

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

QUASAR SCIENCE LLC
Petitioner,

v.

COLT INTERNATIONAL CLOTHING, INC. d/b/a COLT LED
Patent Owner.

Case: IPR2023-00614
U.S. Patent No. 10,566,895

**PATENT OWNER'S SUR-REPLY
TO PETITIONER'S RESPONSE**

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<i>Westinghouse Air Brake Techs. Corp. v. Siemens Mobility, Inc.</i> , IPR2017-01454, Paper 33 at 36-39 (PTAB Dec. 6, 2018).....	19

Statutes

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PATENT OWNER'S SECOND UPDATED EXHIBIT LIST

Exhibit No.	Exhibit Description
2001	U.S. Patent No. 10,411,582 to Macias (“’582 Patent”) (“Parent” or “Parent ‘582 Patent”)
2002	U.S. Patent No. 9,845,924 to Macias (“’924 Patent”) (“Grandparent”)
2003	U.S. Patent No. 9,719,642 to Macias (“’642 Patent”) (“Great-Grandparent”)
2004	Four “Request for Ex Parte Reexamination Transmittal Forms” by requester, Quasar Science, LLC (“Reexam Transmittals”): i. 9,719,642 Patent dated 5/30/18 (Control No. 90/014,146) ii. 9,845,924 Patent dated 6/12/18 (Control No. 90/014,150) iii. 9,719,642 Patent dated 9/4/19 (Control No. 90/014,371) 9,845,924 Patent dated 9/4/19 (Control No. 90/014,372)
2005	File History for U.S. Patent No. 10,411,582 to Macias
2006	Ex Parte Reexamination Certificate (11513 th), May 17, 2019 to Macias on US Patent No. 9,845,924 (“First ‘924 Reexam Certificate”)
2007	Ex Parte Reexamination Certificate (11548 th), July 29, 2019 to Macias on US Patent No. 9,719,642 (“First ‘642 Reexam Certificate”)
2008	Ex Parte Reexamination Certificate (11900 th), August 19, 2021 to Macias on US Patent No. 9,845,924 (“Second ‘924 Reexam Certificate”)
2009	Ex Parte Reexamination Certificate (11858 th), June 7, 2021 to Macias on US Patent No. 9,719,642 (“Second ‘642 Reexam Certificate”)
2010	U.S. Patent Publication No. 2011/0043137 to Negley (“Negley”)
2011	“Whiter, Brighter LEDs,” by Keeping, Steven, Electronics Products Magazine, Oct. 30, 2011 (“2011 Keeping Article”)
2012	U.S. Patent Publication No. 2003/0072156 to Pohlert et al. (“Pohlert”)
2013	U.S. Patent Publication No. 2007/0228999 to Kit (“Kit ‘999”)
2014	U.S. Patent Publication No. 2007/0258240 to Ducharme (“Ducharme ‘240”)

2015	Official Action dated October 17, 2018 in reexamination for U.S. Patent No. 9,719,642, Reexam Control No. 90/014,146 (“First ‘642 Reexam”)
2016	Office Action dated November 21, 2018, in reexamination for U.S. Patent No. 9,845,924, Reexam Control No. 90/014,150 (“First ‘924 Reexam”)
2017	Patent Owner Submission Amendment and Response to Office Action (“Amdt 2/21/19”) dated Feb. 21, 2019 in Reexamination Control No. 90/014,150 (First 924 Reexam)
2018	Notice of Intent to Issue Reexamination Certificate, Reexamination Control No. 90/014,150, dated April 2, 2019 (“NIRC First 924 Reexam”)
2019	Office Action dated Feb. 23, 2021, Reexamination Control No. 90/014,372 (“Second ‘924 Reexam”)
2020	U.S. Patent No. 8,511,851 to Van de Ven (“Van de Ven”)
2021	The Vitec Group plc Acquisitions and Trading Update, Press Release dated April 12, 2021
2022	“The Vitec Group plc changes its name to Videndum plc,” by Marchetti, May 2022, printed/accessed from https://videndum.com/media/videndum-in-action/the-vitec-group-plc-changes-its-name-to-videndum-plc/
2023	Quasar Science’s Request for Reexamination of U.S. Patent No. 9,719,642 dated September 4, 2019 (“Second ‘642 Reexam Request”)
2024	Quasar Science’s Request for Reexamination of U.S. Patent No. 9,845,924 dated September 4, 2019 (“Second ‘924 Reexam Request”)
2025	Patent Owner Colt’s Interrogatories
2026	Declaration of David L. Hoffman
2027	Complaint filed February 17, 2022 against Petitioner Quasar Science LLC (and others) for patent infringement, Case No. 1:22-cv-00213 (Dist. Del.)(“Complaint”)
2028	First Amended Complaint filed June 1, 2022 in Case No. 1:22-cv-00213 (Dist. Del.)(“FAC”)
2029	Docket sheet for Case No. 1:22-cv-00213 (Dist. Del.)(“Litigation

	Docket”)
2030	Protective Order in Case No. 1:22-cv-00213 (Dist. Del.)(“Protective Order”)
2031	Colt’s Initial Infringement Contentions cover document and excerpts re ‘895 Patent (“Infringement Contentions”)
2032	Marketing printed in 2017 from QuasarScience.com web site (“Old QuasarScience.com Marketing Excerpts”)
2033	Marketing printed on 11/16/2023 from QuasarScience.com web site 2023 (“Petitioner QuasarScience.com Marketing Excerpts”)
2034	Marketing printed on 11/16/2023 from www.movie-men.com/producto/12-quasar-120/ (“Movie Men Web Marketing”)
2035	Marketing printed on 11/16/2023 from https://www.bpm-media.de/en/products/light/light-tubes/quasar-science-crossfade-x-4-ft/ (“BPM Web Marketing”)
2036	Marketing printed on 11/16/2023 from https://qual.wikis.its.utexas.edu/display/comm/Quasar+Tubes+Q-LED+X+CrossFade+Linear+Lamp (“UT Austin Web Marketing”)
2037	Marketing printed on 11/16/2023 from https://www.filmandvideolighting.com/quasar-tubes-q-led-x-crossfade-linear-lamps.html (“Film & Video Web Marketing”)
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2039	Declaration of Zhang, Ya Jun (“Zhang Decl.”)
2040	Vitec Group PLC entitled “The Vitec Group plc 2021 Full Year Results” dated March 1, 2022 from https://files.q4europe.com/news-pdf/3294/VitecGroup_15348316.pdf (“Vitec 2021 Report”)
2041	Declaration of Todd Csernecky (“Csernecky Decl.”)
2042	Pictures of Ladder Lights, printed/accessed from www.ColtLED.com on December 18, 2023

2043	Image of a lighting tube taped to wall from www.quasarscience.com/products/crossfade-x , video at time code 0:38, printed/accessed December 18, 2023 (“Lighting Tube Taped to Wall Image”)
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2045	MacTech LED “Why LED” web page from Wayback Machine, https://web.archive.org/web/20140223160146/http://www.mactechled.com/why-led , Printed/Accessed December 18, 2023 (“MacTech Why LED”)
2046	<u>Set Lighting Technician’s Handbook</u> , 4 th Ed., Box, Harry C., Focal Press, New York, published 2013 (“Set Lighting Handbook 2013”)
2047	Declaration of Kevin Baxter with Appendix A (Curriculum Vitae (CV) and Patent List of Kevin Baxter) and Appendix B (Photo of Raymond James Stadium printed/accessed from https://supertailgate.com/stadium/tampa-bay-buccaneers) (“Baxter Decl.”)
2048	Wayback Machine/Internet Archive from KinoFlo.com’s website showing its Diva-Lite® fluorescent tube product, dated May 25, 2012, at https://web.archive.org/web/20120525111604/http://www.kinoflo.com/Lighting%20Fixtures/Diva-Lite/Diva-Lite.htm , Printed/accessed January 19, 2024 (“Diva-Lite® May 2012 Wayback”)
2049	Wayback Machine/Internet Archive from KinoFlo.com’s website showing its Celeb® 200 DMX LED fixture, dated May 13, 2012, at https://web.archive.org/web/20120513120651/http://kinoflo.com/Lighting%20Fixtures%20(LED)/Celeb_200/Celeb_200.html , Printed/accessed January 19, 2024 (“Celeb_200® May 2012 Wayback”)
2050	“Are LED retrofits that work with existing ballasts a good idea?”, by Wright, Maury, Ed., <u>LED Magazine</u> , June 2014, p. 4 as printed/accessed January 19, 2024 from https://digital.ledsmagazine.com/ledsmagazine/201406?pg=7#pg7
2051	Declaration of David L. Hoffman in Support of Patent Owner’s

	Response (“Hoffman POR Decl.”)
2052	Various photos of Patent Owner Colt’s Bicolor LED Tubular Light (“Colt Bicolor Photos”)
2053	Claim Chart showing selected ‘895 Patent Claims vs. Colt’s Bicolor LED Tubular Lights (“Claim Chart ‘895 Patent vs Colt Bicolor”)
2054	Wayback Machine of Old Quasar’s website at www.quasarscience.com of November 2016 showing Specifications for “All Quasar products,” https://web.archive.org/web/20161123195106/http://www.quasarscience.com/pages/specifications , Printed/Accessed December 13, 2023 (“2016 Specifications”)
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2056	Wayback Machine, from Old Quasar’s website at www.quasarscience.com of February 2017 showing details concerning Old Quasar’s S-Switch Lamp models https://web.archive.org/web/20170209215712/http://www.quasarscience.com/products/q-led-s-switch-linear-lamps?variant=3592534851 , Printed/Accessed December 13, 2023 (“2017 Q-LEDs”)
2057	Various photos of Old Quasar’s S-Switch model, four-foot size (“S-Switch Photos”)
2058	Q50XG INFO SHEET for Old Quasar’s Crossfade model, four-foot size as accessed/downloaded from the Wayback Machine at https://web.archive.org/web/20180712172527/http://admin.quasarscience.com/photometrics/2018-05-30-Q50XG%20Info%20Sheet.pdf on December 13, 2023 (“2018 Q50XG Info Sheet”)
2059	Claim Chart showing selected ‘895 Patent Claims vs. Old Quasar’s S-Switch Tubular LED Lights (“Claim Chart ‘895 Patent vs Quasar S-Switch”)
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2064	Third party marketing from BH Photo's website at https://www.bhphotovideo.com/c/product/1686089-REG/quasar_science_921_2303_crossfade_x_linear_led.html for Petitioner Quasar's Crossfade X product, printed/accessed on 11/11/2023 ("BH Photo Crossfade X")
2065	Claim Chart showing selected '895 Patent Claims vs. Petitioner Quasar Science's Crossfade Model LED Tubular Lights (Crossfade including Crossfade X) ("Claim Chart '895 Patent vs Quasar Crossfades")
2066	Declaration of Fernando Silva ("Silva Decl.")
2067	Declaration of Bruce Wonderlick with Appendix A ("Wonderlick Decl.")
2068	Declaration of Guillermo Macias ("Macias Decl.")
2069	Patent Owner Colt's website at www.colttled.com on January 12, 2019 marketing Colt's Bicolor LED Tubes
2070	Patent Owner Colt's List of TV Shows and Movies Using Colt's Bicolor LED Tubes from 2013 to beginning 2017 ("List of Shows/Movies")
2071	Patent Owner Colt's Actual Sales from 2017 and 2018 to Wamco ("Actual Sales List")(CONFIDENTIAL-PROTECTIVE ORDER MATERIAL)

2072	Patent Owner Colt's website at www.ColtLED.com printed/accessed on January 12, 2019 ("ColtLED Home Page")
2073	Warner Bros. Set Lighting rental list excerpts, June 2018 ("WB 2018 Rental Excerpts")
2074	Warner Bros. Set Lighting rental list, 2023 ("WB 2023 Rental List")
2075	Quasar's web page from the internet.org archive of November 23, 2016 ("Quasar's 2016 web page")
2076	Kino Flo retail prices from www.bhphotovideo.com (B&H) and www.filmandvideolighting.com (Barn Door) websites, printed/accessed on January 13, 2019 ("Kino Flo Prices")
2077	Report No. L091914008R01 on Lux/FC/Colormetrics by Light Laboratory Inc., issued October 21, 2019 on Colt's Bicolor LED Tube in four-foot length ("Lumen and Colormetrics Report")
2078	Declaration of Bradley Brunon ("Brunon Decl.")
2079	Deposition Transcript of Ya Jun Zhang, taken October 12, 2018 ("Zhang Depo Transcript")
2080	Declaration of Gary Allen, Ph.D. ("Allen Decl.")
2081	Cree XLamp MK-R LEDs, Product Family Data Sheet, CLD-D560 REV OA, (2012)("2012 Cree Data Sheet")
2082	"GE Global Research Breaks OLED Records," Photonics Spectra, March 2004 ("GE Global Research OLED")
2083	Cree LED Luminaire Design Guide, #CLD-AP15 REV 0E 2016 ("Cree Design Guide")
2084	"Thermal Design of integral LED replacement lamps," by Allen, Gary, et al., GE Lighting Solutions and General Electric Lighting, presented at 13th International Symposium on the Science and Technology of Lighting (LS13), June 26, 2012 ("Dr. Allen Thermal Design Paper")
2085	"Effect of Ambient Temperature," by Lamptech, Updated 30-X-2011, printed/accessed on January 19, 2024 from

	http://www.lamptech.co.uk/Documents/FL_Temperature.htm (“Lamptech Effect of Ambient Temp”)
2086	LED Luminaire Reliability: Impact of Color Shift, April 2017, The Next Generation Lighting Industry Alliance (NGLIA) as printed/accessed on January 19, 2024 at https://www.energy.gov/sites/prod/files/2017/04/f34/lsrc_colorshift_apr2017.pdf (“Color Shift Report”)
2087	“ANSI NEMA LED BINNING STANDARD, blog post by MADPCB, September 7, 2016, printed/accessed from https://madpcb.com/ansi-nema-led-binning-standard/ on January 21, 2024 (“MADPCB 2016 Blog”)
2088	Cree Application Bulletin CLD-AP22 rev 22 (2008 – 2014), Binning and Labeling, “Cree® XLamp® XP Family LEDs,” printed/accessed at on January 21, 2024 from https://www.mouser.com/pdfdocs/xlampxpblabel.pdf (“Cree 2008-2014 Binning Standards”)
2089	“ANSI NEMA ANSLG C78.377-2008,” American National Standard Lighting Group, Rosslyn, Virginia, Copyright 2008 (“2008 ANSI Standards”)
2090	NIST Spectrally Tunable Lighting Facility for Color Rendering and Lighting Experiments, by Miller, C. ,et al Light and Lighting Conference with Special Emphasis on LEDs and Solid State Lighting, Budapest, (2009), printed/accessed on January 20, 2024 from https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=903085 (“Miller NIST Paper”)
2091	Błaszczak, et.al., “Characterization of Multi-Emitter Tuneable Led Source for Endoscopic Applications, Metrol. Meas. Syst.,” Vol. 26 (2019) No. 1), pp. 153–169, printed/accessed on January 20, 2024 from https://journals.pan.pl/Content/110245/PDF/art_14.pdf (“Blaszczak Tunable LED Source”)
2092	“Rationale of Color Quality Scale,” by Ohno, Yoshi et al, NIST, June 8, 2010, printed/accessed on January 20, 2024 from https://www1.eere.energy.gov/buildings/publications/pdfs/ssl/cqs_rationale_06-10.pdf , (“Rationale of Color Quality Scale”)
2093	Petitioner’s Objections and Answers to Patent Owner’s Interrogatory

	Nos. 1 – 5, served January 12, 2024 (“Petitioner’s Interrogatory Responses”) (CONFIDENTIAL-PROTECTIVE ORDER MATERIAL)
2093	Petitioner’s Objections and Answers to Patent Owner’s Interrogatory Nos. 1 – 5, served January 12, 2024 (“Petitioner’s Interrogatory Responses”)(PUBLIC-REDACTED)
2094	Declaration of Bruce Finn (“Finn Decl.”)
2095	GoDaddy WHOIS Search Results for www.madpcb.com, Printed/Accessed at https://www.godaddy.com/whois/results.aspx?domain=www.madpcb.com on January 21, 2024 (“WhoIs www.madpcb.com”)
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2098	U.S. Patent No. 8,754,594 to Lenk (“Lenk ‘594”)
2099	U.S. Patent No. 8,638,033 to Lenk (“Lenk ‘033”)
2100	Declaration of Ken Fisher (“Fisher Decl.”)
2101	BBS Area 48 LED, by BBS Lighting (2013) (“BBS Remote Phosphor Data Sheet”)
2102	“Lighting Advances Focus on Size, Efficiency,” Johnston, Craig, <u>TV</u>

	<u>Technology</u> , July 15, 2013, accessed/printed from https://www.tvtechnology.com/news/lighting-advances-focus-on-size-efficiency-on-January-27 , 2024 (“Lighting Advances Efficiency”)
2103	“Advances in Lighting Add More Versatility,” Johnston, Craig, <u>TV Technology</u> , August 03, 2014, accessed/printed from https://www.tvtechnology.com/news/advances-in-lighting-add-more-versatility) on January 27, 2024 (“More Versatility”)
2104	Arri Studio Cool 4 web page, October 6, 2013 as accessed/printed from https://web.archive.org/web/20131006045207/http://www.arri.com/lighting/lighting_americas/studio_cool_fluorescent/studio_cool_4.html on January 31, 2024 (“Arri 2013 Studio Cool”)
2105	ARRI SkyPanel S60-C DataSheet, October 2015, as printed/accessed from https://web.archive.org/web/20160327134438/http://www.arri.com/skypanel/assets/pdf/ARRI_SkyPanel_S60-C_Data_Sheet.pdf on January 31, 2024 (“Arri 2015 SkyPanel”)
2106	MacTech LED Rental and Sales web page from May 2, 2013 from https://web.archive.org/web/20130502023555/http://quote.mactechled.com/ , printed/accessed January 31, 2024 (“MacTech 2013 LED Tube”)
2107	MacTech LED Rental and Sales web page from August 1, 2015 from https://web.archive.org/web/20150801193922/http://www.mactechled.com/ , as printed/accessed January 31, 2024 (“MacTech 2015 LED Panel”)
2108	U.S. Patent No. 6,948,823 to Pohlert, Grosswendt, Fisher and Baxter (“’823 Patent”)
2109	“Litepanels New 1x1 Bi-Color LED Light,” Press Release, December 22, 2008, from https://www.studiodaily.com/2008/12/litepanels-new-1x1-bi-color-led-light/ , accessed/printed on February 1, 2024 (“Litepanels 2008 Bi-Color Panel Launch”)
2110	Petitioner Quasar Science’s website “about us” page, printed/accessed from https://www.quasarscience.com/pages/about-us , on February 1, 2024 (“Quasar’s About Us Web Page”)
2111	Pipeline LED System, by BBS Lighting (2013) (“BBS 2013 Pipeline LED Data Sheet”)

2112	“Effect of Current Spreading on the Efficiency of Droop of InGaN Light-Emitting Diodes,” by Ryu, Han-Youl et al., <u>Optics Express</u> , Vol. 19, No. 4, January 31, 2011 (“Current Droop Paper”)
2113	“FilmLA Reports That ‘Production is Starting to Responsibly Return’ Following Near-Collapse of On-Location Filming in Q2,” Robb, David, <u>Deadline</u> , July 8, 2020, from https://deadline.com/2020/07/los-angeles-film-tv-production-report-q2-2020-coronavirus-1202980579/ , printed/accessed on 12/5/2023 (“Deadline July 2020 Article”)
2114	2021 Q2 Production Report, “Los Angeles Shoot Days,” <u>FilmLA</u> , from https://filmla.com/wp-content/uploads/2021/08/2021_Q2_Production_Report_FilmLA.pdf , printed/accessed on 12/5/2023 (“FilmLA 2021 Q2 Report”)
2115	2022-2023 Q3 Production Report, “No Surprise: Summer of Strikes Sends LA Shoot Days Lower,” <u>FilmLA</u> , October 17, 2023, from https://filmla.com/no-surprise-summer-of-strikes-sends-la-shoot-days-lower/ , printed/accessed on 12/5/2023 (“FilmLA 2022-2023 Q3 Report”)
2116	U.S. Patent No. 9,127,818 to Maxik et al. (“Maxik”)
2117	U.S. Patent No. 4,530,179 to Larew (“Larew”)
2118	U.S. Patent No. 8,587,185 to Negley (“Negley ‘185”)
2119	European Patent Specification Publication No. EP 0572733B1 to Hochheim and Swink (“Hochheim”)
2120	U.S. Patent No. 8,456,091 to Goitiandia, Hochheim and Primrose (“Gotiandia”)
2121	WO 2011/146657 A1 to Vasquez (“Vasquez”)
2122	<u>Set Lighting Technician’s Handbook</u> , Ed., Box, Harry C., Focal Press, Boston, published 1993 [1 st edition], cover, copyright page, p.102 (“1993 Handbook Excerpts”)
2123	Provisional Application No. 61/648,554 filed May 17, 2012 (“Macias Provisional”)

2124	Corrected Official Filing Receipt for Serial No. 61/648,554, mailed 06/04/2012 (“Provisional Filing Receipt”)
2125	Emails of February 16, 2024 and March 27, 2024 from David Hoffman to Ken Fisher re retention
2126	February 16, 2024 Expert Consulting Agreement with Ken Fisher

I. INTRODUCTION

The individual elements in claim 1 were known, **but not in combination.**

Trying to maximize every light output parameter to achieve claim 1's bicolor (1[b]-[d]) with 1000+ lumens each color (1[j]/[j](i)), with G/M<5, CRI>90 (1[j](ii)-(iii)), and housing with diffusion cover forming a fluorescent form factor ("FFF/T-12") (1[a], [e]-[f]), was a path to failure by overheating the LEDs' P/N junction, thereby destroying light quality critical for commercial image recording ("Film/TV") (1[pre], 1[j]). The 1000+ lumens (§II) for a Film/TV quality tube in 2013 required extremely high power loading, well-exceeding sound limits, leading to thermal issues (§III).

Petitioner's Reply's introduction is misleading. There is no concession that the only issue is 1000+ lumens. And, the full language of claim 1[j]/1[j](i) requires 1000+ lumens emitted from **the light system in both warm and cool white modes.**

Dependent claims 12-13, 22, 29-30 emphasize high power loading (≥ 42 watts), well exceeding the art for FFF/T-12 with housing and cover.

Though not needed, secondary considerations, especially aggregated, are substantial.

II. PETITIONER FAILED TO REACH 1000+ LUMENS FOR THE INVENTION AS A WHOLE

A. Ground 2 Does Not Reach 1000+ Lumens for Warm and Cool Modes

Petitioner argues Ground 2 (Ducharme, Ianiro, Katzir and Hasnain), achieves 1000+ lumens by calculating LED rated lumens per watt (LPW) to luminaire output, and downplays or argues inapplicability of losses. Reply, §II.A., pp.2-3; Ex.1049-Holmes.Supp., ¶s 22-27.

But Petitioner has not shown a POSITA, considering known lumen losses, would have a reasonable expectation of success in designing a bicolor luminaire (1[b]-[d]) with all claim 1 elements, including 1000+ lumens for warm white and for cool white (1[j]/[j](i)), G/M<5 and CRI>90 (1[j](ii)-(iii)), and a housing and diffusion cover forming a FFF/T-12 (1[a],[e]-[f]).

1. Petitioner's/Holmes' speculative lumen calculations

Petitioner's Expert/Attorney Holmes cites Hasnain's LED light for replacing fluorescent's 70-100 lumens per inch ("Lm/in"). Ex.1049-Holmes.Supp., ¶22. But this is for "**conventional** incandescent or fluorescent light...." Ex.1008-Hasnain-C1:Ls.6-10 (emphasis added); not TV/film quality.

To match fluorescent, Hasnain wants 0.9 watts per inch ("W/in") with 70-100 LPW. Ex.1008-Hasnain-C3:L63-C4:L3. **But Hasnain's LED's G/M bias and CRI are unknown. Any luminaire lumen calculations are speculative and**

inapplicable, failing to satisfy 1[j](ii)-(iii). Ex.2080-Dr.Allen, pp.18-19 (¶s 28-29).

A POSITA cannot just design at Hasnain's 70-100 LPW **and assume the LEDs are GM<5 and CRI>90. Petitioner never provides evidence of Hasnain's LEDs' qualities.** Petitioner just asserts a POSITA would order them. But 2013 binning wasn't that specific. Ex.2080-Dr.Allen, ¶73.

More important, Petitioner's lumen outputs (Ex.1049-Holmes.Supp., ¶s 22-27 and all other Petitioner lumen calculations) omit various lumen losses resulting from using/converting to LED qualities **GM<5 and CRI>90** (1[j](ii)-(iii)) instead of lesser, conventional quality, and for a diffusion cover (1[e]). §II.A.3-below (other omitted losses discussed).

2. '895 Patent testing is net of lumen losses

Petitioner argues the '895 Patent does not mention losses so they don't apply to Petitioner. Reply, p.3, citing Ex.1049-Holmes.Supp., ¶s 22-27.

This conclusory illogic improperly injects enablement (viewing '895 disclosure) and hindsight into obviousness. Enablement is outside IPR scope. 35 U.S.C. §311(b).¹ Inventors need not know or set forth how or why the invention

¹ Petitioner argues a POSITA, armed with the '895 disclosure, could create the '895 luminaire. But: "Defining the problem in terms of its solution reveals

works. *Newman v. Quigg*, 877 F.2d 1575, 1581 (Fed.Cir. 1989).

Merely because the '895 Patent does not mention losses does not mean Petitioner can ignore them.

Additionally, '895 Claim 1[j]/[j](i) recites 1000+ lumen output for a **bicolor luminaire (“light system”) meeting all claim elements**, including GM<5; CRI>90 with a housing and diffusion cover forming a FFF/T-12. Claim 1's luminaire output is **after experiencing losses**, because element 1[j] recites output from “the light emitted from the LED light system.” This is equally true of '895 Patent Examples 1-3 constructing with cover then testing the luminaire: “A four foot long T12 ... LED lamp was constructed...” Ex.1001-C10:Ls.9-10,48-49; C11:Ls.18-19. The lamp has a “diffusing shade cover 24.” Ex.1001-C6:Ls.31-33, Fig.2.

3. Petitioner's/Holmes' lumen calculations omit losses

Petitioner/Holmes argue Hasnain's 70-100 LPW is luminaire output. Petitioner/Holmes propose two 22W versions 22Wx70 LPW=1540 lumens; and 22Wx100 LPW=2200 lumens. Reply, pp.4-5, Ex.1049-Holmes.Supp., ¶23. To

improper hindsight" *Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH*, 139 F.3d 877, 881 (Fed.Cir. 1998).

support 70-100 LPW Petitioner submits an LED datasheet. Ex.1062-datasheet;

Ex.1049-Holmes.Supp., ¶54.

(i) Hasnain's 70-100 LPW is LED output, not luminaire

Contrary to Holmes' assertions (Ex.1049-Holmes.Supp., ¶s 53-54),

Hasnain's 70-100 LPW is for LEDs, not luminaire output. Hasnain says: "white

light sources based on GaN blue emitting LEDs generate 70 to 100 lumens per

watt." Ex.1008-Hasnain-C3:L63-C4:L3. Referring to **Petitioner's** datasheet, **cool**

white (5000K) LEDs yield 75 LPW at CRI=90 and 100 LPW at CRI=65. Ex.1062,

p.1-specifications, below:

Part No.	Chip Structure	Emitting Color	Color Rendering Index (Ra)	Absolute Maximum Ratings (Ta=25°C)					Electrical and Optical Characteristics (Ta=25°C)							
				Power Dissipation Ps (mW)	Forward Current If (mA)	Peak Forward Current Ifp (mA)	Operating Temperature Topr (°C)	Storage Temperature Tstg (°C)	Forward Voltage V _F Typ. (V)	Chromaticity (x, y)	Min. (cd)	Luminous Intensity Iv Typ. (cd)	Luminous Flux Φ _v Typ. (lm)	Luminous Efficiency Typ. (lm/W)		
PSL0102WBEA	InGaN	White (5,000K)	65	0.78	200 ^{*1}	400 ^{*2}	-40 to +130	-40 to +130	3.3	120	(0.345, 0.352)	120	8.2	12	44	100
PSL0102WBEB			80										5.4	10.8	38	95
PSL0102WBEC			90										5.4	8.2	30	75
PSL0102WBED			74										8.2	11.8	42	75
PSL0102WBFA			65										8.2	10.8	37	93
PSL0102WBFB			80										5.4	8.5	31	78
PSL0102WBFC			90										5.4	7	25	63
PSL0102WBFD			75										8.2	10.8	37	93

*1: Mounting condition must be carefully considered *2: Duty ≤ 1/10, ≤ 10ms max.

Ex.1062, p.1-annotated/excerpted.

Hasnain's light is just LEDs on a board, insulation 33 and heat-dissipating

structure 36. Ex.1008-Hasnain-C3:Ls.47-52; Ex.2080-Dr.Allen, ¶s 20, 48-50

(Hasnain: no cover, no housing; just "bare LEDs"); §II.A.8-below (same).

Accordingly, Hasnain does not consider diffusion losses, CRI or green bias, or

warm white's lower output. Since the datasheet's 75-100 LPW for cool white

essentially matches Hasnain's 70-100 LPW, Hasnain is using existing cool white LPW as device output. Ex.1062, p.1-chart (cool white 75-100 LPW).

(ii) Lumen calculations must use the lower, warm white specs

Since claim 1 recites 1000+ lumens for both cool and warm whites, the lower **warm white (3000K)** LPW specifications at CRI=90 yielding **63 LPW** should be used:

Part No.	Chip Structure	Emitting Color	Color Rendering Index (Ra)	Absolute Maximum Ratings (Ta=25°C)					Electrical and Optical Characteristics (Ta=25°C)							
				Power Dissipation P _o (mW)	Forward Current I _f (mA)	Peak Forward Current I _{fm} (mA)	Operating Temperature Topr (°C)	Storage Temperature Tstg (°C)	Forward Voltage V _f Typ. (V)	Chromaticity (x, y)	I _f (mA)	Luminous Intensity I _v		Luminous Flux Φ _v Typ. (lm)	Luminous Efficacy (lm/W)	
PSL0102WBEA	InGaN	White (5,000K)	65	0.78	200 ^{*1}	400 ^{*2}	-40 to +130	-40 to +130	3.3	120	(0.345, 0.352)	8.2	12	44	100	
PSL0102WBEB			80									10.8	38	95		
PSL0102WBEC			90									8.2	30	75		
PSL0102WBED			74									11.6	42	75		
PSL0102WBFA		White (3,000K)	65								(0.437, 0.404)	8.2	10.6	37	93	
PSL0102WBFB			80									8.5	31	78		
PSL0102WBFC			90									7	25	63		
PSL0102WBFD			75									10.6	37	93		

*1: Mounting condition must be carefully considered *2: Duty ≤ 1/10, ≤ 10ms max.

Ex.1062, p.1-annotated/excerpted.

(iii) Calculations for Holmes 22W proposals

Using Dr. Allen's 15% minimum lumen penalty for improving green bias

(since the datasheet bias is unspecified) (Ex.2080-Dr.Allen, ¶s 26-27),² 67% best luminaire efficiency factor from LED LPW to luminaire output (Ex.2080-Dr.Allen, ¶s 78-80), and Holmes' proposed 22W with warm white CRI=90 LEDs (63 LPW from Ex.1062), luminaire output is only 789 lumens:

Watts	LPW (@ 3000K; CRI=90)	Total Pre- Loss Lumens	Green bias penalty (≥15%) Ex.2080,p.18-¶27	Subtotal	Luminaire Max Efficiency (67%) Ex.2080,¶78
22	63	22x63= 1386	1386x0.15=208	1386-208= 1178	1178x0.67= 789 Lumens

Petitioner/Holmes also propose (22W)x(**100 LPW**)=2200 lumens. Ex.1049-Holmes.Supp., ¶s 23, 57-58. However, 100 LPW is inapplicable since it is for **cool white at CRI=65** (Ex.1062, p.1) **and G/M unknown**, so this proposal fails to meet claim 1[j](iii)(CRI>90), 1[j](ii)(G/M<5). Alternatively, using Dr. Allen's 44% (minimum) for combined lumen penalties and luminaire (maximum) efficiency factor, Holmes' proposed 2200 lumens would be **at best** only 888

² 15% loss for green bias improvement is reasonable since it is **Petitioner's burden** to show bias/CRI of Hasnain's LEDs and **complete** calculations for luminaire output.

(0.44)x(2200). Ex.2080-Dr.Allen, ¶s 78-80 (44% explained); Ex.2080, p.22-¶31 (35% loss to achieve CRI=90 and G/M=5).

Petitioner argues losses are routinely handled but fails to show complete calculations and specifications for such.

4. Applying losses to Durosite

Petitioner argues Durosite was 1500 lumens (17W). Reply, p.4; Ex.1049-Holmes.Supp., ¶s 24-25, 56, but presents no evidence of G/M bias, CRI or diffusion cover. Even assuming Durosite had reasonably good conventional LEDs (CRI=80; G/M=20), loss is 35%. (Ex.2080-Dr.Allen, pp.16-22 (¶s 24-31)). Minimum diffusion cover losses are another 20% (Ex.1039-Dr.Allen.Depo., @54:2-6; 53:25-54; 51:4-20). Starting with 1450 lumens for warm white (Ex.2123, PDF@5; Ex.1049-Holmes.Supp., ¶25), then accounting for these losses, light output is $(1-.35) \times (1-.20) \times (1450 \text{ lumens}) = \mathbf{754 \text{ lumens}}$.

The same speculative LED qualities and ignored losses apply to Petitioner's proposals/devices, including Exhibits 1033-1037. Ex.1049-Holmes.Supp., ¶26.

5. Holmes' proposed 44W is inapplicable

Holmes' proposes 44W luminaires yielding 3080 and 4400 lumens. Ex.1049-Holmes-Supp., ¶s23, 57-59. But going from 22W to 44W doubles power

loading thus doubling heat. Ex.2080-Dr.Allen, ¶54 (linear relationship between power loading and heat). §III-below (thermal issues) and §VI-below (42W claims)(POSITA would not use 42W, particularly for Film/TV for fear of damaging LED quality.)

6. Holmes' mischaracterizes lumen losses and Hasnain's output

(i) Selecting better LEDs means losing lumens

Petitioner argues the '895 Patent LED testing means there are no losses and/or a POSITA just picks better LEDs. Reply, pp.5-6, citing Ex.1049-Holmes.Supp., ¶s 50-54.³

But this approach uses hindsight. See, §A.2-above. Moreover, to improve CRI and green bias lumen penalties cannot be avoided: LPW decreases with increasing CRI and LPW decreases with decreasing green bias. Ex.2080-Dr.Allen, pp.17-19, ¶s 26-27, 30.

Petitioner's datasheet confirms losses going from one given LED quality to another. For warm white LEDs (3000K), CRI=65 yields 93 LPW. Ex.1062, p.1-

³ That Patent Owner didn't depose Holmes is irrelevant. Dr. Allen's testimony was sufficient on losses. Ex.2080-Dr.Allen, pp.13-23, 57 (¶s 23-33, 80).

chart. For the same warm white LEDs, to get CRI=90, **LPW drops over 30%** to 63. *Id.* Likewise, losses occur for green bias. Ex.2080-Dr.Allen, ¶s 26-27 ($\geq 15\%$ loss).

(ii) Ordering LEDs and binning

Petitioner argues constructing the claimed luminaire just meant ordering better LEDs. Reply, pp.16-17, citing Ex.1039-Dr.Allen.Depo., @90:16-23. But in 2013, there were no bins for CRI>90 and green bias less than five McAdam steps ($G/M < 5$); bins were 7-steps for cool and warm white. Ex.2080-Dr.Allen, ¶73. Holmes binning discussion was **not** correct. Ex.2080-Dr.Allen, ¶s70-73. In addition to contending with losses, a POSITA could not simply order LEDs satisfying 1[j](ii)-(iii).

(iii) Macias/'895 selection and one-by-one testing LEDs

Petitioner argues Macias just tested and selected LEDs. Reply, pp.5-6. Macias' "selection" was **after** ordering and receiving LEDs:

[B]ecause LED manufacturing quality varies greatly, LEDs are first tested and then placed in the array if they meet the specifications sufficient to produce sufficient light from each color light type....

Ex.2123-provisional, p.5:Ls.4-6 (PDF@8).

Macias got an LED driver to “push the chips” (Ex.1047-Macias.Depo., @240:21-23) to increase power dramatically (42W). Ex.1001-C10:L27. He “took many trips to China to overcome thermal failures.” Ex.2068-Macias, ¶9. He overcame issues with too much green and lumen penalties. Ex.1047-Macias.Depo., @115:3-12, 239:2-24), had “many barrels of failures” and finally succeeded.⁴ *Id.*@100:8-14.

(iv) Quantifying lumen penalties for green bias

Holmes critiques Dr. Allen for mentioning filters. Ex.1049-Holmes.Supp., ¶51, referencing Ex.2080-Dr.Allen, ¶s 26-27. Lumen penalties/losses just equal the lumen loss that would be experienced using a filter to improve G/M bias to $G/M < 5$ from whatever the LED's green bias actually is. Ex.2080-Dr.Allen, ¶s 26-27.

Petitioner/Holmes contend properly designed fixtures have no current droop. Ex.1049-Holmes-Supp., ¶52. But thermal droop occurs to get claim 1's elements

⁴ The manner of invention does not negative patentability. 35 U.S.C. §103. “[I]t is immaterial whether it resulted from long **toil and experimentation** or from a flash of genius.” *In re Merck & Co., Inc.*, 800 F.2d 1091, 1099-1100 (Fed.Cir. 1986)(quoting reviser's note)(emphasis added).

because LED junction temperatures are pushed. (§III.A.4.-below; fn.5-thermal droop: 15% loss); Ex.2080-Dr.Allen, ¶s 21-23, 42, 78.

7. Diffusion cover 20% loss

Petitioner argues Hasnain's 70-100 LPW is net of losses. Reply, p.6; Ex.1049-Holmes.Supp., ¶53. But Hasnain's 70-100 LPW is for LEDs, before losses. §II.A.3(i)-above.

Petitioner argues the '895 Patent allows for clear diffusion covers." Reply, p.6; Ex.1049-Holmes.Supp.,¶54. But, for diffusion, whether clear or not, there is at least 20% loss:

So typically these diffusing plastics were 30 and 40 percent absorbing output....We [at GE Lighting] pushed the technology to be **20 percent** absorbing. That is **the best** ... at this time.

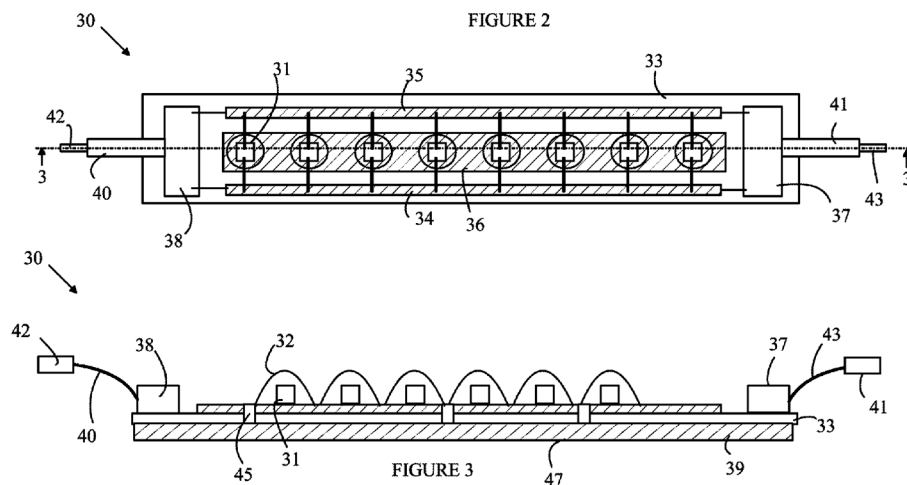
Ex.1039-Dr.Allen.Depo.,@51:4-8 (emphasis added); @50:8-51:20 (generally).

Dr. Allen explains the '895 Patent's reference to clear diffusers (Ex.1001-C6:Ls.31-33): "...this patent spec [teaches] that [a] **diffuser shade needs to diffuse the light**." Ex.1039-Dr.Allen.Depo., @52:25-53-2 (emphasis added). A clear cover, e.g., a "diffraction grating" can diffuse. *Id.*@53:3-12.

8. Hasnain has no cover or housing

Hasnain is an open-air design: no cover or housing. Ex.1008-Hasnain-

C3:Ls.51-53 (“ambient environment” cooling); C5:Ls.65-67 (“heat-radiating surface...dissipates the heat to the surrounding air...”); Ex.2080-Dr.Allen, ¶s 48-50 (open-air). There is no cover, no housing and no FFF/T-12. Ex.1008-Hasnain-C3:L36-C4:L58, Figs.2-3 (below-no cover, no housing).



Ex.1008-Hasnain, Figs.2-3. (Figs.4-5 have no cover, no housing too. §III.B.1-below).

B. Ground 1 Is Not 1000+ Lumens

Petitioner argues Ground 1 (Kit, Ducharme, Ianiro and Katzir) yields 1200 or 1040 lumens. Reply, §II.B., pp.6-7. But Petitioner fails to explain how to translate Kit's mono-color to bicolor yet maintain lumens.

Moreover, Kit's 1040 lumen/Cree-based light and hypothetical 1200 lumens were addressed by Dr. Allen. Ex.2080-Dr.Allen, ¶s75-78 (well under 1000 after

losses). These versions are inapplicable because green bias is speculative, and for the hypothetical 1200 lumen version CRI is too.

Dr. Allen explained shortcomings of Petitioner's hypothetical Katzir/K2 device. Ex.2080-Dr.Allen, ¶s 81-86 (e.g., Katzir proposes 14W requiring unattainable 221 LPW; Ex.1006-Katzir [0026]; no G/M bias or CRI thus speculative and/or 35%+ loss).

Petitioner's/Holmes' asserted 42W input is conclusory. A POSITA would not use that amount. §III.A.4-below (thermal limitations); §VI-below (42W claims: extreme).

III. THERMAL ISSUES PRECLUDE REASONABLE EXPECTATION OF SUCCESS

Petitioner argues thermal issues are routine because unmentioned in the '895 Patent. Reply, §III, pp.7-8. This is improper hindsight. (§II.A.2-above.)

A. Hasnain's Teachings Are Incompatible with Ducharme

Petitioner argues reliance just on Hasnain's 70-100 LPW and "an 'additional heat-dissipating surface on the backside of the light source...to dissipate more heat....'" Reply, p.9:Ls1-7.

1. A POSITA cannot use Hasnain's 0.9 W/in in Ducharme's covered, housed device

Petitioner's Ground 2 uses Ducharme's cover 5003 and housing 5001 (Ex.1005-Ducharme-C12:Ls.49-53, Fig.5a). Reply, p.9:Ls1-4. But Petitioner cannot rely on Hasnain's 70-100 Lm/in requiring LEDs at **0.9 W/in** (Ex.1008-Hasnain, C3:L61-C4:L3) otherwise the proposed device is way overheated at the LEDs' P-N junctions. Ex.2080-Dr.Allen, ¶s 40-62. Per conventional design principles this leads to irreparable damage. *Id.*, ¶s 60-61. A POSITA would have no motivation to combine and no reasonable expectation of success. *Id.*, ¶s 41, 60-61.

Petitioner's proposed 44W (greater than Hasnain's 0.9W/in x 44" usable length) requires Hasnain's "heat-dissipation techniques" which cannot be applied in Ducharme's **housed and covered device**. Hasnain's embodiments are all **coverless and unhoused for airflow**. A POSITA would not simply apply Hasnain's wattage to Ducharme to get Petitioner's proposed lumens because the wattage requires Hasnain's **open-air device**. (§II.A.8-above; §III.B.1.-below); Ex.2080-Dr.Allen, ¶s 48-50 (Hasnain's open-air).

2. Hasnain's 70-100 LPW LED's G/M bias and CRI are unknown thus unusable by a POSITA

Petitioner proposes using Hasnain's 70-100 LPW. Reply, p.9:Ls.1-7. But,

Hasnain's 70-100 LPW uses LEDs with unspecified G/M bias and CRI, so there is no motivation to combine or reasonable expectation of success to achieve 1[j](ii)-(iii). (§II.A.1.-above (speculative G/M and CRI)).

3. Hasnain's heat-dissipation will not work with Ducharme's housing and cover

Petitioner argues that a POSITA could just take Hasnain's "additional heat-dissipating surface [47]" and modify Ducharme to use higher wattage. Reply, p.9:1s.1-7. But '895 Claim 1 includes the housing, cover and FFF/T-12 formed thereby. Ex.1001-claim 1,1[a],[e]-[f]. Placing surface 47 inside a covered, housed device **defeats heat-dissipation** per Dr. Allen and common engineering sense:

In a tube LED lamp, both of those spreaders [elements 36, 47] will be enclosed in the cover and housing. So we are just making the air inside the tube hotter.... We are not getting the heat out of the tube.

Ex.1039-Dr.Allen.Depo.,@97:13-17; also, @96:22-97:19. Figs. 4-5 require rigid attachment to the troffer wall and would not work due to the troffer's limiting conductance and a POSITA would not use such extreme measures. Ex.2080-Dr.Allen, ¶s 66-68.

Putting surface 47 and/or structure 59 outside any housing and cover would ruin the FFF/T-12, especially where in contact with troffer wall 25. It is unclear

how structures 47,59 would be installed or work with FFF/T-12. Ex.1008-Hasnain-C5:Ls.3-5 (structure 59 contacts wall 25).

4. Critical thermal limitations

Petitioner downplays thermal issues. Reply, p.8-top. But, leading LED manufacturer Cree's Design Guide recommends maximum LED junction temperature (T_j) be **80°C**. Ex.2080-Dr.Allen, ¶44; Ex.2083-Guide, p.8-bottom⁵. While higher junction temperatures may be possible, a POSITA would not risk damaging critical CRI and G/M bias, and other qualities for Film/TV. Ex.2080-Dr.Allen, ¶s 44-61, esp., ¶s 44, 59-61.

The Color Shift Report teaches even small thermal changes can quickly degrade color qualities (four times more likely and chromaticity shifts towards green). Ex.2086-Report, p.19-near bottom (75°C to 85°C and 75% to 85% humidity, **at just 5°C above Cree's recommended $T_{jMAX}=80°C$**); Ex.2080-Dr.Allen, ¶s 59-61 (disastrous effects of overheating on color, photometrics, chromaticity). Therefore, a POSITA would design at or below Cree's 80°C, especially for Film/TV. Ex.2080-Dr.Allen, ¶s 35-44 (¶44-end: "[A] POSITA would certainly not want to go above Cree Design Guide's recommended p-n

⁵ Note significant, 15% thermal droop at 80°C vs. 25°C. Ex.2083, p.8-chart.

junction 80°C limit.”) (§III.A.4-above). This precludes achieving claim 1, even using Hasnain. Ex.2080-Dr.Allen, ¶s 35-68 (thermal analysis).

Substantial heat issues circa 2013 are well-confirmed. The Set Lighting Technician's Handbook references “[t]he **lethal effect of overheating**” Ex.2046-Handbook, p.248 (PDF@270)(2nd paragraph)(emphasis added).

Hasnain avoids **tube form factor**: “Since these replacements have the same form factor as the fluorescent tubes..., **heat dissipation presents challenges...**” Ex.1008-Hasnain-C3:Ls.20-23 (emphasis added).

Even assuming a POSITA sought bicolor (1[b]-[d]) with housing and diffusion cover in FFF/T-12 (1[a], 1[e]-1[f]), 1000+ lumens per bicolor mode, G/M<5, CRI=90 ([j](i)-(iii)) for Film/TV, such POSITA would not have a reasonable expectation of success since it required at least 0.9 W/in, extremely high for a **housed, covered luminaire**.

While Hasnain is in Ground 2, the same analysis dooms Petitioner's Ground 1 to likely thermal failure due to the same $T_{jMAX}=80^{\circ}\text{C}$ limit.

5. Individually known elements

Petitioner argues individually known elements. Reply, pp.9-10, citing Ex.1049-Holmes.Supp., ¶s7-27. But claims must be evaluated as a whole. 35 U.S.C. §103; *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1537 (Fed.Cir.

1983).⁶ (§II.A.2.-above (hindsight)).

B. Substantial Well Known Thermal Concerns Reinforce Likely Failure

Petitioner argues thermal concerns were readily handled. Reply, §III.B., p.10. But a POSITA had to avoid significant thermal degradation, especially for Film/TV (§III.A.4.-above), further explained below.

1. Dr. Allen's⁷ analysis is not faulty

Petitioner argues Dr. Allen overlooked Hasnain's heat dissipation. Reply, §III.B., p.10-middle; Ex.1049-Holmes.Supp., ¶s 41-49, citing Ex.2080-Dr.Allen, ¶s 35-62. But Dr. Allen considered it and explained its insufficiency. Ex.1039-Dr.Allen.Depo.,@95:7-21; @96:11-97:19 (if Hasnain's spreader/heat-dissipating

⁶ See also, §II.A.3.-A.4.; §III.B.; §IV.A.

⁷ Petitioner argues (Reply, p.10, fn.4) that Patent Owner's POSITA definition excludes Dr. Allen. But experts need not exactly match the invention's field.

Westinghouse Air Brake Techs. Corp. v. Siemens Mobility, Inc., IPR2017-01454, Paper 33 at 36-39 (PTAB Dec. 6, 2018). Dr. Allen meets Petitioner's definition. Ex.1039-Dr.Allen.Depo.,@43:10-21; @44:1-10 (EE or equivalent); @44:11-21 (two years' experience designing LED lighting including for Film/TV).

surface is covered it won't work). Dr. Allen discusses Holmes (Ex.1003-Holmes, ¶350) and Hasnain's spreader/heat-dissipating surface 47. Ex.2080-Dr.Allen, ¶s 39-40, 66-68 (discussing Hasnain's Fig.4, "surface 47"); Ex.1039-Dr.Allen.Depo., @97:4-19; §III.A.3.-above.

Petitioner/Holmes argues Dr. Allen's analysis was faulty because the '895 Patent's Examples 2-3 testing is allegedly without a cover: "The LEDs are tested to provide the desired light...about 1000 lumens or more, and purity of color." Ex.1049-Holmes.Supp., ¶43, citing Ex.1001-C11:39-44. But this sentence does not mean Macias tested a coverless luminaire or just LEDs for 1000 lumens.

In responding to the question: "But we have at least 1,000 lumens based on the LEDs alone, no cover, right?", Dr. Allen stated: "...all of the limitations that go into this lamp...for which he has to choose the individual LEDs in order to get 1,000 lumens out of the limitations...." Ex.1039-Dr.Allen.Depo.,@86:15-24. Dr. Allen's interpretation makes sense since each LED is not producing 1000 lumens.

Moreover, a constructed device is tested per the '895 disclosure (and claims), because output (1000 lumens) is from a luminaire with diffusion cover. Both Examples 2-3 are over 1000 lumens. Ex.1001-C10:L66, C11:31-32; §II.A.2 (explains '895 Patent's **luminaire** testing); §II.A.6(iii)(explains '895 Patent's **pre-luminaire** selection/testing of LEDs).

Holmes argues Hasnain teaches an optional cover. Ex.1003-Holmes, ¶350; Ex.1049-Holmes.Supp., ¶s 44-49, esp., ¶45. The alleged “cover” is just a “lens mounted above”: “[C]ylindrical lens 61 is mounted **above** the LEDs.” Ex.1008-Hasnain-C6:Ls.57-60, Fig.5 (emphasis added). Petitioner’s conclusory assertions have not shown the lens is a “cover” that together with a “housing” makes an **FFF/T-12 per elements 1[e]-[f]**. Hasnain’s Fig.4 has no cover or housing:

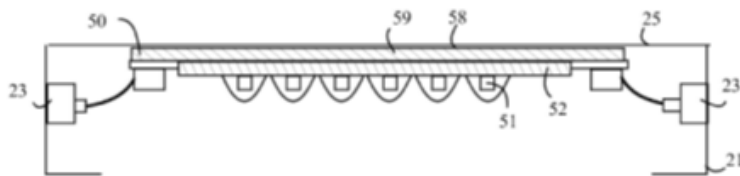


FIGURE 4

Ex.2008-Hasnain, Fig.4.

Hasnain’s Fig.5 also does not have a cover otherwise airflow is blocked. The lens 61 is supported above the LEDs, but there is no indication of closing off airflow. Ex.2008-Hasnain-C6:Ls.48-60.

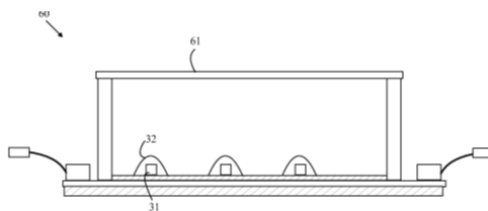


FIGURE 5

Ex.2008-Hasnain, Fig.5. Moreover, even if there were a cover, there is no housing and **no FFF/T-12**.

Holmes asserts (conclusory, without calculations or data) Ducharme's

Fig.5A (below) air slots (in lower body 5001) provide cooling. Ex.1049-

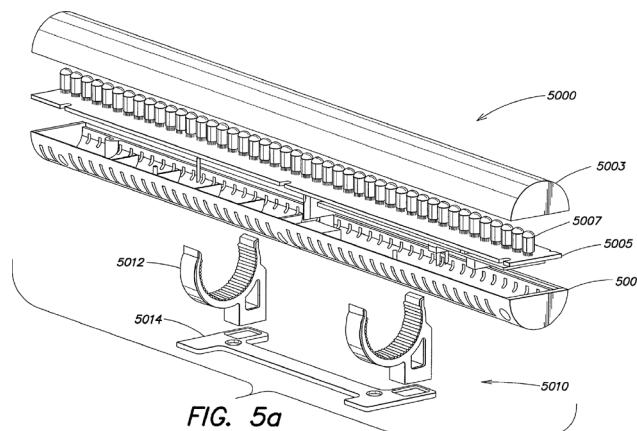
Holmes.Supp.,¶48. Such air slots obviously have substantially less airflow

compared to Hasnain's "no cover, no housing" design. Dr. Allen confirms that: Air

slots are "an order of magnitude less effective than good thermal management. I do

not want to leave you with the impression that is thermal management. It is not."

Ex.1039-Dr.Allen.Depo.,@107:4-9 (also @105:4-107:9).



Ex.1005-Ducharme, Fig.5a.

2. Lack of known thermal failure is not relevant

Petitioner argues Baxter was unaware of bicolor thermal failures. Reply, p.10. But Baxter left the industry shortly after Colt's Bicolor introduction. He had limited experience, if any. Ex.2068-Macias, ¶20 (introduction October 2013); Ex.2047-Baxter,p.25 (Litepanels stint ended July 2014).

Petitioner argues Wonderlick hadn't seen thermal issues with Mac Tech.

Reply, p.11. But Mac Tech was only 10W. (§IV.A.2.-below.)

IV. NO MOTIVATION TO COMBINE AND NO REASONABLE EXPECTATION OF SUCCESS

Petitioner argues “the web of design issues” are just well-known thermal issues unmentioned in the '895 Patent. Reply, p.11. (But see, §II.A.2 (improper hindsight); §III (thermal issues).)

A. All Elements Separately Known Is True of Every Invention

Petitioner argues all individual claim elements were well-known. Reply, §IV.A., pp.11-15. That's true of most, if not all inventions and ignores the invention as a whole.

1. Technical capability is not obviousness

Petitioner cites Baxter's statement that Litepanels had the technical ability to make a bicolor tube. Reply, p.12. Whether another company **could** have made the claimed device is not obviousness. *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed.Cir. 2015). Litepanels found trying to make LED tubes too risky. Ex.2047-Baxter, ¶s 27, 57-58, 73-80 (supported by ¶s 28-72). Baxter personally

considered failure likely and concludes a POSITA would conclude the same. *Id.*, ¶s 73-75.

2. Mac Tech's mono-color LED tube was only 10 watts

Petitioner mentions Mac Tech's tubes for Film/TV. Reply, p.13. But it was mono-color, in reality had too much green and was **only 10 watts**. Ex.1043-Fisher, @113:21-25 ("Mac Tech at the time were nine to ten watts...."). Even assuming 63 LPW LEDs Mac Tech yielded only 630 lumens (63x10) before losses.

3. Petitioner again argues routine design, known elements, mere selection mischaracterizing '895 selection/testing

Petitioner/Holmes argues color purity and testing/selection were known. Reply, pp.14-15; Ex.1049-Holmes.Supp., ¶s 28-31. (But see, §II.A.2. ('895 examples testing constructed device); §II.A.6(iii) ('895 selection/testing LEDs); §III.B.1 (Dr. Allen on '895 selection/testing)).

Holmes quotes Dr. Allen: "[a] POSITA would not have a reasonable expectation of success without knowing the photometric and chromaticity specifications of the LEDs" and asserts it proves the **inverse**. Ex.1049-Holmes.Supp., ¶30 (quoting Ex.2080-Dr.Allen, ¶31). That is false logic and conclusory attorney argument. Dr. Allen's paragraph 31 explained a POSITA

cannot assume $G/M < 5$ and $CRI > 90$, therefore Hasnain's 70-100 LPW is inapplicable. Ex.2080-Dr.Allen, pp.21-22 (§s 30-31).

B. Petitioner Did Not Establish Motivation to Combine and Reasonable Expectation of Success

Petitioner/Holmes make several conclusory, hindsight-based attorney arguments using improper interpretation of '895 Patent and testimony. Reply, §IV.B., pp.15-17; Ex.1049-Holmes.Supp., ¶s 33-40.

Petitioner/Holmes argue heat is trivial, citing Dr. Allen's testimony regarding enablement. Reply, §IV.B., pp.15-17; Ex.1049-Holmes.Supp., ¶s 34, 37, citing Ex.1039-Dr.Allen.Depo.,@88:18-90:23 ('895's LED selection and aluminum housing as part of heat management).

Holmes misinterprets Dr. Allen's testimony, which as a whole was a POSITA armed with the '895 specification (hindsight), seeing an aluminum housing, large number of LEDs (576), 40,000 hour life, and one-by-one testing/selection, would be able to solve thermal issues and reproduce the claimed invention. Ex.1039-Dr.Allen.Depo.,@88:18-90:23 (aluminum housing; 40,000 hours), @128:15-24 (576 LEDs), @86:2-24 ('895 LED testing with luminaire goal of 1000 lumens in mind). Also, §II.A.2.-above and fn.1 (improper hindsight).

Holmes argues Dr. Allen confirms routine design but Holmes improperly uses '895 Patent teachings, i.e., hindsight. (§II.A.2.-above). Holmes argues to

create bicolor just double Durosite's 300 LEDs. Ex.1049-Holmes-Supp., ¶38.

Assuming a POSITA were trying to convert Durosite into bicolor, it is much more likely that one half the 300 LEDs would be warm, and the other half cool since the LED layout already uses the entire board.

Durosite was only 17W for 300 LEDs in mono-color. Ex.1001- C2:Ls.47-50. Durosite, after losses, would not output 1000 lumens. (§II.A.4-above). By contrast, Macias Example 1 uses 42W. Ex.1001-C10:L27.

Durosite had unknown G/M bias and CRI so is meaningless to a POSITA. (§II.A.4-above.)

Doubling Durosite's 300 LEDs (not part of Grounds 1 or 2) also would conflict with Hasnain's LEDs spaced "one to two inches." Ex.1008-Hasnain-C6:Ls.38-40. Six hundred LEDs one inch apart won't fit a 4' x 1.5" tube.

Holmes asserts failure to consider bicolor selectivity. Ex.1049-Holmes.Supp.,¶39. Dr. Allen listed the bicolor claim elements (1[b]-[d], 1[g], 1[j](i)) and referenced selective color output (bicolor) including modes putting about twice the wattage through half the LEDs compared to mono-color. Ex.2080-Dr.Allen, ¶s 11, 85.

Holmes quotes Dr. Allen's testimony (Ex.1039-Dr.Allen.Depo., @128:15-24) but mis-explains it. Ex.1049-Holmes.Supp., ¶s 37, 40. The question Dr. Allen was answering was what the '895 Patent **teaches a POSITA (hindsight)**; not what

a POSITA would know **absent the '895 Patent**. Further, Dr. Allen's use of "not challenging" refers to "each LED has to carry less current," meaning not challenging **the LEDs' performance** rather than, as Holmes incorrectly suggests, being easy to conceive and make the claimed bicolor. Ex.1039-Dr.Allen.Depo., @128:15-24.

Petitioner interprets Macias' specifications/testing testimony contrary to the '895 Patent. Reply, p.17, citing Ex.1047-Macias.Depo.,@321:7-16 (Macias got LEDs from manufacturer). But see, §II.A.2. (testing of **constructed** luminaire); especially, §II.A.6(iii) (**'895 selection/testing one-by-one after receiving LEDs**); §III.B.1. (Dr. Allen's interpretation of '895 selection/testing).

V. SECONDARY EVIDENCE

A. Colt's Products Are Coextensive

Petitioner argues that Colt markets unclaimed features defeating co-extensiveness. Reply, §V.A., pp.18-20. But most important the product marketed is Colt's Bicolor T12 LED light system, which is what is claimed. Ex.1001-claim 1 ("An LED light system...suitable for a commercial image recording, in a form factor of a fluorescent light tube lamp....") That Colt's product embodies Claims 1 and 12-13 was shown and unchallenged. Ex.2051-Hoffman, ¶s 5-6; Ex.2053-claim chart, pp.1-10; Ex.2068-Macias,¶39. A perfect match is not required:

[W]e have never held that the existence of one or more unclaimed features, standing alone, means nexus may not be presumed.... [W]hat we do require is that the patentee demonstrate that the product is essentially the claimed invention.

Fox Factory, Inc. v. SRAM, LLC, 944 F.3d 1366, 1394 (Fed.Cir. 2019).

Petitioner argues Colt's product is not "essentially the invention." Reply, pp.19-20. Petitioner also asserts unclaimed features "materially impact the functionality," so there is no nexus, citing *Fox Factory*. Reply, p.20:Ln1-4. But *Fox Factory* says:

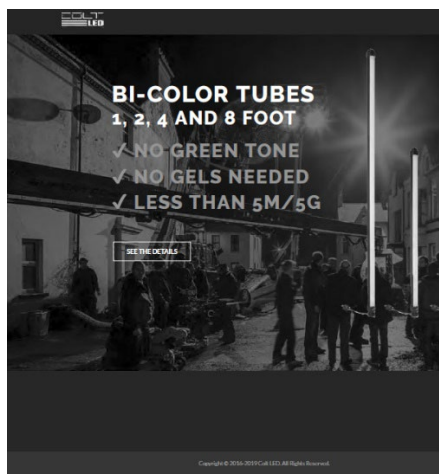
A patent claim is not coextensive with a product that includes a "**critical**" unclaimed feature **that is claimed by a different patent and that materially impacts** the product's functionality....

Id., at 1376 (emphasis added). In *Fox Factory*, patent owner described the unclaimed feature as "critical" and that same feature was claimed by a different patent. *Id.* But Petitioner presents no evidence of critical unclaimed features or another patent.

Regardless, Petitioner fails to show unclaimed material features for the **relevant Film/TV market**. Petitioner only cites third-party Wamco's website benefits listing. Ex.1049-Holmes.Supp., ¶s 60-62. Petitioner/Holmes argue these benefits materially impact functionality because Wamco's webpage lists them as

“Benefits.” Reply, p.19-bottom; Ex.1060. But Wamco markets to **aerospace and aircraft customers**, not Film/TV (not “commercial image recording” of elements 1[pre],1[j]). Ex.1047-Macias.Depo.,@200:1-10 (Wamco aerospace/aircraft lighting).

Petitioner presents no evidence that Wamco's listed benefits are “critical” (or even “material”) for Film/TV. By contrast, Colt markets what is critical: bi-color tube, G/M<5, high CRI, light output:



Ex.2069



FIG. 1 LUMINAIRE

Test Summary					
Distance (ft)	Color Settings	CCT	CRI	Lux	FC
4	D	5796	94.5	597	55.46
8				165.91	15.41
12				74.71	6.94
16				42.56	3.95
4	T	3107	96.6	554	51.47
8				154.11	14.32
12				69.51	6.46
16				39.51	3.67

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Ex.2077, p.2

Colt's marketing shows the claimed important features for Film/TV. Ex.2068-Macias, ¶s 10,19, Exs.2072, 2077; also, Ex.2041-Csernecky, ¶s 13-14; Ex.2067-Wonderlick, ¶s 12,14; Ex.2066-Silva, ¶s 10-11. Even Quasar prominently marketed these features. Ex.2075, p.1 (“highest lumens per watt,” “95+ CRI” and “0CC (no Magenta or Green spikes).”)

Even if not presumed, nexus exists because Colt marketed the claimed invention's elements. See, Ex.2069, Ex.2077, p.2; Claim 1[j](i)-(iii) (1000+ lumens; G/M<5; CRI>90); 1[d](selective warm and cool); 1[f] (FFF/T-12); 1[b]-1[c] (bicolor). Note that Petitioner does not challenge Patent Owner's entitlement to Quasar's sales. See, Patent Owner Response ("POR")(Dkt.#28-confidential); (#46-public), §XI.E.2., pp.56-57, Ex.2093-Interrogatory Responses (Petitioner's revenue pp.11-13) and Ex.2068-Macias, ¶s 29-34, esp. ¶33 (estimate pre-2017).

B. Patent Owner Established Sales Were a Direct Result of the Claimed Invention

1. The WBIP "Invention as a whole" standard applies

Petitioner argues sales were not a direct result of claimed unique characteristics. Reply, p.20. But, per the Federal Circuit, patentee need only tie the objective evidence to the **invention as a whole** (for consistency with 35 U.S.C. §103), noting: "This is especially true for situations like those at issue here, where the claimed invention is, admittedly, a **combination of elements that were known individually in the prior art.**" *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1331-32 (Fed.Cir. 2016)(emphasis added). Here, both Patent Owner and Petitioner agree that claim 1 comprises individually known elements. (§III.A.5-above.)

2. The aluminum housing is irrelevant

Petitioner argues the “aluminum housing” is the only new element. Reply, p.21-top; Ex.1049-Holmes.Supp., ¶s 34-35. But this argument incorporates multiple misconceptions and distortions. (§II.A., especially, §II.A.6 explaining several distortions); Ex.2080-Dr.Allen, §I, ¶s17-34 (lumen penalties), §II, ¶s 35-62 (thermal issues).

Petitioner presents no evidence that aluminum housings (not even in claim 1) motivate Film/TV customers. (§V.A.-above (actual desirable features/reasons).)

C. Market share

Petitioner criticizes Csernecky's statement that over half the productions he worked used Colt's or Quasar's bicolours. Reply, p.21-middle.

Csernecky and others support substantial market presence:

“Over the last two to three years, **almost every production** that I have worked on has used one of Colt's or other (Quasar's) bicolor LED lighting tubes.” Ex.2041-Csernecky, ¶18 (emphasis added).

“Since introduction..., it has been used in about 90% of all new productions that Paramount supplies [equating] to 18 of 20 of the new productions per year.” Ex.2067-Wonderlick, ¶14.

“[R]arely seen any productions using fluorescent tubes...last three to four years.” Ex.2041-Csernecky, ¶18.

“Colt's Bicolor Tube light has completely replaced fluorescent tube lights as the standard at Paramount.” Ex.2067-Wonderlick, ¶16.

Even other big studios rented Colt's product from Paramount. Ex.2068-Macias, ¶20.

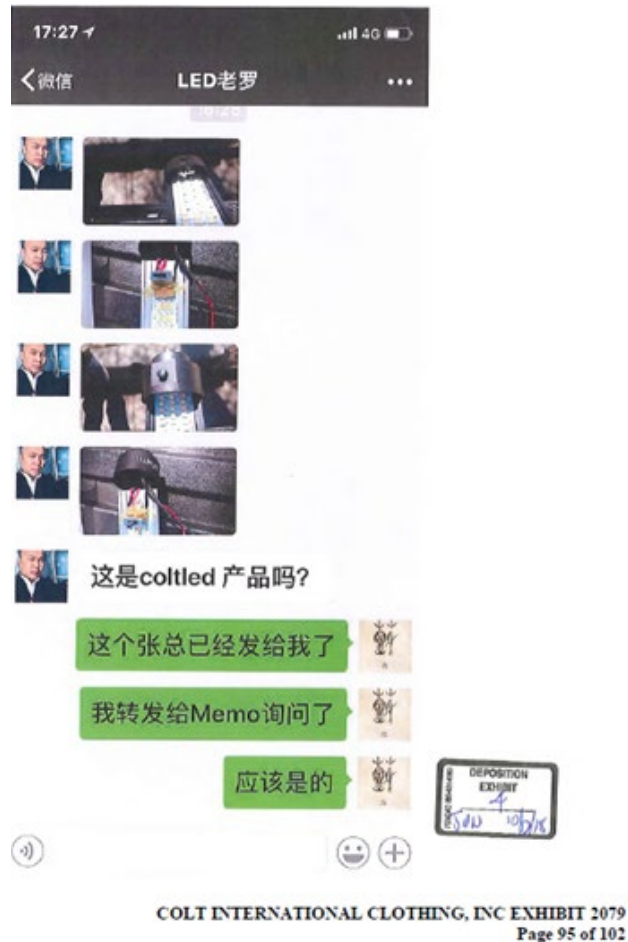
D. Copying

Petitioner asserts Zhang's 2018 declaration (Ex.2036) and 2018 deposition transcript (Ex.2079) conflict on whether he received Colt's product from Gonzalez or Lau. Reply, §V.C., pp.21-22. But both Gonzalez and Lau were with Quasar.⁸ More importantly, Zhang's deposition testimony that Lau provided Colt's product to copy is uncontroverted. Ex.2079-Zhang.Depo.@14:24-15:4 (Lau not satisfied with initial product); *Id.*@15:22-16:3 (sample from Lau to take apart); *Id.*@20:3-7 (sample from Lau to copy). There is additional corroboration with uncontroverted evidence that Quasar's Gonzalez obtained sample Colt products from Silva. Ex.2066-Silva, ¶s 15-16. There even are photos of Colt's products disassembled

⁸ Quasar Science LLC was the entity that Real Party in Interest The Vitec Group (now Videndum plc) bought and created Petitioner Quasar Science LLC. Petition, p.4-listing Videndum; Ex.2021-name change: Vitec to Videndum; Ex. 2019, p.1-Vitec purchase.

(below). Ex.2079-Zhang.Depo., @PDF95: POR, #29/#48, pp.53-55 (PDF@61-63)

(Zhang deposition excerpts evidencing copying).⁹



Ex.2079, @PDF95.

⁹ Petitioner asserts Zhang's 2018 transcript (Ex.2079) is hearsay. Reply, p.22, fn.6. But Petitioner didn't object. See, IPR docket. The transcript is under oath, Petitioner's predecessor questioned Zhang (Ex.2079, @76:12+), and the corroborating evidence discussed above would satisfy FRE 807 (residual exception).

Petitioner presents Gonzalez's terse declaration that he never met or instructed Zhang to copy. Reply, pp. 22-23; Ex.1059-Gonzalez. But Petitioner and Gonzalez **never** contradict that Zhang received Colt's products from Quasar to copy. Petitioner did not submit any denials from Lau. Patent Owner's claim charts showing Quasar's products match Colt's claims are undisputed. Ex.2051-Hoffman, ¶12; Ex.2059 (claim chart).

Petitioner asserts Zhang and Macias have competing declarations in unrelated case, Laysion v Colt, a commercial dispute (resolved) concerning an alleged oral order from Colt. Ex.1040, p.3:L.3 ("verbally ordered" allegation); Ex.1047-Macias.Depo., @288:4-9 (dispute resolved). Zhang and Colt's business dispute including factual disagreement does not change corroboration explained above including the photo of disassembled product.

E. Long-Felt Need

Petitioner attacks long-felt need arguing Baxter made concessions about Litepanels. Reply, §V.D., pp.24-25. But Petitioner provides no evidence that Litepanels' bicolor LED **panel** competed with Colt's tubes. Petitioner also says Baxter said Colt's tubes "are not really used that much in the industry." Reply, p.25:Ls.4-5. But Baxter is **not** a commercial success witness. He left Litepanels shortly after Colt's product introduction. (§III.B.2.-above (Baxter left Film/TV

2014)). Colt's product eliminated decades changing out tubes and gels. Ex.2066-Silva, ¶7.

F. Combined Secondary Evidence

Petitioner individually attacks, but secondary evidence must be considered **as a whole** and can sum to **substantial weight** even if individually insubstantial.

Volvo Penta of the Americas, LLC v. Brunswick Corp., 81 F.4th 1202, 1215

(Fed.Cir. 2023). Colt has substantial secondary evidence summing to convincing evidence. (POR, §XI, pp.42-59).

VI. 42+ WATTS INPUT IS EXTREME FOR A COVERED TUBULAR LUMINAIRE

For claims 12-13, 22, 29-30, Petitioner argues well-known, trivial thermal concerns, citing only Holmes' conclusory, attorney argument. Reply, §V, p.25, citing Ex.1049-Holmes.Supp., ¶s33-40.

A POSITA would avoid extreme input power like 42W. Going from 22W to 44W doubles power loading, doubling heat. Ex.2080-Dr.Allen, ¶54. Since a POSITA would not want to risk damaging LED quality (§III.A.4.-above), a POSITA would lack motivation to modify Kit's or Ducharme's devices by Hasnain's suggested power input and would lack a reasonable expectation of success especially since Hasnain is incompatible with a cover and housing. (§III.A.1.-3.-above; Ex.2080-Dr.Allen, ¶s 35-68, esp. 63-68 (re 42W input).)

Kit's disclosure that Cree's mono-color (announced but unintroduced) luminaire "**should** consume 28 watts" (Ex.1004-Kit-C6:Ls.25-27)(emphasis added)(Reply, p.26) appears speculative and still **not anywhere near 42W**. There is no evidence that it was covered or housed, or what green bias and CRI were. Ex.1004-Kit-C6:Ls.25-27. A POSITA would disregard this postulated 28-Watt Cree lamp. Ex.2080-Dr.Allen, ¶s 74-86, esp. 74-75.

A POSITA would not use 28 watts in a covered, housed bicolor LED lamp with high quality LEDs for Film/TV. (§III, esp. III.A.4.-above.)

Most telling: Durosite was only 17W (§II.A.4.-above) and Katzir preferred 14W (Ex.1007-Katzir [0026]). Petitioner's proffered actual Film/TV LED tube, Mac Tech, was even lower wattage (**only 10W**). (§IV.A.2.-above). Claims 12-13, 22, 28-29 are over four times that!

VII. CONCLUSION

Judgment confirming patentability of all challenged claims is respectfully requested.

Dated: June 26, 2024

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VIII. CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned hereby certifies that the foregoing **PATENT OWNER'S SUR-REPLY TO PETITIONER'S RESPONSE** complies with the type-volume requirements of 37 C.F.R. § 42.24(b)(2) because it contains fewer than 5600 words, excluding the parts exempted under 37 C.F.R. § 42.24(c), as measured by the word-processing system used to prepare this paper.

Date: June 26, 2024

Respectfully submitted,
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IX. CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing **PATENT OWNER'S SUR-REPLY TO PETITIONER'S RESPONSE** was served on June 26, 2024, via email directed to counsel of record for Petitioner at the following:

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