

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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UNIVACCO Technology Inc.,  
Petitioner, v.

LEONHARD KURZ Stiftung & Co. KG,  
Patent Owner.

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Case No.  
Patent No. 12,220,935 B2

**PETITION FOR POST GRANT REVIEW OF  
U.S. PATENT NO. 12,220,935**

**LIST OF EXHIBITS**

|         |                                                                                                                                                                                                                                                                                   |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ex-1001 | U.S. Patent No. 12,220,935 to Lasch (“the ’935 Patent”)                                                                                                                                                                                                                           |
| Ex-1002 | Declaration of Dr. Christopher K. Haas                                                                                                                                                                                                                                            |
| Ex-1003 | Curriculum Vitae of Dr. Christopher K. Haas                                                                                                                                                                                                                                       |
| Ex-1004 | Prosecution History of the ’935 Patent                                                                                                                                                                                                                                            |
| Ex-1005 | <b>ASTM D6862-11: Standard Test Method for 90 Degree Peel Resistance of Adhesives.</b> ASTM International, West Conshohocken, PA, 2011. <a href="https://doi.org/10.1520/D6862-11">https://doi.org/10.1520/D6862-11</a>                                                           |
| Ex-1006 | ZwickRoell. (n.d.). Materials testing machines ProLine Z005 to Z100 [Product information, PI 375 623]. ZwickRoell GmbH & Co. KG.                                                                                                                                                  |
| Ex-1007 | ASTM International. (2018). <i>ASTM D3330/D3330M–04(2018): Standard test method for peel adhesion of pressure-sensitive tape</i> . ASTM International. <a href="https://doi.org/10.1520/D3330_D3330M-04R18">https://doi.org/10.1520/D3330_D3330M-04R18</a>                        |
| Ex-1008 | ASTM International. (2025). <i>ASTM D903–98(2025): Standard test method for peel or stripping strength of adhesive bonds</i> . ASTM International. <a href="https://doi.org/10.1520/D0903-98R25">https://doi.org/10.1520/D0903-98R25</a>                                          |
| Ex-1009 | Gandur, M. C., Kleinke, M. U., & Galembeck, F. (1997). <i>Complex dynamic behavior in adhesive tape peeling</i> . <i>Journal of Adhesion Science and Technology</i> , 11(1), 11–28. <a href="https://doi.org/10.1163/156856197X00994">https://doi.org/10.1163/156856197X00994</a> |

U.S. Patent No. 12,220,935  
Declaration for Post-Grant Review

|         |                                                                                                                                                                                                                                                                                                                                                    |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ex-1010 | IMASS Inc. IMASS TL-2300 Tester: Slip/Peel Tester for Peel, Release and COF. Datasheet TL2300 DS 0211. Accord, MA: IMASS Instruments for the Materials and Surface Sciences.                                                                                                                                                                       |
| Ex-1011 | Peel-Zone Model of Tape Peeling Based on the Gecko Adhesive System ( <a href="http://dx.doi.org/10.1080/00218460701282539">http://dx.doi.org/10.1080/00218460701282539</a> )                                                                                                                                                                       |
| Ex-1012 | Peng, Z., Wang, C., Chen, L., & Chen, S. (2014). Peeling behavior of a viscoelastic thin-film on a rigid substrate. <i>International Journal of Solids and Structures</i> , 51(25–26), 4596–4603.                                                                                                                                                  |
| Ex-1013 | Van Heek Textiles. (2021, January). <i>Foil stamping advice</i> [PDF]. Van Heek Textiles. <a href="https://www.vanheektextiles.nl/assets/Downloads/Bookcloth-foil-stamping-advice-vanheektextiles-0121.pdf">https://www.vanheektextiles.nl/assets/Downloads/Bookcloth-foil-stamping-advice-vanheektextiles-0121.pdf</a>                            |
| Ex-1014 | GlueMachinery. (n.d.). <i>Angle Effect of Peel Adhesion on Pressure Sensitive Tapes and Labels</i> . Retrieved [accessed November 7, 2025], from <a href="https://www.gluemachinery.com/angle-effect-peel-adhesion-pressure-sensitive-tapes-labels/">https://www.gluemachinery.com/angle-effect-peel-adhesion-pressure-sensitive-tapes-labels/</a> |
| Ex-1015 | Pocius, A. V. (2012). <i>Adhesion and adhesives technology: An introduction</i> (3rd ed.). Carl Hanser Verlag GmbH & Co. KG.                                                                                                                                                                                                                       |
| Ex-1016 | Dalbe, M.-J., Santucci, S., Vanel, L., & Cortet, P.-P. (2014). <i>Peeling-angle dependence of the stick-slip instability during adhesive tape peeling</i> . <i>Soft Matter</i> , 10(45), 9637–9643. <a href="https://doi.org/10.1039/c4sm01840k">https://doi.org/10.1039/c4sm01840k</a>                                                            |
| Ex-1017 | Callister, W. D., Jr., & Rethwisch, D. G. (2018). <i>Fundamentals of materials science and engineering: An integrated approach</i> (5th ed.). Wiley. ISBN 978-1-119-17550-6                                                                                                                                                                        |
| Ex-1018 | Precision Urethane & Machine, Inc. (2025). <i>Mechanical properties of polyether</i> [PDF]. <a href="https://www.precisionurethane.com/assets/files/pdfs/PolyetherMechanicalProperties.pdf">https://www.precisionurethane.com/assets/files/pdfs/PolyetherMechanicalProperties.pdf</a>                                                              |

## **I. INTRODUCTION**

### **A. Engagement**

1. I, Chris K. Haas, PhD, have been retained by counsel for Petitioner Univacco Technology Inc. (“Petitioner”) as an expert in for the above-captioned post-grant review (PGR) proceeding. I was asked to investigate and express opinions about the validity of claims 1 – 25 of U.S. Patent No. 12,220,935 (the “‘935 Patent”), a copy of which is attached as Exhibit 1001. If asked to do so by the parties’ attorneys or the Court, I will testify at trial about the information and opinions in this report. The exhibits attached to this report are incorporated herein by reference. I have personal knowledge of the facts and opinions set forth in this declaration and believe them to be true. If called upon to do so, I would testify competently thereto.

### **B. Compensation**

2. For my time working on this matter, I am being compensated at my standard hourly consulting rate. I do not have any personal or financial stake or interest in the outcome of the present proceeding, and the compensation is not dependent on the outcome of this PGR and in no way affects the substance of my statements in this Declaration. I do not have any expectation or promise of additional business with the Petitioner in exchange for the positions explained herein. My

analysis here is based on my years of education, research and experience, as well as my investigation and study of relevant materials, including those cited herein.

**C. Qualifications and Experience**

3. My qualifications generally are set forth in my Curriculum Vitae, which is attached as Ex-1003. Ex-1003 also includes a list of the publications I have authored and a list of the other cases in which I have testified during the last five years.

3. I received the following educational degrees: a BS in Chemical Engineering (1993) and a PhD in Chemical Engineering (1997), both from Northwestern University in Evanston, Illinois.

4. I have over 20 years of professional experience with technology and product development of adhesive tapes and polymer extrusion, and that experience includes the development of several products involving adhesive systems. Part of the product development process includes troubleshooting and testing of adhesives for adhesive and cohesive strength, so I am intimately aware of many types and forms of peeling tests, for example. I was the lead product developer for several new products for use in ID cards and passports which needed to be affixed to paper passport data pages or plastic driver's licenses using varying adhesives, including 3M Color Floating Image Security Laminate®. I have at least 19 issued patents, most of which

involve adhesive systems. I was extensively involved in crafting and obtaining these patents, and I was on 3M's Tech Forum Intellectual Property Steering Committee as the sole technical Committee member for seven years.

5. I also have over 15 years of experience teaching at the University of St. Thomas in St. Paul, Minnesota as an adjunct professor as well as over 4 years at the University of Minnesota Twin Cities, and my teaching load includes graduate-level Polymers in Design, Manufacturing Processes, and Materials Engineering, all of which include instruction on adhesive materials, their properties and how adhesives are used in various manufactured systems.

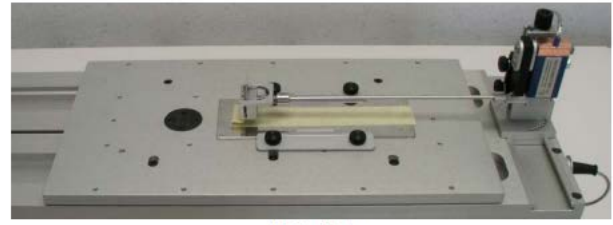
6. In my current role as an expert witness, I have served as an expert in at least four cases involving adhesive systems, including Mepco Label Systems vs. Derm Cosmetic Labs, Inc., Schwendimann/Nucoat Inc. vs. Stahls' Inc., and Lowe/Insight vs. Shieldmark/Advanced Plastics/Crown Equipment. For example, in the Mepco Label Systems v. Derm Cosmetic Labs, Inc. case, adhesive labels were not sticking to PET bottles, and I was called in to determine the root cause of the issue in order to settle a product liability case. For this case, I tested several dozen bottles and labels using an IMass TL-2300 peel tester (shown in the figure below, taken from Ex-1010) and analyzed and reported the results using industry standard statistics. For that testing, I used a standard roller to roll down the adhesive, stored

the materials in a constant temperature and humidity room prior to testing, and took repeated 180° peel measurements from a variety of samples to ensure I was not reporting outlier data.

#### IMASS TL-2300 Tester

Conforms to TLMI standards as well as PSTC, ASTM, FINAT, AFERA and TAPPI standards  
Speeds 6 to 1500 in/min (15 to 3800 cm/min)  
Accommodates longer, wider samples  
Successor to TL-2200, keeping its functions and adding more.

- Easy to set up and operate



180° Peel Setup

### D. Information Considered

7. In preparation for this declaration, I have considered the materials discussed in this declaration, including the '935 Patent, the references cited by the '935 Patent, the prosecution history of the '935 Patent (including the references cited therein), various background articles and materials referenced in this declaration, and the prior art references identified in this declaration. In addition, my opinions are further based on my education, training, experience, and knowledge in the relevant field.

### II. PERSON OF ORDINARY SKILL IN THE ART

8. A person of ordinary skill in the art ("POSITA") at the time of the purported invention of the '935 Patent would have had at least three years'

experience working with polymers, plastics, and/or adhesives with a BS or engineering degree in chemistry, analytical chemistry, polymer engineering, materials science, chemical engineering, or an equivalent field. Alternatively, a POSITA would have had a master's degree or in one of the above academic disciplines with one year of work experience as described above. Additional education can substitute work experience, and vice versa. For purposes of investigating the validity of the '935 Patent and forming my opinions in this report, I have applied this definition.

9. The proposed level of skill for the POSITA would not change if a different priority of the invention date is found.

### III. LEGAL STANDARDS

10. I am not an attorney, and I have not been asked to offer any legal opinions. In preparing and expressing my opinions in this Declaration, I have applied the legal standards described below, which were explained to me by counsel for Petitioner.

11. I am not an attorney and I do not intend to testify at trial about the law that a jury should apply. In forming my opinions in this report, I have applied the following legal standards.

12. **Claim Construction.** I apply the plain and ordinary meaning to each claim term, as that plain and ordinary meaning would have been understood by a

POSITA. I reserve the right to offer opinions on any claim constructions proposed in this proceeding or to offer opinions on constructions in district court litigation.

13. **Burden of proof.** I understand that the Petitioner, as the ones attempting to prove the invalidity of the '935 Patent, have the burden of providing invalidity of the '935 Patent by a preponderance of the evidence.

14. **Indefiniteness.** I understand that a patent claim is indefinite if, read in light of the specification, it fails to inform a POSITA "with reasonable certainty" where the boundary lies. When a measured number marks the boundary, the patent must supply an objective method to obtain it. This analysis is done from the perspective of a person having ordinary skill in the art.

15. **Enablement.** I understand that, in the context of anticipation, the content of the prior art item must enable a person having ordinary skill in the art to practice the patented invention without undue experimentation. But I understand that the enablement requirement does not apply in a public use or sale of a prior art device or method that embodies the patented invention. I understand that the following factors may be considered to determine whether experimentation would have been undue: a) the quantity of experimentation necessary; b) the amount of direction or guidance presented; c) the presence or absence of working examples; d) the nature of the patented invention; e) the state of the prior art; f) the relative skill of

persons in the art; g) the predictability or unpredictability of the art; and h) the breadth of the patent claims.

16. **Written description.** I understand that a patent claim is invalid if the patent does not contain an adequate written description of the claimed invention. The test for written description is whether the specification, including the written description and drawings, would have objectively demonstrated to a person having ordinary skill in the art that the patent applicant actually invented or "possessed" the claimed subject matter when the patent application was filed. The specification does not require a disclosure of examples or an actual reduction to practice of the claimed invention. However, the specification must show possession of the claimed invention on its face, and evidence of reduction to practice outside the specification is not sufficient by itself to satisfy the written description requirement.

#### **IV. THE CHALLENGED PATENT**

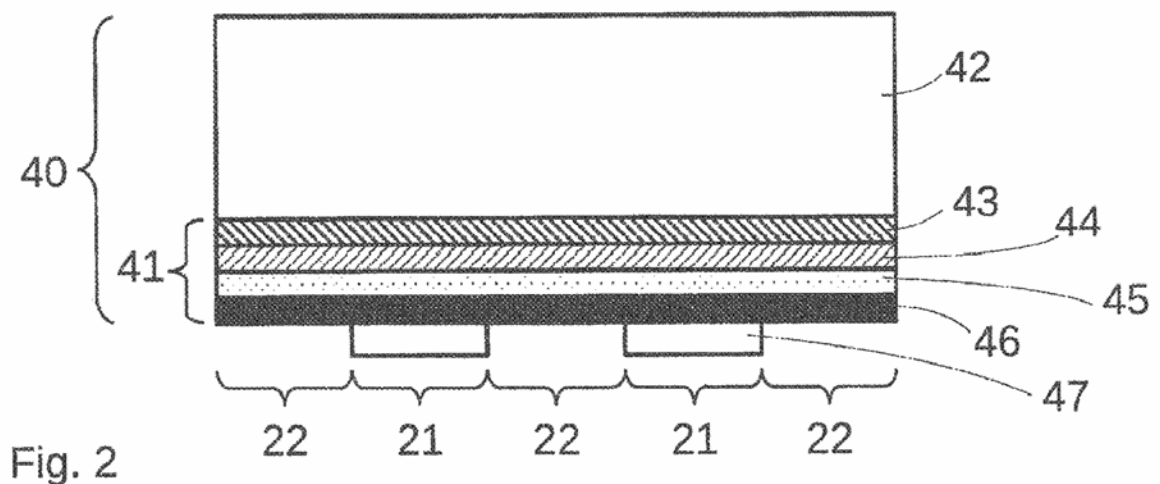
17. The '935 Patent is based on U.S. Patent Application No. 17/780,090 which was filed in the U.S. Patent and Trademark Office on November 20, 2020.

18. The "Summary of the Invention" in the '935 Patent describes a decorative foil and a method for producing this foil. The foil consists of an "all-over varnish layer" and a "carrier film." (Ex-1001, 1:45-49.)

19. The all-over varnish layer can be applied to a substrate using an adhesive, and the carrier film is removed. The force required to remove this carrier film after application and fluctuations in that force are key to the claims, as is the thickness of the carrier film and the thickness of the all-over varnish layer. (See Ex-1001, Abstract.)

20. In particular, the all-over varnish layer consists of several other layers, which includes “at least one detachment layer and/or at least one protective varnish layer and/or at least one decorative layer and/or at least one primer layer and/or at least one adhesive layer and/or at least one color layer.” (Ex-1001, 3:1-5.)

21. The “Detailed Description of the Invention” in the ‘935 Patent describes a foil that has a carrier film and includes figures such as figure 2 which describes one configuration:



(Ex-1001, fig. 2)

22. Where 40 is the decorative foil, 41 is the all-over varnish layer, 42 is the carrier film, 43 is the detachment layer, 44 is the protective varnish layer, 45 is the decorative layer, 46 is the primer layer, and 47 is the adhesive layer. (Ex-1001, 20:36-43.)

23. Decorative foils like this are typically applied to a substrate to which an adhesive is applied in a certain pattern. Fig. 2 of the '935 Patent shown above demonstrates a patterned adhesive layer. As described in the '935 Patent, the adhesive can be "a hot glue, a thermoplastic adhesive, a cold glue, [or] a radiation-curable adhesive" (Ex-1001, 15:64-65; fig. 2.) After the foil-adhesive-substrate bond has been formed, the carrier film is removed. When the carrier film is removed, the portions of the all-over varnish layer bonded to adhesive (which is bonded to the substrate) will remain on the substrate, while the all-over varnish layer not bonded to the adhesive will remain with the carrier film. The force needed to separate the carrier film from the all-over varnish layer/adhesive/substrate system is defined as the "tear-off force" (Ex-1001, 3:12-16.)

24. Naturally, in order for some of the all-over varnish layer to remain with the adhesive/substrate and some of the all-over varnish layer to leave with the carrier film requires some cracking and breaking within the all-over varnish layer; the force

required to form these cracks is defined in the '935 Patent as the "cracking force" (Ex-1001, 7:43-45.)

25. As stated in the '935 Patent, the adhesive is often applied in a pattern so that the final product will have a similar pattern. This pattern can be a "character, symbol, microprint, image, photo, logo, portrait, pictogram, pattern..." etc. (Ex-1001, 7:28-31.) In order to have the best possible final image, the all-over varnish layer should break cleanly along the edge with no missing portions within the applied pattern. "The covering power is a measure of the number of defects in a target substrate decorated with a continuous solid surface. In the case of 100% covering power, therefore, no defects or holes occur inside this solid surface..." (Ex-1001, 4:50-54.)

26. The detailed description also includes some description of a process of applying an adhesive layer to a substrate and then applying the decorative foil. This process description includes some peel force data related to the force required to remove the carrier film from the all-over varnish layer, with some description of the test used to generate those data. This description and test will be described in more detail later in this document. Although it is not explicitly stated in the '935 Patent, this peel force is a combination of the cracking and tear-off forces.

27. The '935 Patent has a total of 25 claims. I understand that the following claims are under review for invalidation: 1 through 25.

28. Independent claims 1 and 25 of the '935 Patent are reproduced below:

1. *A decorative foil comprising a carrier film and an all-over varnish layer, wherein the carrier film has a thickness in the range of from 3.0  $\mu\text{m}$  to 10.0  $\mu\text{m}$ , and*

*wherein a tear-off force between the carrier film and the all-over varnish layer has fluctuations in the force amplitude around its average in a range of from more than or equal to  $-0.5\text{ cN}$  to less than or equal to  $0.5\text{ cN}$ .*

25. *A decorative foil comprising a carrier film and an all-over varnish layer, wherein the carrier film has a thickness in the range of from 3.0  $\mu\text{m}$  to 10.0  $\mu\text{m}$ , and*

*wherein the all-over varnish layer has a covering power of more than or equal to 99.5%, in the case of a decoration of a continuous solid surface and a decoration or point perception of more than or equal to 99.5%, in the case of a decoration of a 10% halftone area.*

#### **A. Prosecution History of the '935 Patent**

29. I understand that the '935 Patent issued on February 11, 2025 from U.S. application No. 17/780,090, which is a National Stage entry of PCT/EP2020/082896,

filed November 20, 2020, which, in turn, claims priority to German patent application No. 102019132787.3, filed December 3, 2019. (Ex-1001, Cover.)

30. I understand that during prosecution, an Office Action was issued on April 16, 2024. (Ex-1004, p. 285.) Therein, the Examiner indicated that claims 7, 12, 16, and 28 were rejected under 35 USC 112(b) due to indefiniteness. (Ex-1004, p. 289.) The Examiner erroneously did not list claim 6 as being rejected. (Ex-1004, p. 285.) However, in the detailed discussion of the Office Action, the Examiner rejected claim 6 and erroneously indicated that claim 6 “can have two conflicting interpretations,” whereas the Examiner should have indicated that claim 6 has three conflicting interpretations that are included the detailed grounds of the rejection: “(1) said tear-off force is with respect to the carrier film and the all-over varnish layer; (2) said tear-off force is with respect to the all-over varnish layer and some other surface; or (3) said tear-off force is with respect to the carrier film and some other surface.” The Examiner indicated that for purposes of examination the “former interpretation” applies, wherein the claim will be treated to read as “a[[the ]] tear-off force between the carrier film and the all-over varnish film has fluctuations.” (Ex-1004, p. 290.)

31. In response, the applicant filed an Amendment on September 10, 2024. More specifically, the applicant amended the claims by canceling claim 7, incorporating claim 6 into independent claim 1, and rewriting claim 8 in independent

form. The applicant did not comment on the above-mentioned errors. (Ex-1004, pp. 272-281.)

32. Based on my knowledge, experience, and review of the information that I discuss in more detail below, I do not agree that '935 Patent claims 1 through 25 are patentable. Those of skill in the art would not have understood how to make or use the claimed invention in a manner that would provide proper enablement without undue experimentation, taking into account the specification and drawings of the '935 Application.

33. I have been informed that the Petition presents substantially new arguments that were not considered during prosecution.

**B. Priority Date**

34. For the purposes of this declaration, I have been asked to assume that the priority date of the '935 Patent is December 3, 2019.

**C. Claim Interpretation**

35. I have been informed and understand that in a PGR proceeding, claims are to be interpreted according to the *Phillips* claim construction standard. I understand that under this standard, the meaning of claim terms is considered from the viewpoint of a POSITA at the time of the alleged invention. I have been informed

and understand that claim construction is a matter of law and that the final claim constructions for this proceeding will be determined by the Patent Trial and Appeal Board (“PTAB”).

36. I have been informed that claim terms are generally given their ordinary and customary meaning as understood by one of ordinary skill in the art in light of the specification and the prosecution history pertaining to the patent. I understand, however, that claim terms are generally not limited by the embodiments described in the specification.

37. I understand that in addition to the claims, specification, and prosecution history, other evidence may be considered to ascertain the meaning of claim terms, including textbooks, encyclopedias, articles, and dictionaries. I have been informed that this other evidence is often less significant and less reliable than the claims, specification, and prosecution history.

## **V. DETAILED EXPLANATION OF THE UNPATENTABILITY GROUNDS**

### **I. THE ASSERTED CLAIMS OF THE ‘935 Patent ARE INVALID BASED ON INDEFINITENESS**

38. Claim 1 of the ‘935 Patent states:

*A decorative foil comprising a carrier film and an all-over varnish layer.*

*wherein the carrier film has a thickness in the range of from 3.0  $\mu\text{m}$  to 10.0  $\mu\text{m}$ , and*

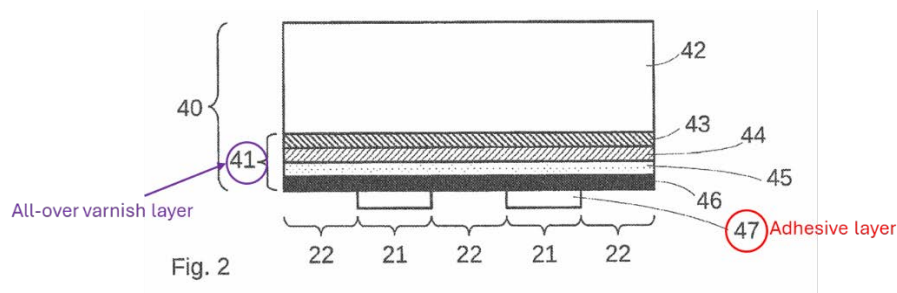
*wherein a tear-off force between the carrier film and the all-over varnish layer has fluctuations in the force amplitude around its average in a range of from more than or equal to  $-0.5\text{ cN}$  to less than or equal to  $0.5\text{ cN}$ . (Ex-1001, 20:48-55.)*

39. There are several aspects of claim 1 that are overly ill-defined.

**A. Composition of the all-over varnish layer**

40. I have reviewed the specification of the '953 patent, and there are several inconsistencies and omissions in the composition of the all-over varnish layer that make applying claim 1 all but impossible. Within the specification of the '953 patent, each one of these layers is described. However, based on Fig. 2, 3, 4, and 5, the adhesive layer is separate from the varnish layer.

41. Other than the adhesive layer described as 47 in Fig. 2, 3, 4, and 5, there is no other adhesive layer described in the specification.



(Ex-1001, fig. 2 (annotation added))

42. This is further confused by the description of Fig. 1 (and Fig. 2) that states that “...except that an adhesive layer 47 covers a surface of the all-over varnish layer 41....” (Ex-1001, 13:67-14:1.). This statement notes that the adhesive layer is either not a part of the all-over varnish layer or that there is some additional undefined adhesive layer, which would complicate any peel testing.

43. In addition, the thickness of the all-over varnish layer is not consistent with the thicknesses of its individual components.

44. The thickness of the all-over varnish layer is provided as having a thickness from 1.0  $\mu\text{m}$  to 2.5  $\mu\text{m}$ , in particular from 1.0  $\mu\text{m}$  to 1.7  $\mu\text{m}$ . (Ex-1001, 2:36-37.) In addition, the detachment layer is listed as in the range from 0.01  $\mu\text{m}$  to 0.50  $\mu\text{m}$ , preferably from 0.10  $\mu\text{m}$  to 0.30  $\mu\text{m}$  (Ex-1001, 3:55-56); the protective varnish layer is listed in the range from 0.5  $\mu\text{m}$  to 3  $\mu\text{m}$  or possibly (“in particular”) from 0.8  $\mu\text{m}$  to 1.3  $\mu\text{m}$  (Ex-1001, 4:60-62); the decorative layer is listed in the range from 0.08  $\mu\text{m}$  to 0.500  $\mu\text{m}$ , preferably from 0.08  $\mu\text{m}$  to 0.060  $\mu\text{m}$  (Ex-1001, 5:7-8); and the primer layer is listed as in the range from 0.1  $\mu\text{m}$  to 2  $\mu\text{m}$ , preferably 0.2 to 0.8  $\mu\text{m}$  (Ex-1001, 6:40-41). There is no thickness range given for the adhesive or the color layer.

45. As a POSITA would recognize, it is thus impossible to achieve the minimum  $1.0\text{ }\mu\text{m}$  of the “in particular of from  $1.0$  to  $1.7\text{ }\mu\text{m}$ ” based on the individual layers of the construction provided by the ‘935 Patent itself because the minimum thickness of the preferred individual layers is greater than  $1.0\text{ }\mu\text{m}$ . Inevitably, some layers are not present in the all-over varnish layer, but if some layers must be excluded from the construction of the all-over varnish layer, it is not clear what layers must be present in the all-over varnish layer as described in the claims.

46. This thickness indefiniteness is exacerbated if the adhesive is included in the construction of the all-over varnish layer, as the definition of the all-over varnish layer. (Ex-1001, 3:1-5; 15:46.) A POSITA would understand that the kind of adhesives described in the specification of patent ‘935, including “hot glue, thermoplastic adhesive, a cold glue, a radiation-curable adhesive” (Ex-1001, 8:56-58), etc., have typical thickness ranges in excess of  $1.0\text{ }\mu\text{m}$ , especially for systems using decorative foils. (See, e.g., Ex-1013 (adhesive coating layer “ $1.0$  to  $1.3$  microns”). This means that it is impossible for the all-over varnish layer of the ‘935 Patent to fall *anywhere* within the thickness range described in the specification, i.e.,  $1.0\text{ }\mu\text{m}$  to  $1.7\text{ }\mu\text{m}$ , as the minimum thickness of the combined construction would be greater than  $2\text{ }\mu\text{m}$ .

47. In my opinion, because the description of the all-over varnish layer in the '935 Patent is inconsistent with the claims, the composition of the claimed all-over varnish layer—present in all claims—is unclear. Therefore, a POSITA would neither know how to construct the claimed invention nor how to avoid infringement.

**B. Fluctuations in the force amplitude**

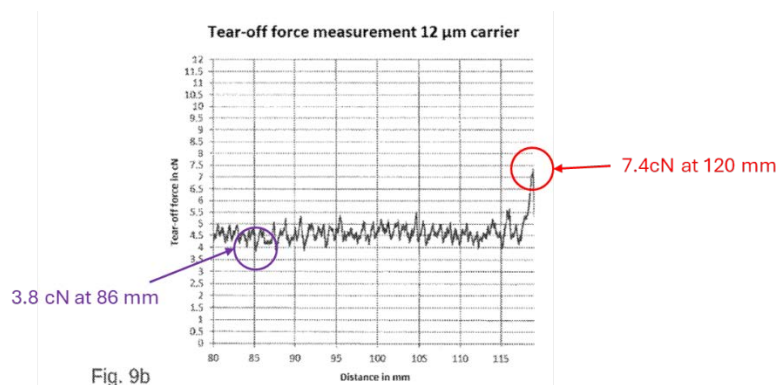
48. I have reviewed the specification of the '953 patent, and there are several inconsistencies and omissions in the essential peel force measurement system that make applying claim 1 all but impossible.

49. The fluctuation limitation in claim 1 requires a tear-off “force amplitude around its average” of  $\leq \pm 0.5$  cN, meaning that claim 1 has a boundary that is a measured parameter.

50. As claim 1 of the '935 Patent does not include a method for measuring fluctuations of the tear-off force, I consulted the specification. The most relevant information states that “[a] materials testing machine of the Z005 type from ZwickRoell GmbH & Co. KG was used to record the measured values. The carrier film 42 to be peeled off has a width of 13.5 mm and a length of 41 mm in both tests. The detachment of the carrier film 42 is effected in the longitudinal direction at speed of 100 mm/min.” (Ex-1001, 18: 39-44.) However, this information is not nearly

enough to allow a POSITA to apply the  $\leq \pm 0.5$  cN boundary to a comparative example.

51. One major issue is that the fluctuation value is undefined and unclear. The simplest interpretation is that the fluctuation is equal to the highest maximum force minus the lowest minimum force. For example, in Fig. 9b, this would be 7.4 cN (around 120 mm on the distance axis) – 3.8 cN (around 86 mm on the distance axis), giving a fluctuation of 3.8 cN. Since the specification states that the fluctuation is “up to  $\pm 1$  cN around the average” (Ex-1001, 18:58-59), a different and unspecified formula must have been used for obtaining that value. Therefore, the fluctuation in the force amplitude around its average is indefinite.



(Ex-1001, fig. 9b (annotation added))

52. In addition, the peel angle for this test is not specified. The only time peel angle is mentioned in regards to this test is “... wherein the peel angle between the carrier film 42 and the all-over varnish layer 41 lies in a range of from 0° to 120°,

preferably of from  $0^\circ$  to  $90^\circ$ .” (Ex-1001 17:50-55.) Therefore, the peel angle used in the test method to define a critical aspect of the claims is indefinite. The peel angle is the angle of the removing the tape (in this case the carrier film) from the substrate, as shown in the figure below, where  $\theta$  denotes the peel angle:

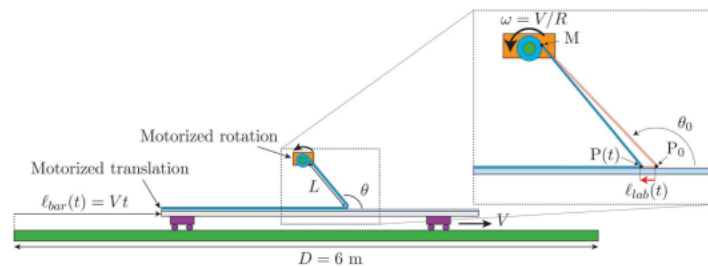


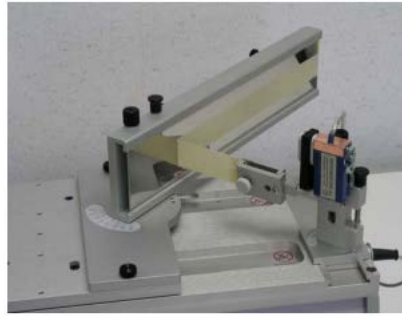
Fig. 1 Scheme of the peeling experiment at controlled velocity  $V$ , angle  $\theta$  and peeled tape length  $L$ . The translation velocity  $V$  of the rigid bar and the winding velocity  $R\omega$  are slaved electronically to each other.  $\ell_{bar}$  is the position of the rigid bar and  $\ell_{ab}(t) = \overline{P_0 P(t)}$  is the position of the peeling front in the laboratory frame.  $M$  is the location of the point where the winding of the peeled tape proceeds,  $P_0$  is the average location of the peeling point and  $P(t)$  is its location as a function of time  $t$ .  $\theta_0$  is the average peeling angle. We denote  $L = |MP_0|$  as the average peeled tape length.

(Ex-1016, fig. 1)

53. A POSITA would appreciate that peel angle is a very important aspect of testing peel adhesion. Commonly, for pressure sensitive adhesives, as described in section 9.2.3.2 of the seminal book *Adhesion and Adhesives Technology* (Ex-1015), “[p]eel is tested most commonly by the  $90^\circ$  or  $180^\circ$  peel tests”. However, these are not the only peel angles used in the industry.

54. A POSITA would further appreciate that peel force can change dramatically depending on peel angle, as described repeatedly in the literature that emphasizes that peel performance and variability (such as the fluctuations described in the claims of patent ‘935) all depend on peel angle. (See, e.g., Ex-1011; Ex-1012; and Ex-1014). As a result, it would take significant experimentation to divine what

peel angle would generate the data presented in the specification of the '935 Patent. It is for this reason that testing equipment such as the TL2300 includes a wide range of user-selectable peel angles (“from 22 ½° to 180°”). (Ex-1010.)



**Variable Angle Peel Fixture** (above) is easily installed and removed for other fixture installations. Accommodates peel angles from 22 ½° to 180°. Pin-indexed angles are at intervals of 22 ½°, but any other angle in between may be interpolated using the built in scales. This fixture receives panels 2 3/8 inches wide by 12 inches long, accepting tape widths to 2 inches.

(Ex-1010, pg.1)

55. The application of the carrier/all-over varnish layer to the adhesive/substrate is also not defined in determining the fluctuations of the tear-off force. How the adhesive is applied to any substrate or other layers is typically defined in standardized peel tests. (See, e.g., Ex-1005; Ex-1007; Ex-1008). For example, Ex-1007 page 3 states: “6.4.1 A steel roller 85 6 2.5 mm [3.25 6 0.1 in.] in diameter and 45 6 1.5 mm [1.75 6 0.05 in.] in width, covered with rubber approximately 6 mm [0.25 in.] in thickness, having a Shore scale A durometer hardness of 80 6 5. The surface shall be a true cylinder void of any convex or concave deviations. The mass of the roller shall be 2040 6 45 g [4.5 6 0.1 lb]. 6.4.2 No part of the apparatus shall increase the mass of the roller during use. The roller

shall move either mechanically or by hand at the rate of 10 6 0.5 mm/s [24 6 0.5 in./min]. A mechanically operated roller is recommended for referee purposes.” This level of detail is needed because the application process such as “roll down” (i.e., pressing on the adhesive with uniform force) is “a testing parameter important for PSAs [pressure sensitive adhesives] when determining peel or shear.” (Ex-1015 p 26). There exist numerous pathways to applying and firmly affixing an adhesive, especially hot-melt or pressure-sensitive adhesives. In fact, it is not clear if the decorative foil is adhered to a substrate prior to carrier removal in the ‘935 Patent example even though that is how it would be used as a product. This information is absent from the ‘935 Patent. Therefore, it would take significant experimentation to divine what application technique would generate the data presented in the specification of the ‘935 Patent.

56. The sample measurement temperature and the conditioning (i.e., length of time at some specified temperature and humidity prior to testing) applied before the measurement was taken is also not defined in determining the fluctuations of the tear-off force. As shown in Exhibits 1005, 1007, and 1008, the conditioning is typically defined. For example, from page 3 of Ex-1007: “Condition the sample rolls of tape in the standard conditioning atmosphere as described in Practice D4332 for a period of not less than 24 h. Test at these conditions. (Warning—The tester should

know that by prolonged handling heat is transmitted to the stainless steel test panel. Therefore, during and after application of the adhesive tape to the test panel, the panel should be handled as little as possible.)” This level of detail is needed because the temperature can greatly affect the peel performance. As described in Fig. 9.13 of Exhibit 1015, “the modulus (dashed line) of the adhesive [is] a function of the temperature...”, so the average and the fluctuations of a peel test would be affected by measurement temperature and conditioning before measurement. Therefore, it would take significant experimentation to divine what application technique would generate the data presented in the specification of the ‘935 Patent.

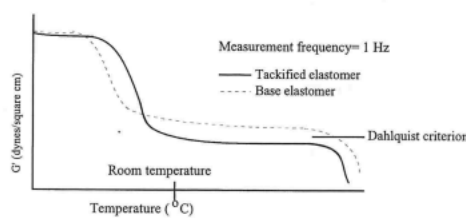
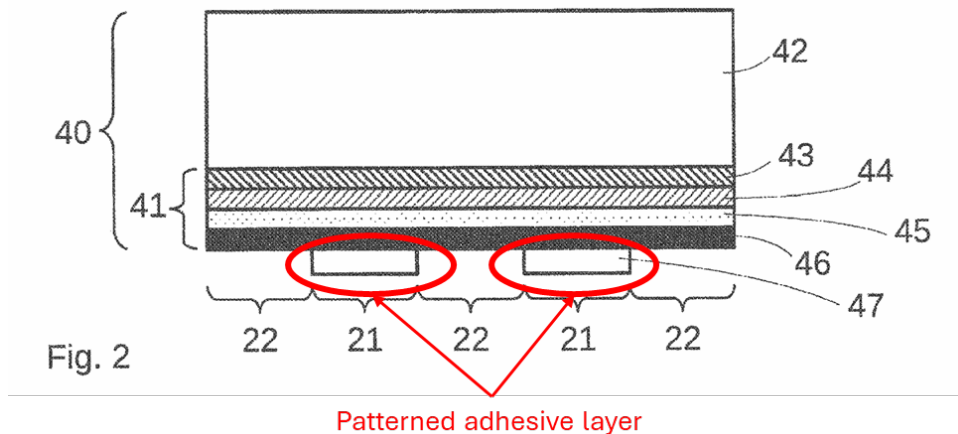


Figure 9.13 Dynamic mechanical spectrum of a PSA-based elastomer in the tackified and non-tackified state. The measurement is done at a single frequency but as a function of temperature. Note that the tackified elastomer has a plateau modulus below that of the Dahlquist criterion

(Ex-1015, fig. 9.13)

57. Finally, it is not clear what adhesive pattern was used to apply the foil to the substrate, if the foil was first attached to a substrate prior to the removal of the carrier film. As shown in Figs. 2 – 5 of the ‘935 Patent, sometimes the adhesive might coat the entirety of the interface between the foil and the substrate, and it might only cover a portion of the surface. This is described in Fig. 2 as “with the

same structure as shown in Fig. 1, except that an adhesive layer 47 covers a surface of the all-over varnish layers 41 in the first regions 21 and does not cover it in the second regions 22.” (Ex-1001, 13: 66 – 14:2].



(Ex-1001, fig. 2 (annotation added))

58. In my opinion, the description of the overall fluctuations of the force layer and the test method used to devise those fluctuations is not fully developed within the claims or the specification of the ‘935 Patent, so it is unclear what is being claimed in any of the claims, most of which include this limitation. Therefore, since a POSITA cannot ascertain what an appropriate test method would be to account for this limitation because many aspects are unclear within the specification and claims, the asserted claims of the ‘935 Patent are not sufficiently defined.

## **II. THE ASSERTED CLAIMS OF THE ‘935 Patent ARE INVALID BASED ON ENABLEMENT**

**A. Thickness and material of the carrier and all-over varnish layers**

59. Given the claim breadth, the sparse guidance of a single success at  $\sim 5.7$   $\mu\text{m}$  and one failure at  $12\text{ }\mu\text{m}$  do not teach a POSITA how to achieve a  $\pm 0.5$  cN envelope across the full  $3\text{--}10\text{ }\mu\text{m}$  range, especially at the hard edge ( $\sim 9\text{--}10\text{ }\mu\text{m}$ ), without undue experimentation. The '935 Patent instead reflects, at best, an unguided suggestion to optimize carrier film thickness across a broad  $7\text{ }\mu\text{m}$  range that is structurally and functionally unpredictable based on a single data point. Therefore, the '935 Patent fails to enable a POSITA to make the full scope of the claimed genus of decorative foils and identify which compositions will achieve the claimed fluctuation range as the challenged claims require. The '935 Patent offers no examples, working guidance, or methodology for achieving the claimed fluctuation range with  $3.0\text{ }\mu\text{m}$  carrier films,  $4.0\text{ }\mu\text{m}$  carrier films,  $6.0\text{ }\mu\text{m}$  carrier films,  $8.0\text{ }\mu\text{m}$  carrier films, or  $10.0\text{ }\mu\text{m}$ .

60. The internal inconsistency compounds the enablement failure by making interpolation unreliable. If the true fluctuation for  $12\text{ }\mu\text{m}$  films is  $\pm 1.8$  cN (based on the raw data in Figure 9b including the  $7.4$  cN peak), then linear interpolation suggests that  $9\text{--}10\text{ }\mu\text{m}$  films would have fluctuations of approximately  $\pm 1.2\text{--}1.4$  cN. This would make the claimed  $\pm 0.5$  cN range unlikely to be achievable across the full  $3\text{--}10\text{ }\mu\text{m}$  range without extensive optimization that the '935 Patent does not teach.

61. As described above, there are potentially several layers involved in the all over varnish layer, many of which are polymeric and therefore viscoelastic, that is, they exhibit both solid and liquid properties. This means that the peel mechanism is incredibly complex, so several data points (certainly more than one “good” and one “bad”) are needed to define the performance of such a system.

62. In addition to the complex viscoelastic interactions among various components mentioned in above, Ex-1009 demonstrates that fluctuations arise from “the formation of adhesive fibrils during the peeling” (p12) and involve “two frequency domains: lower frequencies are associated with stick-slip and higher frequencies are related to the massive rupture of adhesive fibrils.” (Abstract) These mechanisms represent significant contributors to the observed force variations. The ‘935 Patent does not address these mechanisms, including adhesive fibril formation, stick-slip phenomena, cohesive zone propagation, friction/shear force, or rate-dependent filamentation effects, which may significantly influence fluctuation behavior. Without guidance on how these variables interact with carrier film thickness to affect the claimed fluctuation range, a POSITA cannot reliably predict or control tear-off force fluctuations across the full scope of the claims.

63. The ‘935 Patent treats fluctuations as a simple, predictable result of carrier film thickness. However, this single-variable approach does not

provide sufficient understanding of the multi-variable system that determines whether a decorative foil will achieve the claimed performance characteristics, particularly the fluctuation range. As discussed in Ex-1009, Ex-1011, and Ex-1016, the effects of peeling rate, peeling angle, film thickness, surface roughness and the interfacial adhesive on the peel-off force must be considered as both the viscoelastic properties of a film and interfacial adhesive contribute to the rate-dependent peel-off force. Instead, the '935 Patent lacks an understanding of the multiple complexly interacting force fluctuation phenomena and associated variables in multi-layer adhesive systems that make the claimed fluctuations unpredictable. Ex-1012 shows that going from 30 to 90° peel angle can change peel-off force by a factor of 5 while increasing the film thickness from 0.13 mm to 0.39 mm only changes peel-off force by a factor of  $\sim 1.25$  for some systems:

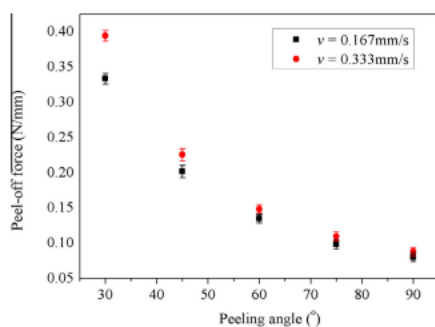


Fig. 7. The peel-off force varying as a function of the peeling angle with two different peeling rates 0.167 mm/s and 0.333 mm/s, respectively.

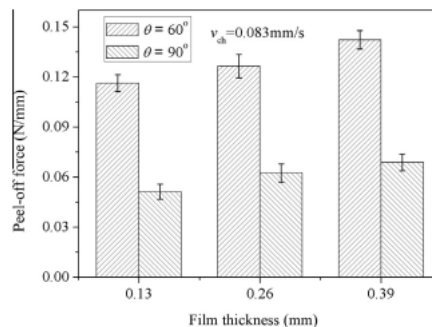


Fig. 8. The influence of film thickness on the peel-off force with a determined peeling rate and two different peeling angles 60° and 90°, respectively.

(Ex-1012, fig. 7 and 8)

64. Claim 1 embraces a vast genus of decorative foils as it is not limited to any particular all over varnish layer composition or structural class. While the claim limits the carrier film thickness to 3.0  $\mu\text{m}$  to 10.0  $\mu\text{m}$ , the structural limitations still encompass a broad genus of structurally and functionally disparate compositions which include “PET, PMMA, PC, PE, PVC, PS, ABS, PU, PBS, PLA, PAN, and/or glass.” (Ex-1001 2:66-67.) These materials have a wide range of Moduli of Elasticity which are given in Ex-1017 and 1018, demonstrating a range of about four orders of magnitude for Modulus of Elasticity for PU (1,212 psi for PU PP1701 in Ex-1018) to glass (10,000,000+ psi for various glasses in Ex-1017, Table B-2). These materials will offer significantly different performance in peel for both average force and fluctuation force due to this difference in modulus. As the claims of the ‘935 Patent include the functional limitation requiring “fluctuations in the force amplitude around its average in a range of from more than or equal to  $-0.5$  cN to less than or equal to  $0.5$  cN,” there is no way to determine whether a composition meets this functional limit without significant testing and undue experimentation.

**B. Fluctuations in the force amplitude**

65. As described in section I B above, the test method for determining the peel force fluctuations is incomplete. This would require significant trial and error

test development to identify the same conditions that were used by the inventors of the '935 Patent.

66. To give one example, as an expert on peel testing, the higher “force amplitude” of the “fluctuations” for the 12  $\mu\text{m}$  sample described in the specification of the '935 Patent (Ex-1001 18:58-60) is consistent with stick-slip adhesive behavior as described in Exhibits 1015 and 1016. As is documented in Ex-1016, the criteria for large fluctuations is dependent on peel angle. As the peel angle is not defined for the fluctuation test method, tests run at several different angles between 0 and 90° in order to enable this invention. Fig. 3 of Ex-1016 shows that the effect of peel angle on stable peel (i.e., low fluctuation peel) vs. stick-slip (i.e., high fluctuation peel) is very high as high peel angle ( $> 90^\circ$ ) has several points of stable peel while low peel angle ( $< 90^\circ$ ) has no points of stable peel for their system:

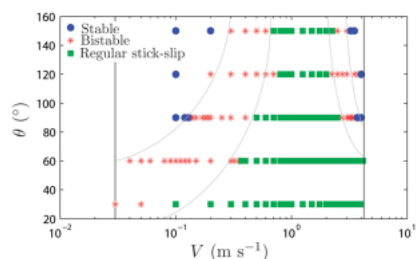


Fig. 3 Diagram of the peeling regime in  $(V, \theta)$ -space. Each marker corresponds to one experiment. The vertical lines show the experimental limits of our setup. The continuous gray lines are a guide to the eye.

(Ex-1016, fig. 3)

67. The equipment specified in the specification of the '935 Patent to test this peel force is given as “A materials testing machine of the Z005 type from

ZwickRoell GmbH & Co. KG was used to record the measured values.” (Ex-1001 18:39-41) with no other information. Ex-1006 is the Product Information guide for this equipment, and there is no indication of any peel test, let alone peel angle within this document. Therefore, in order to run this peel test, a separate fixture would need to be identified and acquired. With equipment like this there are typically dozens of off-the-shelf fixtures or grips available, and even more are available if using customized versions. Ex-1006 shows that the base model versions of this equipment do not come with a fixture well suited to peel tests of any angle:

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**Product Information**

Materials Testing Machines ProLine Z005 to Z100



ProLine Z050 TN with body-over-wedge grips, makroXtens P, and



ProLine Z010 TH with pneumatic grips

(Ex-1006, pg. 1)

68. Typically, when developing a peel test for the manufacture of a new product, it is advisable to set up the test to mimic what is seen by the product during

manufacture. In the case of the decorative foil of patent '935, the peel angle used in this test should be similar to the peel angle used in the application of this product to a substrate when the carrier is removed. As a POSITA would not know what angle this product would see during application to a substrate, it would take considerable experimentation to identify the correct fixture to use to test this product during carrier removal.

69. Yet another issue with the fluctuating testing is the uncertainty regarding the analysis of the data. The data sets shown in Fig. 9a and 9b of patent 935 show a lot of non-normal distributions and complex non-sinusoidal fluctuations. Therefore, it is unclear how the inventors calculated average or fluctuation range. For example, Ex-1009 describes complex mathematics used to quantify fluctuations in adhesive tape peeling with different quantification approaches that can be used. The relative skill of practitioners in this field is correspondingly high, given the technical complexity involved in understanding and controlling force fluctuation phenomena in multi-layer adhesive systems. Ex-1009 demonstrates that force oscillations are deterministic phenomena requiring sophisticated mathematical analysis using “Lyapunov exponent and Grassberger-Procaccia dimension” to distinguish from random noise. Side-by-side images of the peel force data from the '935 Patent and

some peel force data in fig. 1 from Ex-1009 showing similar levels of chaos in the signals:

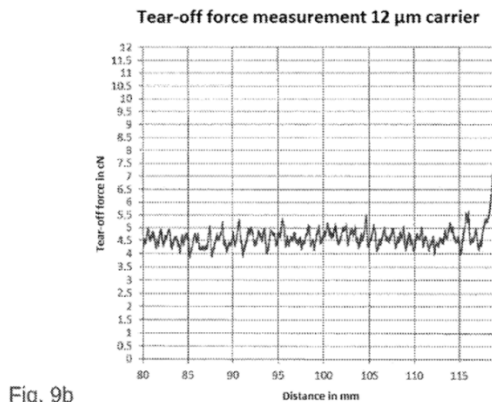


Fig. 9b

(Ex-1001, fig. 9)

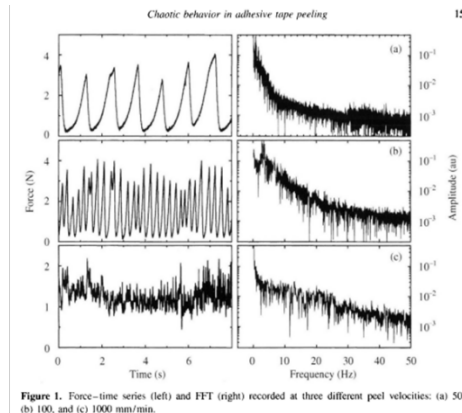
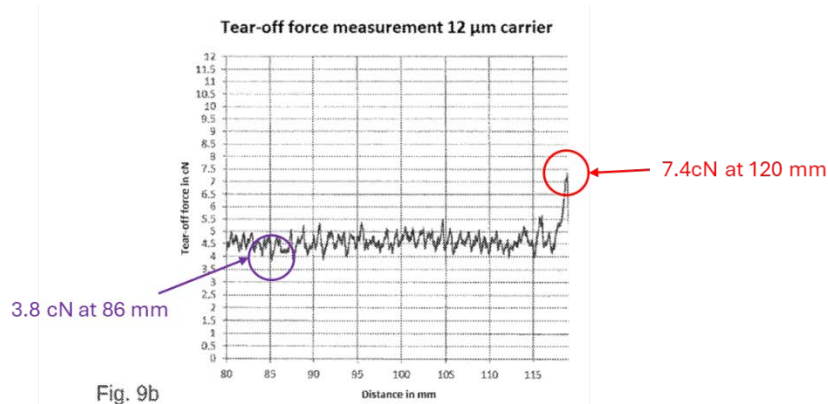


Figure 1. Force-time series (left) and FFT (right) recorded at three different peel velocities: (a) 50, (b) 100, and (c) 1000 mm/min.

(Ex-1009, fig. 1)

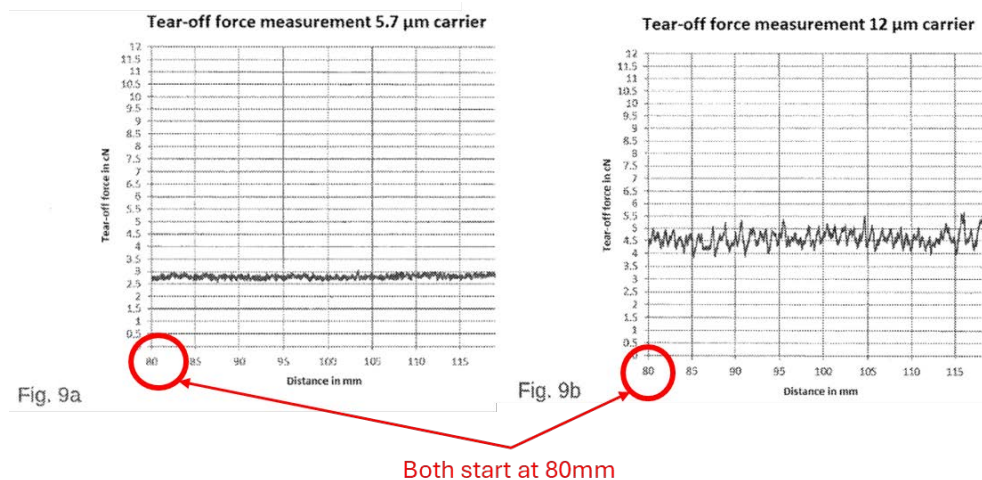
70. Yet another issue with the data provided for the fluctuation testing is the mathematical inconsistency between the data shown in Figure 9b and what is written in the specification (Ex-1001 18:57-60). Figure 9b of the '935 Patent shows a high peak force of approximately 7.4 cN for the 12  $\mu$ m carrier film at around 120 mm on the distance axis and around 3.8 cN for the same film at around 85 mm on the distance axis. However, the '935 Patent states that "fluctuations in the force amplitude of up to 1 cN around the average occur in the case of a decorative foil with a carrier film thickness of 12  $\mu$ m." This constitutes an irreconcilable contradiction. If the 7.4 cN value shown in Figure 9b is included in calculations, the actual fluctuation is approximately  $\pm 1.8$  cN (roughly a maximum of 7.4 cN and a minimum of 3.8 cN), not the  $\pm 1$  cN stated in the '935 Patent text. If the 7.4 cN value is excluded as an

outlier, the specification provides no guidance on what standard governs such exclusions or how to consistently apply data processing methods.



(Ex-1001, fig. 9b (annotation added))

71. In addition, the data given in Fig. 9a and Fig. 9b may be missing data as they both start at 80 mm in the distance axis although the sample used had “a length of 41 mm in both tests.” (Ex-1001 18:42). No explanation is given for this discrepancy.



(Ex-1001, fig. 9a, 9b (annotation added))

72. The '935 Patent's failure to address basic measurement methodology constitutes undue experimentation. The '935 Patent fails to teach how to define the averaging window; what tear-off angle to maintain; what statistical methods govern fluctuation calculations; how to identify and handle measurement outliers or spikes; what data processing methods to apply before calculating fluctuations; and whether the claimed performance applies to raw or processed measurement data.

73. Without this fundamental guidance, a POSITA cannot determine whether a decorative foil meets the claimed functional limitation without extensive trial-and-error experimentation across multiple measurement protocols.

## **VI. SUPPLEMENTATION**

74. I reserve the right to supplement this report based on additional information, including any information to respond to positions asserted by Plaintiffs, their experts, or their counsel.

## **VII. CONCLUSION**

75. For the reasons set forth above, it is my opinion that claims 1 through 25 of the '935 Patent are unpatentable.

76. In signing this Declaration, I understand that the Declaration will be filed as evidence in a contested case before the PTAB.

77. I declare, under the penalty of perjury, that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true.

Dated: November 11, 2025

By: 

Christopher K. Haas, Ph.D.