the education level of those who work in the industry, and the sophistication of technology involved, in addition to the type of problems encountered in the art, prior art solutions to those problems, and the rapidity with which innovations are made in the particular technology.
10. I have reviewed the MacLean Declaration’s assessment of the qualifications of a person of ordinary skill in the art (MacLean Decl. at Section IV, ¶¶21-24). It is my understanding, and I have been informed that a person having ordinary skill in the art is a hypothetical person who is presumed to have known the

relevant art at the relevant time. I also have been informed that factors that I should consider in determining the level of ordinary skill in the art may include: (A) type of problems encountered in the art; (B) prior art solutions to those problems; (C) rapidity with which innovations are made; (D) sophistication of the technology; and (E) educational level of active workers in the field. I also have been informed that the hypothetical person having ordinary skill in the art would have the capability of understanding the scientific and engineering principles applicable to the pertinent art.

11. For the purposes of the opinions I express in this document, I adopt Dr. MacLean's and Petitioner's description of a person of ordinary skill in the art (POSITA). The relevant field of the POSITA is the field of "the formulation, manufacturing, and end-use performance of polymeric film and sheet products." EX1003, ¶23; Petition at 3. The relevant academic field of the POSITA is Polymer Science and Engineering, Material Science and Engineering or a related engineering field. As an alternative to having a bachelor's degree in Polymer Science and Engineering, Material Science and Engineering or a related engineering field, a POSITA would have at least seven years of experience in the formulation, manufacturing, and end-use performance of polymeric film and sheet products.

IV. The '882 Patent Claims and How a Person Skilled in the Art Would Understand Them

12. I have been informed and understand that determining the meaning of terms and phrases used in patent claims is assessed from the viewpoint of a person having ordinary skill in the art (POSITA). I understand that claim terms are given their ordinary and customary meaning as would be understood by a person of ordinary skill in the art at the time of the invention having taken into consideration the language of the claims, the specification, and the prosecution history of record.
13. The '882 patent specification informs me, and would inform a POSITA, that an important feature of the inner tubular film is the presence of a coating or covering on the external surface of the inner tubular film that is adjacent the curable resin. The '882 patent specification makes it clear in the detailed description and examples that the purpose and function of the coating or covering is to satisfy the fundamental purpose of the invention, which is to provide an inner tubular film with improved mechanical properties (e.g., elasticity and splice), and improved release characteristics. A small amount of material on the external surface of the inner tubular film, of which there are likely a number of various distinct substances, that does not perform the purpose and function of improved mechanical properties and improved release

characteristics, would not be considered by a POSITA to be a coating or covering in the context of the '882 patent.

14. The term coating and the expression “coating or covering” also would include a significant amount of material on the external surface of the inner tubular film, even if it did not perform the purpose and function. It is my opinion that a person having ordinary skill in the art would look to the purpose of the coating or covering when determining if enough material were present on the external surface of the film to be considered a coating or covering.
15. The examples in the '882 patent would have informed a POSITA that an amount of wax present that is added in a small amount to the polymer forming the external layer would not be considered a coating or covering, even if some of that wax migrated to the surface, as it likely could. The first table on column 15 of the '882 patent provides the composition of the inner tubular film of comparative example V1:

Layer number	Composition	Proportion in layer in %	Thickness in μm
1	Durethan C38 F	88	40
	Durethan B40 FAM	12	
2	Adhesive promoter: Admer NF 498 E	100	10
3	Lupolen 2420 F	70	65
	Exceed 1327 CA	30	
4	Adhesive promoter: Admer NF 498 E	100	10
5	Lupolen 2420 F	70	75
	Exceed 1327 CA	30	
			Sum: 200 μm

16. The external layer, layer number 1, includes 12% Durethan B40 FAM. The designation “FAM” informs a person having ordinary skill in the art that this material includes an additive, and I have been informed and understand that it contains less than 0.1% of EBS wax. Thus, the amount of wax present in the external polymer layer is less than 0.012% by weight, or about 120 parts per million (120 ppm). During manufacture and storage of this comparative film V1, at least some of the EBS wax present in the external layer would migrate to the surface of that layer.
17. The examples show, however, that this amount, which likely would be very small, is not sufficient to provide improved mechanical properties and improved release characteristics. See the results of the release force test in the table on column 17 of the ‘882 patent, and the results of the air inflation test,

splicing and breaking in the table on column 19 of the '882 patent. It is my opinion that a person having ordinary skill in the art would not have considered a comparative example to be covered by a patent claim, and consequently, would have known and understood that small amounts of migrating compounds (either externally applied after film formation or applied during manufacture of the film and migrating to the surface), even if those compounds migrated to the surface of the film, would not have been considered a coating or covering in the context of the '882 patent.

18. It is my opinion that a POSITA, at the time of the invention of the '882 patent, would have known that a small amount of migrating compound, such as a slip agent, that is present on the external surface of the film does not form a covering that covers the surface.
19. It is my opinion that a POSITA, at the time of the invention of the '882 patent, would have known that a small amount of migrating compound, such as a slip agent, in the polymer used to make the film would be insufficient to migrate to the external surface of the film and to form a covering over the surface. Film manufacturers commonly use less slip agent in the polymer used to make the film than would be required to form a covering so as to avoid problems with printing and laminating on the film surface, which would be impaired by the presence of a covering. This knowledge of a POSITA is reflected in

Wypych, G., Handbook of Antiblocking, Release, and Slip Additives 3rd Edition (2014) at pages 61-64 and 80-83, among others. (EX2016).

20. My understanding of the ‘882 patent also is that the inventors made a distinction between the terms “coating” and “covering,” and that these two terms do not mean the same thing. There are a number of statements in the ‘882 patent specification and claims that have led me to this understanding. For example, the ‘882 patent includes the following discussion:

According to another preferred alternative, at least one wax, paraffin, fatty acid, fat and/or another migrating, preferably lipophilic—but in other embodiments alternatively hydrophilic—compound is contained in at least one of the two outer layers. A coating with these substances is also possible.

EX 1001 at 4:15-20. The ‘882 patent inventors are describing one embodiment where a migrating compound is contained in at least one of the two outer layers and then migrates to the surface. The last sentence then states that a coating with these substances is also possible, which informs me that incorporating a migrating compound into the layer is different from coating the layer with the migrating compound.

21. The ‘882 patent also distinguishes between coating and covering when discussing the thickness of the material formed on the surface of the film:

The film thickness of the coating and/or covering of the tubular film according to the invention is preferably no more than 15 μm , better if no more than 5 μm , and especially preferable if it is *between 5 nm and 3 μm in case of a covering and between 0.1 to 3 μm in case of a coating.*

EX 1001 at col. 7, ll. 6-10, emphasis added. The specification clearly delineates between coating and covering where the thickness of the covering can be orders of magnitude lower than the thickness of the coating. This would be reasonably expected by a POSITA because a covering created by a compound added to a polymer film that migrates to the surface will be present in far lower amounts than the same amount of the compound “coated” on the surface after film formation.

22. Claim 1 of the ‘882 patent makes a distinction between coating and covering in the last two clauses of that claim:

a coating of at least one of (1) a coating with a polysiloxane; or (2) a coating or covering with at least one migrating compound; and wherein the coating is applied over a section of or an entire circumferential area of the outer facing external side facing the carrier material.

EX. 1001 at 20:31-36. There is nothing in the claim that mandates that the term “coating” also include a “covering,” which is what I understand

Petitioner's construction to require. Claim element 1[e] does not require such a construction, and when read in light of the remaining portion of the claim and the specification, as well as the specification, the '882 patentee made a clear distinction between the terms "coating" and "covering." The last portion of claim 1 only states that the *coating* is applied over the outer facing external side, and does not mention the term *covering*. This informs me that a covering is not applied over the outer facing external side, which makes sense because a migrating compound that migrates to the surface would not ordinarily be considered to have been "applied over," although this migration could be considered applied over but in my opinion that is not how it would ordinarily be interpreted or practiced.

23. I have been informed and understand that the file history of corresponding patent applications in other countries (in the same patent family) can be reviewed to aid in understanding and interpreting the claims of the U.S. patent counterpart. I was provided with a copy of European Patent No. 2777925 (EX2005), which is the European patent that issued from the same priority applications of the '882 patent and thus are in the same patent family. While EX2005 is in German, it does include an English version of the claims, and a portion of the English translation of claim 1 is reproduced below:

. . . wherein the external side of the inner tubular film (2) that faces the carrier material has at least regionally a coating (3) with at least one polysiloxane and/or with at least one migrating compound, and / or a covering with at least one migrating compound, that is integrated into an external layer of the inner tubular film (2) and migrates depending on time to the surface of the external layer.

The claim clearly recites the distinction between a coating and covering. A coating includes a coating of polysiloxane and/or a coating with at least one migrating compound. In contrast, a covering only includes at least one migrating compound integrated into an external layer of the film and migrates.

This distinction is consistent with my understanding of the '882 patent.

24. I also have been provided with a response to the European Patent Office that the '882 patent owner, Buergofol, filed during the proceedings that led to the grant of European Patent No. 2777925. Bergofol made it clear in that response how the invention achieves its purpose and function, the same invention, purpose, and function of the related '882 patent:

In addition, the structure of claim 1 has been clarified. According to one alternative, a coating with at least one polysiloxane and/or at least one migrating compound is claimed and according to another alternative, a covering with a migrating compound is claimed (as well as a combination of these two alternatives). The covering is

produced by introducing the migrating compound into said outer layer and its subsequent migrating movement to the surface of this outer layer. The latter alternative is disclosed, for example, on page 9 in the fourth paragraph of the original description.

EX2006, pg. 9 of 15. These statements made by the Patent Owner are consistent with my understanding of the '882 patent. There are three ways that are disclosed in the '882 patent in which the inventors achieved the improved mechanical properties and improved release effect:

- Coating the external surface of the inner tubular film with polysiloxane;
- Coating the external surface of the inner tubular film with a migrating compound; and
- Incorporating a migrating compound into the external layer of the inner tubular film and *providing a covering* on the external surface of the external layer when sufficient amounts of migrating compound migrate to the external surface.

25. It is my opinion that a person having ordinary skill in the art would have construed the claimed “coating” in accordance with its plain and ordinary meaning to include *coating* the external surface of the external layer with a polysiloxane and/or a migrating compound. It also is my opinion that a person having ordinary skill in the art would have reasonably understood that the claimed “covering” is different from the claimed “coating” and that “covering” means the migrating compound present on the external surface of the external

layer due to its incorporation into the layer and subsequent migration to the external surface. A person having ordinary skill in the art would have understood the term “covering” to be a type of a “coating” that is not applied to the external surface of the external layer, but rather that forms as a result of the migrating compound incorporated into the polymer layer and migrating to the surface.

V. The ‘882 Patent

26. The ‘882 patent discloses an insertion tube (can be a one- or multilayered film, but preferably is multilayered) for use in trenchless sewage pipe renovation, in which the tube meets the strict requirements made to its mechanical stability and has an outstanding release effect against adhesive substances such as resins. EX1001, 2:53-62. The ‘882 patent discloses the following features and advantages of the films:

- Mechanical stability with “outstanding mechanical properties such as very high elasticity, low tendency to splice, sturdiness, resistance and puncture resistance,” that “virtually rule out a bursting of the films.” EX1001 at 2:55, 56 and 3:14-18; at col. 12:38-50;
- “Outstanding release effect against adhesive substances such as resins,” EX1001 at 2:56-57; and
- The unexpected result that the films had a good release effect, which was “also accompanied by a reduction of the coefficients of friction of film against film,” that enables the tubular film to be

used as a preliner that can be inserted with “minimized interference.” EX1001 at 2:63-67 and 3:8-10; 18-22; at col. 9:31-42.

27. Based on my review of the Petition and the report of Dr. MacLean, Petitioner and its expert focus almost exclusively on the second feature and advantage, and do not address the improved mechanical properties and reduced coefficient of friction of film against film. See, e.g., Petition at 10 (“The ‘882 Patent is directed to an inner tubular film with ‘an outstanding release effect against adhesive substances such as resins’”) Petitioner’s expert discusses the improved mechanical properties in one paragraph (75) without any discussion as to how they are achieved, (despite the ‘882 patent’s disclosure on col. 8, ll. 46-52), and expends the following 5 paragraphs discussing what Dr. MacLean characterizes as the “outstanding release effect” being achieved through a coating. EX1003 at ¶¶76-81.
28. Petitioner and its expert have completely ignored one of the fundamental inventive aspects of the ‘882 patent, which is the discovery that the use of a coating of a polysiloxane or migrating compound, and/or a covering of a migrating compound that migrated to the surface of the external layer, unexpectedly improved the mechanical properties of the film that is described

in the claims. The '882 patent discloses the surprising discovery multiple times throughout its disclosure, as highlighted below:

In the films according to the invention, it came as a surprise to discover that a good release effect against adhesive resins is also accompanied by a reduction of the coefficients of friction of film against film. Such a result was unexpected. EX1001, 2:63-67.

As already mentioned above, it was surprisingly found out that the tubular film according to the invention is characterized by very good mechanical properties. Thus, for example, siliconization (coating with polysiloxane) of the tubular film leads surprisingly to a clear, improvement of the mechanical values with regard to splice formation and elongation at break. EX1001, 8:46-53.

A surprising finding was that the elasticity until break increased significantly with coating with polysiloxane and wax additivation compared to the non-siliconized reference that was not additivated with wax from comparative example V1. In the polysiloxane-coated tubular film from example B3, the increase in elasticity until break compared to the reference from comparative example V1 is 3.1%, in example B2 even almost 7%. EX1001, 19:39-46.

29. It is at least these improved mechanical properties that a person having ordinary skill in the art would have considered to be the inventive contributions of the '882 patent inventors especially in light of mitigating customer complaints due to implementing the novel coating/covering strategy.

The fact that the '882 patent also discloses improving the release effect by use of a specified coating and/or covering is also an additional improvement to what I am informed and understand to be a solution to a problem that was not known prior to the '882 patent filing date.

30. I have reviewed a declaration by one of the '882 patent inventors, Dr. Abdel-Kader Boutrid (EX2004), and another declaration by another '882 patent inventor, Mr. Gregor Schleicher (EX2003). The inventors explain in the declarations that prior to the filing date of the '882 patent, they were unaware of any problem of inner film tearing while being withdrawn from renovated pipe, until customers of Buergofol made the inventors aware of a problem in the spring of 2012. EX2003 at ¶¶ 18-22; EX2004 at ¶¶ 10-11.
31. The two inventor's declarations explain how they visited (or were aware of one of the inventor's visits) the customers during the spring of 2012, and it was then that they first heard of a problem with the inner tubular film tearing and breaking off. EX2003 at ¶¶ 23-24; EX2004 at ¶¶ 12-15. It is my opinion that a person having ordinary skill in the art would not have expected there to be any problem with film tearing during withdrawal of an inner tubular film, because Hummel (EX1005) discloses withdrawing such a film from a UV-curable resin system without tearing. I simply would not have expected there to be any problem with the Hummel approach.

32. Dr. Boutrid's explanation of his hypothesis as to why this problem first arose is reasonable. Dr. Boutrid describes learning that some customers had begun using UV-curable resins that included maleic anhydride, and that he believed the maleic anhydride may be strongly adhering to the polyamide outer layer. EX2004 at ¶¶ 14-15. It is my understanding that it was the discovery of this newly occurring problem that had not previously existed, that led the '882 patent inventors to the solutions disclosed in the '882 patent specification.
33. Dr. Boutrid also explains the unexpected and surprising results achieved by the '882 patent's coating and/or covering. *Id* at ¶¶ 19-58. I agree with Dr. Boutrid's concerns that use of coatings on a polyamide layer, or that use of a covering formed by incorporating migrating compounds into the polymer layer might worsen one or more important mechanical properties, such as decreasing its strength. *Id* at ¶19. I also agree with Dr. Boutrid that the improvement of mechanical properties, such as a "measurable increase in the elasticity of the inner film until film splice and film break," is unexpected, and would not have been reasonably expected by a person having ordinary skill in the art prior to the '882 patent filing date. *Id* at ¶¶20-22.
34. These improved mechanical properties correlate with the coating with polysiloxane or migrating compound, or the covering formed from migration of a migrating compound incorporated into the layer. I disagree with the

statements in Dr. MacLean's declaration that: "In order to achieved the desired mechanical properties of the tubular film, the '882 Patent teaches that the tubular film may contain at least one layer of a TPE." EX1003 at ¶82. Dr. MacLean refers to the '882 patent at 6:63-66 as allegedly supporting this statement. But the '882 patent makes it clear that use of the optional TPE "gives the tubular film according to the invention *even better mechanical properties...*" EX1001, 6:63-66, emphasis added. Thus, the '882 patent discloses achieving the improved or desired mechanical properties by use of the claimed coating and/or covering, and that the optional addition of a TPE can provide "even better mechanical properties." *Id.* In addition, there are numerous TPE's, some of which may achieve Dr. MacLean's objective, but many that would not.

35. It is my opinion that the '882 patent inventors were the first to encounter and/or discover the problem of tearing of the inner film from the UV-curable resin during removal of the inner film, and consequently, were the first to present a solution to this newly discovered problem. It also is my opinion that in solving this previously unknown problem, the '882 patent inventors unexpectedly discovered that a coating and/or covering at the interface between the outer externally facing side of the inner film and the UV-curable resin improved the mechanical properties of the inner tubular film.

VI. Rebuttal of Petitioner’s Argument Grounds I and II – Hummel Does NOT Anticipate claims 1, 4-7, 10, and 11, and Hummel Does NOT Render Obvious Dependent Claim 3.

36. Hummel appears to be equivalent to Hummel, U.S. Patent No. 8,794,269 (the “’269 patent” - EX2008), although the terminology of the Hummel translation submitted by Petitioner as EX1005 differs in a few important areas from EX2008, which I understand is an English language translation of the same German patent application. I consider these differences to be important because the term “*withdrawn*” is used in EX2008, which I understand was translated from the same German Hummel reference provided by Petitioner as EX1006, whereas that term was replaced with “*peel*” or “*peeled*” in EX1005. I consider this to be important because the documents Petitioner relies upon in combination with Hummel, Schuhmann (EX1007), and Nagai (EX1009) both use the same term “peel,” whereas the proper translation of the German Hummel reference (EX1006) was submitted to the US Patent Office during prosecution of the ‘269 patent. I have reviewed a translator’s declaration that Buergofol is submitting in this matter explaining that the proper translation is “withdrawn” and not “peeled” (EX2009). The following are the sections of Hummel, EX1006 that were not properly translated in EX1005. Underneath each section is the corresponding text from the properly translated ‘269 patent:

Hummel EX1005

It was also surprisingly found that the multilayer film according to the invention, in particular in the form of a multilayer tubular film, but also as a multilayer film sealed to form a tube, is characterized by very good mechanical properties, in particular by very good elasticity, so that it withstands the stresses occurring during the repair of underground pipes, in particular during inflation in the pipe system, during the preceding transport, the preceding storage and the insertion into the pipe to be repaired, and furthermore, ***after the resin has cured, can be peeled off from it without being torn***, torn in or torn off. EX1005 at 4:3-10, emphasis added.

Hummel EX2008

It has moreover been established, surprisingly, that the multilayer film of the invention, in particular in the form of a multilayer tubular film, or else in the form of a multilayer film sealed to give a tube, features very good mechanical properties, in particular very good extensibility, in such a way that it withstands the loads that arise during the renovation of subterranean pipes, in particular during inflation within the pipe system, during the preceding transport, the preceding storage, and the entry into the pipe requiring renovation, and moreover, ***after the hardening of the resin, can be withdrawn therefrom without any break-off, splitting or tearing***. EX2008 at 2:53-64, emphasis added.

Hummel EX1005

After curing, when the consolidated, repaired sewer pipe made of the cured carrier material is present, the multilayer film according to the invention, preferably in the form of a tubular film, *can be peeled off as an inner tube, preferably without tearing or seizing therefrom*. EX1005 at 23:1-3, emphasis added.

Hummel EX2008

After the hardening process, once the strengthened, renovated drainage pipe made of the hardened support material is in place, the multilayer film of the invention, preferably in the form of a tubular film, as internally situated tube, *can preferably be withdrawn therefrom without break-off or tearing, and/or hindrance to movement*. EX2008 at 12:1-6, emphasis added.

Based on the above evidence, I have relied on the proper translation of Hummel EX1006, and use the expression “withdrawn” instead of “peeled.”

37. Petitioner argues that two aforementioned sections of Hummel (EX1006) that use the words “peeled off” show that “Hummel therefore discloses the motivation to have a release coating that is at least over a section of or the entire area of the outer facing external side facing the carrier material so that the inner tubular film can be removed without tearing” (PET. at 29:17-20). Petitioner’s argument is based on an incorrect translation of Hummel (EX1006). Moreover, it is my opinion that a POSITA would not have read

Hummel (EX1006), including the two incorrectly translated sections, to disclose any such motivation to have a release coating. A POSITA would not have read Hummel (EX1006) to disclose or suggest a release coating.

38. Hummel discloses only that the multilayer tubular film disclosed and claimed in the application publication WO2011/157356 (EX1006) can be withdrawn from the pipe without tearing after the resin has cured. It is my opinion that a POSITA would not have interpreted this disclosure as a statement that there was any problem with Hummel's film tearing as it was withdrawn from the pipe. Nowhere does Hummel state that his inner tubular film tears, or has a tearing problem, when it is removed after resin curing. In fact, Hummel explicitly states that Hummel's film can be withdrawn without tearing. From the disclosure of Hummel, a POSITA would not have recognized any problem with Hummel's film that could be solved by modifying the film with any other teaching.
39. I consider Hummel's disclosure that the multilayer film, used as an inner tubular film, can be withdrawn without tearing or being torn after the resin has hardened to inform a person having ordinary skill in the art that the strength of the multi-layer film exceeds any adhesive force, if any, that exists at the interface of Hummel's multilayer film layer adjacent the UV-curable resin. Even if there were some adhesion between the UV-curable resin and

Hummel's outer layer, a person having ordinary skill in the art would have considered the adhesive force relatively small given Hummel's express disclosure that the film can be withdrawn without tearing or being torn.

40. A person having ordinary skill in the art also would have looked at Hummel's examples to assess the composition of the outer layer of the inner tubular film that is adjacent the UV-curable resin. That layer is layer (e) in Hummel's examples, which is comprised of 100% Durethan CI 31F for examples B1-B3, and 100% Grillon CA6E for example B4. The material data sheets for each of these polymers show that the polymers are polyamides with no additives added thereto (EX2010 - Material Data Sheet for Durethan® CI 31 F Copolyamide PA6/6I; and EX2011 - Material Data Sheet for Grilon® CA6 E PA). A person having ordinary skill in the art therefore would have read and understood Hummel as disclosing no issues or problems with withdrawing the inner tubular multi-layer film disclosed therein from the cured UV resin, without tearing or being torn. It is my opinion that a person having ordinary skill in the art would not have considered Hummel to have disclosed any need or desire to improve the release of the inner tubular multi-layer film from the UV-cured resin. It also is my opinion that a person having ordinary skill in the art would not have been motivated or had any desire to modify Hummel's outer layer to include a coating or a covering because of the additional time, expense, and

uncertainty of its potential adverse effects on other film properties (such as mechanical strength, which is important to Hummel), especially when such a modification was not needed, and would not have been expected to serve any useful purpose.

41. Indeed, it is my understanding that if the interface between the outer surface of the inner tubular multilayer film and the UV-curable resin were modified to render that interface too slippery (with minimal adhesion and friction), the result could destroy the use of the film in trenchless sewage pipe repair. It is important that the inner tubular film remain in contact with the UV-curable resin during the UV curing process with UV light sources inserted into the interior of the pipe. If the inner tubular film were too easily removed from the UV-curable (or cured) resin, portions of the film or all of the film might release during the curing process and collapse toward the center of the pipe, (for example, if the air pressure varies throughout the inner tube, or decreases such that even gravity might cause the film to fall) and make contact with the hot UV light source and cause the film to melt or burn.
42. I have been informed that Dr. MacLean has testified that, if the inner tubular film of Hummel were withdrawn from the pipe after curing, then one would need to use some of the additives listed in Hummel as optional additives to remove the film. I also have been informed that Dr. MacLean testified that if

there is no coating on Hummel's film, then you will not obtain a release effect that is disclosed by Hummel (ability to be withdrawn without tearing or being torn). I disagree with Dr. MacLean's position.

43. As mentioned above, the films used in Hummel's examples do not include any additives in their external layer adjacent the UV-curable resin. Thus, there is no surface treatment of the polyamide layer present at the interface between the film and the resin in Hummel's examples. A person having ordinary skill in the art would reasonably have expected the examples of Hummel to be representative of films that have the ability to be withdrawn from the pipe after curing of the UV-resin, without tearing or being torn. Hummel therefore directly refutes the Dr. MacLean's position that an additive is needed or otherwise required to enable the inner film of Hummel to be withdrawn without tearing or being torn.
44. A person having ordinary skill in the art would know and understand the fundamental physics involved in adhesion between two layers, as well as the peel strength and tearing failure. For example, Liewchirakorn, *et al.*, "Practical Approach in Developing Desirable Peel-Seal....," *Packag. Technol. Sci.*, (2017), ("Liewchirakorn" – EX2012), discloses a number of well-known concepts associated with peel and tearing of two materials having an adhesive force therebetween. While much of Liewchirakorn's discussion and empirical

evidence relates to PLA-based film, a person having ordinary skill in the art would know and understand that some of the fundamental concepts discussed in this document are not limited to any particular type of film.

45. Liewchirakorn discloses the following:

Tearing failure means no peel during peeling process due to high seal strength between film and substrate (or seal strength is higher than the inherent tensile strength of the film). This results in film breakage.

Tearing failure shows the highest peel strength that is close to the film's breaking strength. For partial tearing failure, the samples mostly exhibit slightly lower peel strengths than those of the tearing failure. Partial tearing failure starts with peel at the beginning followed by tearing of the peel arm.

EX2012, pg. 7. Here, Liewchirakorn discloses that tearing occurs when the adhesive or seal strength is higher than the inherent tensile strength of the film. A person having ordinary skill in the art would know this and would have readily understood from Hummel that the adhesive strength between the UV-cured resin and the polyamide outer layer was less than the tensile strength of the film, thereby providing for withdrawal of the film without tearing or being torn.

46. Hummel includes a paragraph on page 8 of Hummel (EX1005, pg. 11 of 71) that lists optional additives. The paragraph states that “any” of the layers of Hummel's film, including Hummel's layer (e), “can, *if necessary*, . . . be

treated with additives selected from the group comprising . . . lubricants, . . . waxes, . . . surface-active compounds, . . .” (EX1005, pg. 11) Hummel is not disclosing in this paragraph that layer (e) of Hummel’s film specifically incorporates wax as an additive, and that is due to the statement by Hummel that such additive can be added “if necessary.” Hummel nowhere discloses to the POSITA that there is anything wrong with the Hummel film as disclosed without wax in layer (e). Hummel nowhere discloses to the POSITA that there is any problem with the Hummel film that would make it “necessary” to add wax, so there is no embodiment of Hummel being disclosed (to the POSITA in this paragraph of the Hummel document) in which layer (e) of Hummel’s film includes wax or any of the listed “additives.” Recognition of a problem with the Hummel film that would make it “necessary” to include a specific additive from the list to layer (e) is knowledge outside the disclosure of the Hummel document.

47. Petitioner and Dr. MacLean are apparently under the mistaken assumption that some additional coating or covering is necessary in Hummel to permit removal of the film without tearing, but that is incorrect. A coating or covering would only be necessary if the adhesive strength between the UV-cured resin and the outer layer of the inner tubular film were higher than the inherent tensile strength of the film. But a person having ordinary skill in the art would not

have reasonably expected that to be the case with Hummel because Hummel discloses no coating or covering, Hummel does not use any additives in the external layer in the examples, and Hummel expressly discloses that the inner tubular film is removed without tearing or being torn. The mere fact that there might be some adhesion between the outer polyamide layer of Hummel and the UV-cured resin does not necessarily mean that Hummel's inner film cannot be removed without tearing or being torn.

48. A person having ordinary skill in the art therefore would not have had any reason to select any of the optional additives listed on page 8 of Hummel (EX1005, pg. 11 of 71). Even if one or more optional additives were selected, the selection must be made from a very large list of possible additives, and then the additive would have to be added to the outer layer (e) of the film. I have been informed and understand that, in order for a prior art document to anticipate a claim, that document must either expressly disclose all elements recited by the claim, or if not expressly disclosed, the non-disclosed element of the claim must be inherent in the prior art. I also have been informed and understand that inherency requires certainty, and that probabilities and possibilities are not adequate to establish inherency.
49. Based on my review of Hummel, this document does not expressly disclose the use of a migrating compound, nor does it expressly disclose a coating or

covering on the externally facing surface of the external layer facing the UV-curable resin material. Use of a migrating compound, and/or the formation of a coating or covering would not have been inherent in Hummel because none of the additives listed in Hummel are necessary, nor would it be necessary to add any of those additives to layer (e). If Hummel does not anticipate independent claim 1 by not disclosing, expressly or inherently, all of the elements of independent claim 1, then Hummel would not anticipate or render obvious any of the claims dependent on claim 1, all of which include additional features and elements. Thus, Hummel does not render obvious dependent claim 3 because Hummel does not disclose or suggest the elements recited by independent claim 1.

VII. Rebuttal of Petitioner's Argument Ground III Hummel in View of Schuhmann Do Not Render Obvious claims 1, 3-7, 10, and 11.

50. It is my opinion that a person having ordinary skill in the art would not have combined Hummel and Schuhmann, and even if combined, the film recited by the '882 patent claims provides unexpectedly improved results. First, Hummel and Schuhmann are concerned with entirely different types of systems and polymeric films. The interface of Hummel's inner tubular film and UV-curable resin involves adhesive forces, if any, that may exist between the UV-curable and cured resins and the polyamide material used as the external layer. In contrast, the interface of Schuhmann's adhesive material and release film

involves adhesive forces between a variety of different types of polymer films (polypropylene is preferred and is used in the examples) and generic “sticky” products (EX1007 at 17). In my opinion, a person having ordinary skill in the art would not have seen any rational basis to use Schuhmann’s release film in Hummel and have a reasonable expectation of success.

51. Hummel does not disclose any need or desire to improve the release effect between the inner tubular film and the UV-curable resin. In fact, Hummel discloses that there are no problems with removing the inner tubular film, and that it can be accomplished without tearing or being torn, without using any release-enhancing agents in the form of a coating or covering. EX1005 at examples (no additives, coatings or coverings), pg. 23. A person having ordinary skill in the art would have no reason to modify Hummel with any of Schuhmann’s teachings to address a problem that does not exist, especially when such a modification could adversely impact other properties of Hummel’s film that Hummel considers important, such as the mechanical properties. EX1005 at 7.
52. In addition, Schuhmann requires the coating or covering on the release film to be embossed. EX1007, title, pg. 5, examples. Every embodiment disclosed in Schuhmann requires embossing the coating or covering, and the examples show that, if the coating or covering is formed over the surface of the release

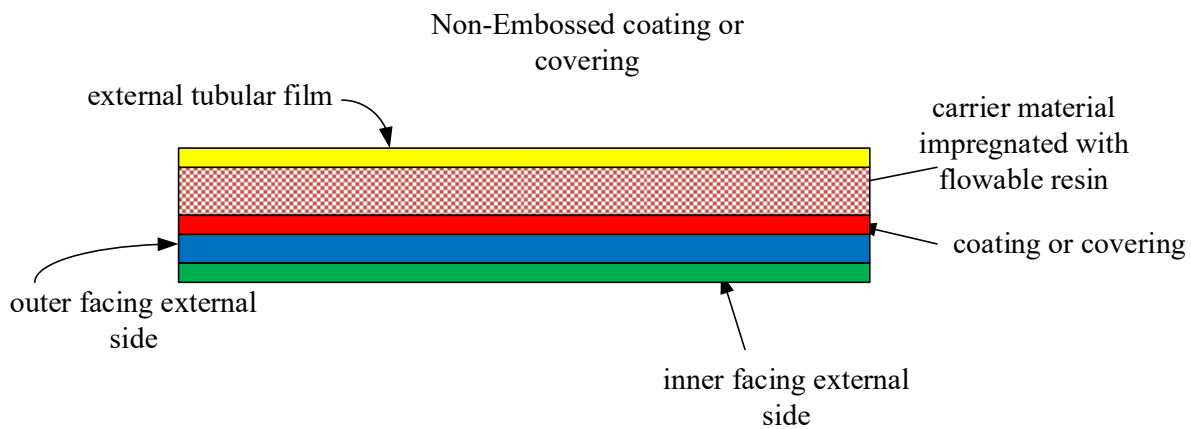
film, it has undesirable release characteristics. EX1007 at 23-24, where comparative example V1b is made from the exact same materials as inventive example B1, and the only difference is that inventive example B1 has an embossed surface. The separation force for comparative example V1b, which includes a coating or covering on the surface of the release film, was nearly 5 times higher than the separation force of example B1 (203 cN/cm for V1b vs. 44 cN/cm for B1). *Id.* Schuhmann therefore requires that the coating or covering must be embossed to provide the release effect from the adhesive material.

53. A person having ordinary skill in the art would not have modified Hummel's external layer to include an embossed coating or covering as described by Schuhmann because a skilled artisan would have reasonably expected such a modification to make the removal of Hummel's inner tubular film more difficult. In contrast to the already formed adhesive in Schuhmann, which would be a tacky solid, the UV-curable resin compositions are not yet cured or solidified prior to the curing process. I am informed that the viscosity of UV-curable resins used in trenchless sewage pipe repair is on the order of 800 cps (see EX2013 at 8). Such a UV-curable resin, which I understand is a resin used in Petitioner's liners, is flowable in a manner consistent with motor oil, and more flowable than honey, ketchup, and Karo syrup. The use of an

embossed surface adjacent a flowable curable resin such as one commonly used in trenchless sewage pipe renovation systems, could actually increase the adhesion between the surface, perhaps resulting in what is referred to as “mechanical interlocking.”

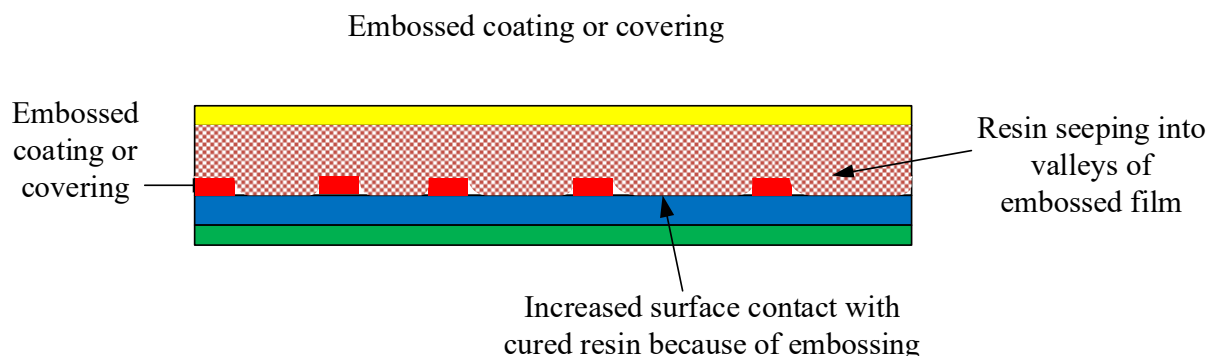
54. I provide below some rudimentary side views of films adjacent a carrier material impregnated with a flowable UV-curable resin to help explain the concept of mechanical interlocking. The configuration of the ‘882 patent can be illustrated as shown below:

‘882 Patent Film



Schuhmann discloses in its examples that a construction as above has inferior peel characteristics. Hummel, if modified by Schuhmann’s embossed film as proposed by Petitioner is illustrated below:

Hummel modified by Schuhmann



This arrangement shows increased contact between the resin after curing and the outer surface of the outer facing external side, making it harder to remove. Schuhmann is not concerned with resin seeping into the valleys of the embossed film because Schuhmann's adhesive is solidified and would not flow, thereby achieving reduced contact. But that would not happen in a UV-curable system.

55. The embossed surface could create what is known as mechanical interlocking, resulting in very strong adhesion between the respective surfaces. Mechanical interlocking is a phenomenon that exists when two surfaces are adhered to one another with one surface being roughened. The adhesive can conform completely to the roughened surface and when hardened, interlocks making it more difficult or potentially impossible to separate. In fact, in an extreme example, mechanical interlocking is applied to enable Teflon to adhere to the surface of a pan. This stronger adhesion, perhaps to the point of mechanical

failure during removal, would defeat the entire purpose of Hummel and Schuhmann, and consequently, it is my opinion that a person having ordinary skill in the art would not have modified Hummel by including Schuhmann's embossed film.

56. Even if Hummel and Schuhmann were combined, the combined teachings do not disclose or suggest the unexpectedly improved properties achieved by the claimed film. The '882 patent discloses the surprising results it achieves multiple times throughout its disclosure, as highlighted below:

In the films according to the invention, it came as a surprise to discover that a good release effect against adhesive resins is also accompanied by a reduction of the coefficients of friction of film against film. Such a result was unexpected. EX1001, 2:63-67.

As already mentioned above, it was surprisingly found out that the tubular film according to the invention is characterized by very good mechanical properties. Thus, for example, siliconization (coating with polysiloxane) of the tubular film leads surprisingly to a clear improvement of the mechanical values with regard to splice formation and elongation at break. EX1001, 8:46-53.

A surprising finding was that the elasticity until break increased significantly with coating with polysiloxane and wax additivation compared to the non-siliconized reference that was not additivated with wax from comparative example V1. In the polysiloxane-coated tubular film from example B3, the increase in elasticity until break

compared to the reference from comparative example V1 is 3.1%, in example B2 even almost 7%. EX1001, 19:39-46.

A possible cause for this surprising and positive effect with regard to the mechanical properties of the tubular film according to the invention can be an additional protective effect of the external polyamide layer owing to a thin polysiloxane film (due to coating) and also to a thin wax film (due to migration to the surface). EX1001, 20:5-10.

57. As discussed above in Section V, two inventors have submitted declarations, one of which describes the unexpected results achieved by the claimed film. The two inventor's declarations explain how they visited (or were aware of one of the inventor's visits) customers during the spring of 2012, and it was then that they first heard of a problem with the inner tubular film tearing and breaking off. EX2003 at ¶¶ 23-24; EX2004 at ¶¶ 12-15. Dr. Boutrid's explanation of his hypothesis as to why this problem first arose is reasonable. Dr. Boutrid describes learning that some customers had begun using UV-curable resins that included maleic anhydride, and that he believed the maleic anhydride may be strongly adhering to the polyamide outer layer. EX2004 at ¶¶ 14-15. It is my understanding that it was the discovery of this newly developed problem that had not previously existed, that led the '882 patent inventors to the solutions disclosed in the '882 patent specification.

58. Dr. Boutrid also explains the unexpected and surprising results achieved by the ‘882 patent’s coating and/or covering. *Id* at ¶¶ 19-58. I agree with Dr. Boutrid’s concerns that use of coatings on a polyamide layer, or that use of a covering formed by incorporating migrating compounds into the polymer layer might worsen one or more important mechanical properties, such as decreasing its strength. *Id* at ¶19. I also agree with Dr. Boutrid that the improvement of mechanical properties, such as a “measurable increase in the elasticity of the inner film until film splice and film break,” is unexpected, and would not have been reasonably expected by a person having ordinary skill in the art prior to the ‘882 patent filing date. *Id* at ¶¶20-22.
59. These improved mechanical properties are the result of the coating with polysiloxane or migrating compound, or the covering formed from migration of a migrating compound incorporated into the layer. Thus, the ‘882 patent discloses achieving the improved or desired mechanical properties by use of the claimed coating and/or covering, and that the optional addition of a TPE can provide “even better mechanical properties.” *Id*.

VIII. Rebuttal of Petitioner’s Argument Ground IV Hummel in View of Nagai Do Not Render Obvious claims 1, 3-7, 10, and 11.

60. For the reasons discussed above, even if Hummel and Nagai were combined, the combined teachings would not have suggested the unexpected properties

achieved by the claimed film. For at least this reason, it is my opinion that Hummel, even if combined with Nagai, does not render obvious claims 1, 3-7, 10, and 11.

61. For the reasons discussed in Section VII above, a person having ordinary skill in the art would have had no reason to modify Hummel in the manner Petitioner contends. Hummel does not disclose any need or desire to improve the release effect between the inner tubular film and the UV-curable resin. In fact, Hummel discloses that there are no problems with removing the inner tubular film, and that it can be accomplished without tearing or being torn, without using any release-enhancing agents in the form of a coating or covering. EX1005 at examples (no additives, coatings or coverings), pg. 23. A person having ordinary skill in the art would have no reason to modify Hummel with any of Nagai's teachings to address a problem that does not exist, especially when such a modification could adversely impact other properties of Hummel's film that Hummel considers important, such as the mechanical properties. EX1005 at 7.
62. The Petition contends a "POSITA would have been motivated to combine the 'release agent' (silicone, wax, fatty acid) of Nagai to the external surface of the inner tubular film of Hummel to increase the release effect between the inner tubular film and the cured resin to prevent sticking of the inner tubular film to

the cured resin.” PET. at 56-57. Nowhere does Hummel disclose or teach that there is any problem with his disclosed inner tubular film sticking to cured resin. Nowhere does Hummel ever mention any issue with the cured resin sticking to the inner tubular film, and to the extent there is some adhesion, it clearly is not enough to prevent Hummel’s inner tubular film from being withdrawn without tearing or being torn. In addition, for UV-curable trenchless sewage repair systems, increasing the release effect between the curable resin and the tubular film is not necessarily a desirable feature, especially if, as Nagai states, adhesion of thin film and resin absorbent material is completely prevented. EX1009, ¶29.

63. If the release effect were enhanced to the level disclosed by Nagai in Hummel’s entirely different system (UV-curable systems vs. thermocurable systems), this could be catastrophic during trenchless sewage pipe repair. Some adhesion is needed between the inner tubular film and the UV-curable resin to facilitate insertion of the tube, proper inflation of the tube to press the curable material against the surface of the pipe and maintain it in that position until cured, and to enable curing. If adhesion between the UV-curable resin and the outer surface of Hummel’s inner tubular film were “completely prevented” by employing Nagai’s release agent, then the inner tubular film would separate therefrom during curing, and some or all of the film could

collapse internally on the hot UV lamps. This likely would result in destroying the integrity of the inner film, and possibly causing a dangerous fire.

64. It therefore is my opinion that there would have been no need or desire to modify Hummel by using Nagai's release agent. It also is my opinion that even if Hummel and Nagai were combined as suggested by Petitioner, the combination fails to disclose or suggest the unexpected results achieved by the claimed film.
65. Neither Hummel nor Nagai discloses the use of migrating compounds, or providing a covering by incorporating a migrating compound into the polymer material during film formation in an amount sufficient to result in migration to the surface to form a covering. Rather, Nagai only discloses externally coating the outer surface of an already formed film. Dependent claim 11 of the '882 patent recites:

11. The insertion tube according to claim 10, wherein the migrating lipophilic or hydrophilic compound is added to an external side containing a thermoplastic olefin homo- or copolymer or a homo- or copolyamide.

EX1001, 22:4-7. This claim requires the migrating lipophilic or hydrophilic compound to be added to the layer (side) containing a thermoplastic olefin homo- or copolymer or a homo- or copolyamide, and not coated on top of the layer. Even if Nagai's coating with silicone or wax were applied to Hummel's

inner tubular film, the combined teachings would not have rendered obvious dependent claim 11.

IX. The Unexpectedly Improved Mechanical Results shown in the '882 Patent are Commensurate in Scope with the '882 Patent Claims.

66. I have been asked to assess whether a person having ordinary skill in the art would have expected the results shown in the '882 patent to be achieved throughout the full scope of the '882 patent claims. It is my opinion that the '882 patent provides sufficient data for a reasonable number of embodiments that would have led a person having ordinary skill in the art to expect the same or similar improvements in the mechanical properties of the inner tubular film throughout the scope of the patent claims. Claim 1 of the '882 patent recites a coating of polysiloxane, a coating of at least one migrating compound, or a covering with at least one migrating compound present on a section or of the entire circumferential area of the outer facing external side facing the UV-curable resin. EX1001, col. 20:31-37.
67. I have been informed and understand that a patent owner need not provide examples of every species possible within the scope of a claim. Rather, a person having ordinary skill in the art should be able to reasonably extrapolate from the data presented that the unexpectedly improved properties would exist throughout the full range of the claims. The examples in the '882 patent

provide a number of different embodiments, all of which show improved elongation and improved resistance to splice. As explained in Dr. Boutrid's declaration, and as shown in the '882 patent, the films included essentially the same compositions, with the exception of the coating or covering present on a section or of the entire circumferential area of outer facing external side facing the UV-curable resin. EX2004, ¶¶37-43. Comparative example V1 includes the following materials:

Layer number	Composition	Proportion in layer in %	Thickness in μm
1	Durethan C38 F	88	40
	Durethan B40 FAM	12	
2	Adhesive promoter: Admer NF 498 E	100	10
3	Lupolen 2420 F	70	65
	Exceed 1327 CA	30	
4	Adhesive promoter: Admer NF 498 E	100	10
5	Lupolen 2420 F	70	75
	Exceed 1327 CA	30	
			Sum: 200 μm

EX2004 at ¶37.

68. In examples B1-B3, the polyamide side of the film from comparative example V1 was coated (finished) with the following silicone or polysiloxane formulations:

Example B1: Comparative example V1 plus polysiloxane formulation 1 according to the following table (application weight AW: 1 g/m²) that allows an easy release and has an especially good release effect;

Example B2: Comparative example V1 plus polysiloxane formulation 2 according to the following table (AW: 1 g/m²) that allows a tight or controlled release and has a medium release effect;

Example B3: Comparative example V1 plus polysiloxane formulation 3 according to the following table (AW: 1 g/m²) that allows a medium release and has a good release effect.

Example	Evonik RC products Quantities in % by weight			
	RC902	RC702	RC 711	A 18
B1		100%		
B2			98%	2%
B3	59%		39%	2%

EX2004, ¶38. These examples B1-B3 therefore use different types of polysiloxane materials (RC902, RC702, RC711, and A18), in varying proportions, and thus would be considered by a person having ordinary skill in the art to be representative of a “coating of a polysiloxane.” While different polysiloxanes in different amounts might be expected to provide slightly different improved mechanical properties, there would have been no reason to

expect that other polysiloxanes coated in similar or slightly different amounts would not also provide the improved mechanical properties disclosed by the '882 patent. In addition, it is possible that use of an extremely large amount of polysiloxane, or a very small amount of polysiloxane to form the coating would not provide improved mechanical properties, but a person having ordinary skill in the art would not have reasonably considered those amounts to be within the scope of '882 patent invention.

69. For tubular films with additional wax added as a migrating material to form the coating or covering on the external layer, the following samples B4-B6 were prepared. For Example B4: Structure of the inner tube film: thickness 200 μm ; with 1% release wax Constab PE-SA 270 (migrating additive) made from ethylene bis stearamide (EBS) in the polyamide external layer:

Layer number	Composition	Proportion in layer in %	Thickness in μm
1	Durethan C38 F	87.5	40
	Durethan B40 FAM	11.5	
	Constab PE-SA 270	1.0	
2	Adhesive promoter: Admer NF 498 E	100	10
3	Lupolen 2420 F	70	65
	Exceed 1327 CA	30	
4	Adhesive promoter: Admer NF 498 E	100	10
5	Lupolen 2420 F	70	75
	Exceed 1327 CA	30	
			Sum: 200 μm

70. Example B5: Structure of the inner tube film: thickness 200 μm ; with 4% release wax Constab PE-SA 270 made of ethylene bis stearamide (EBS) in the polyamide external layer:

Layer number	Composition	Proportion in layer in %	Thickness in μm
1	Durethan C38 F	85.5	40
	Durethan B40 FAM	9.5	
	Constab PE-SA 270	4.0	
2	Adhesive promoter: Admer NF 498 E	100	10
3	Lupolen 2420 F	70	65
	Exceed 1327 CA	30	
4	Adhesive promoter: Admer NF 498 E	100	10
5	Lupolen 2420 F	70	75
	Exceed 1327 CA	30	
			Sum: 200 μm

71. Example B6: Structure of the inner tube film: thickness 200 μm ; with 6% release wax Constab PE-SA 270 made of ethylene bis stearamide (EBS) in the polyamide external layer:

Layer number	Composition	Proportion in layer in %	Thickness in μm
1	Durethan C38 F	85.0	40
	Durethan B40 FAM	9.0	
	Constab PE-SA 270	6.0	
2	Adhesive promoter: Admer NF 498 E	100	10
3	Lupolen 2420 F	70	65
	Exceed 1327 CA	30	
4	Adhesive promoter: Admer NF 498 E	100	10
5	Lupolen 2420 F	70	75
	Exceed 1327 CA	30	
			Sum: 200 μm

72. See EX2004 at ¶¶ 40-43. These examples show the use of a migrating compound in varying amounts added to the outer side of the inner tubular film. A person having ordinary skill in the art would have no reason to expect that different migrating compounds, known in the art to provide a similar effect as the EBS wax used in examples B4-B6, would not also provide the same or similar improved mechanical properties. Similarly, a person having ordinary skill in the art would not have reasonably expected using different amounts of migrating compound to provide dramatically different mechanical properties, other than the use of far less than the 1% used in Example B4, or far more than the 6% used in Example B6. In addition, a person having ordinary skill in the art would understand that smaller amounts of migrating compound would result in less migrating compound migrating to the surface, and thus, at 1% by

weight of migrating compound, the covering so formed likely would not be present on entire circumferential area of the outer facing external side facing the UV-curable resin, but rather only on a section thereof.

73. The examples of the '882 patent do not provide examples of inner tubular films in which the migrating compound were coated on the outer facing external side facing the UV-curable resin, but a person having ordinary skill in the art would not have reasonably expected the results from forming a coating with a migrating compound or forming a covering by migration of a migrating compound to be significantly different. A person having ordinary skill in the would know and understand that coating the outer facing external side would provide more migrating compound on the surface than forming a covering with the same amount of migrating compound, and thus, the amounts used to provide a coating would be less than the amounts used to provide a covering having equivalent amounts of migrating compound on the film surface.
74. The results obtained by use of a coating with polysiloxane or a covering with a migrating compound all provide improved release characteristics, reduced coefficients of friction, improved elasticity until break, and increase in elasticity until spliced, when compared to a comparative example V1 that used a very small amount of the same migrating compound (EBS wax). EX2004 at ¶¶44-58.

75. These improvements are shown for different types of polysiloxane coatings, used in different amounts, as well as for different amounts of migrating compounds added to the external side to form a covering either covering a on a section or of the entire circumferential area of the outer facing external side facing the UV-curable resin. It is my opinion that the unexpectedly surprising results shown in the '882 patent examples would have been reasonably expected to exist for other coatings of polysiloxane and other migrating compounds, either coatings or coverings formed therefrom.

I declare that all statements made herein on my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Date: June 27, 2024

By: Patrick Brant