

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DABICO AIRPORT SOLUTIONS INC.,
Petitioner,

v.

AXA POWER APS,
Patent Owner.

Inter Partes Review No. IPR2025-00408

U.S. Patent No. 9,771,169

PATENT OWNER'S PRELIMINARY RESPONSE

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2001	https://www. aviationpros.com/gse/gpus-pcas-power-carts-accessories/article/53057274/2023-ground-support-worldwide-leaders-of-the-year-itw-gse-2023-product-leader-of-the -year
2002	U.S. Patent No. 4,006,603
2003	https://www.inventionh.com/5-critical-variable-frequency-drive-limitations/
2004	U.S. Patent No. 7,207,183
2005	U.S. Patent No. 6,362,432
2006	U.S. Patent No. 4,272,967
2007	U.S. Patent No. 4,352,273
2008	U.S. Patent No. 4,835,977
2009	U.S. Patent No. 5,031,690
2010	U.S. Patent No. 5,383,335
2011	U.S. Patent Pub. No. 2010/0031676A1
2012	https://www.adelte. com/airports/preconditioned-air-zephir/#:~:text=Preconditioned%20Air %20Unit%20specifications&text=Zephir%20Series%20are%20designed%20and,while% 20consuming%20the%20minimum%20energy.
2013	https://fcxinc.com/pre-conditioned-air/20-150-ton-rating-pre-conditioned-air/
2014	https://www.avicorp.com/civil-aviation/ preconditioned-air
2015	Judgment on Interim Injunction (High Court of Delhi)
2016	U.S. Patent No. 6,446,447
2017	U.S. Patent Pub. No. 2007/0209383
2018	U.S. Patent No. 6,600,278
2019	Understanding Variable Speed Drives (Part 3) (“UVSD”)
2020	Code of Federal Regulations: Definitions and Abbreviations, Title 14 – Aeronautics and Space (1985)
2021	ECCAIRS Air Type Designators by Manufacturer (2010)
2022	https://aviationlearnings.com/pre-conditioned-air-pca-unit/.
2023	U.S. Patent No. 7,661,274

2024	E.P. 3243032B1
2025	https://masweb.vims.edu/bridge/datatip.cfm?Bridge_Location=archive0909.html

I. INTRODUCTION

Patent Owner AXA Power ApS (“AXA Power” or “Patent Owner”) submits this preliminary response to the Petition filed by Dabico Airport Solutions Inc. (“Dabico” or “Petitioner”) requesting *inter partes* review of claims 1-22 of U.S. Patent No. 9,771,169 (“the ’169 patent”).¹ Because the Petition is facially deficient, it should be denied. Each ground contains numerous failures of proof—instances where Petitioner either (1) offers no argument on a necessary point or (2) provides no evidence to support its arguments, or bases them solely on conjecture, unfounded assumptions, or the unsupported “say so” of its alleged expert. Moreover, the fundamentally flawed nature of Petitioner’s theories were laid bare during an Indian proceeding involving Petitioner’s affiliate that challenged the patentability of the Indian counterpart to the ’169 patent (Indian Patent No. 330145).² There, relying on

¹ As set forth in Patent Owner’s Mandatory Notice (Paper 4), Patent Owner recorded a Change of Name reflecting that its name has officially changed to ITW GSE ApS. The company also still carries on business under the secondary legal name AXA Power ApS. No assignment or change of ownership was involved.

² The Indian findings are of course not binding on the Board, but the Indian proceedings contain probative evidence of the knowledge and understanding of

what was presumably Petitioner’s best prior art, the Indian tribunal found the validity theories were not even “credible.” *See infra* at § II.C. Petitioner’s present *inter partes* review petition, which relies merely on redundant references, similarly lacks merit. Institution should be denied for at least three reasons.

First, Petitioner overlooks the full text of the claims, or attempts to effectively rewrite claim limitations. Petitioner argues that the claims are merely directed to employing the concept of variable frequency drive (“VFD”) in a preconditioned air unit (“PCA”), with allegedly obvious additional features such as power sharing, automatic aircraft adjustment, or failure detection. But, to the contrary, the claims are directed to a specific manner of employing *separate* VFDs in *each* compressor of a multi-unit PCA, which was an innovative concept that went against conventional wisdom. This innovation led to awards, recognition, and commercial success—yet Petitioner attempts to read the innovation out of the claims.

Second, Petitioner ignores evidence—including in its own cited art—that

persons of ordinary skill in the art and Petitioner’s representations in that proceeding are relevant. *See, e.g., Tanabe Seiyaku Co. v. U.S. Int’l Trade Comm’n*, 109 F.3d 726, 733 (Fed. Cir. 1997) (stating that “representations made to foreign patent offices are relevant to determine whether a person skilled in the art would consider butanone or other ketones to be interchangeable with acetone”).

either expressly teaches away from the claims of the '169 patent or shows that a person of ordinary skill in the art ("POSITA") would not have had a motivation to make Petitioner's proposed combinations. For example, Petitioner's primary references (Kreymer and Lechmotoren) already provided the same features and benefits that Petitioner alleges would have motivated a POSITA to combine them with Taras and/or Takahashi. But the proposed combinations would have only introduced complexity, bulk, and cost with no additional benefit. In fact, Petitioner's chief secondary reference (Taras) teaches away from Petitioner's proposed combinations, pointing a POSITA in the direction of a different solution that was less complex, cheaper, and less prone to mechanical failure. And Petitioner's Takahashi secondary reference is not even analogous art. It relates instead to a small device for cooling water (not airflow) to cool a computer, with no teachings that would have directed a POSITA concerned with the claimed aircraft preconditioned air units to adapt it for use in a PCA unit.

Third, the only support for many of Petitioner's obviousness theories are circular and vague statements from its expert as to alleged motivations to combine the prior art. For example, a key theory of Petitioner's is that a POSITA would have been motivated to modify the primary references in order to "fine tune the capacity of each refrigeration circuit," without providing any *reason why* a POSITA would have wanted to fine tune each refrigeration circuit, as opposed to fine tuning the

collective output of the *overall system*, which the prior art already did.

These petition deficiencies underpin all of Petitioner’s arguments. Because the Petition is facially deficient, the Board need not weigh opposing facts, competing expert testimony, or differing claim constructions to determine that the Petition falls short as a matter of proof. The Board should not institute review.

II. BACKGROUND

A. The ’169 Patent

Patent Owner is the world’s leading supplier of aircraft ground power units and pre-conditioned air units (“PCAs”). See <https://itwgse.com/>. An example of one of Patent Owner’s innovative PCA products is its patented ITW GSE 3500 PCA:



See *id.* The GSE 3500 PCA has been extremely successful since its release in November 2022. The GSE 3500 PCA was named the 2023 *Ground Support Worldwide* Product Leader of the Year. See Exhibit 2001, <https://www.aviationpros.com/gse/gpus-pcas-power-carts->

[accessories/article/53057274/2023-ground-support-worldwide-leaders-of-the-year-itw-gse-2023-product-leader-of-the-year](#). Among the features of the GSE 3500 PCA that third parties in the industry have recognized as being innovative are (1) its “Variable Frequency Drive (VFD) technology, which enables stepless regulation of discharge temperatures,” (2) its “automated aircraft type detection [that] makes the 3500 the only PCA on the market to automatically adapt its airflow to the specific aircraft type – and not just an aircraft category,” (3) its “Intellegent Power Management (IPM),” which “allocates power dynamically to the different units” drawing power at the aircraft gate, and (4) its failure detection circuitry so that “[i]n the event a module is not working, the PCA does not shut down entirely.” *See id.*

These ITW GSE 3500 PCA innovations are claimed in the ’169 patent, which issued from a PCT application filed March 18, 2010. The inventors of the ’169 patent began by recognizing that “cost, efficiency, flexibility, and serviceability” were all issues with then-existing PCAs. *See* ’169 patent at 1:32-33. The solution that the inventors of the ’169 patent arrived at is a synergistic combination of several concepts that flew in the face of conventional PCA wisdom, i.e., a PCA having: (1) multiple refrigeration units that could each individually be varied using their own variable frequency driver, which works hand-in-hand with implementing (2) the option for modular, self-contained refrigeration units that could be quickly pulled out and replaced by someone with no refrigeration experience, (3) failure detection

and failure bypass for individual refrigeration units, and (4) cooling that can automatically adapt to not just the aircraft category, but the specific aircraft type.

1. Limitations of VFD Technology Were Well Known

As described in the '169 patent, it had already been known for decades that VFDs could provide the ability to vary a motor's power, which in turn could be used to vary the cooling output of a refrigeration system. *See* '169 patent at 8:23-25; *see also e.g.*, Exhibit 2002, U.S. Patent No. 4,006,603 (a 1977 patent directed to using VFDs in a railcar cooling compressor to vary cooling output). Additionally, it was known that a VFD could increase efficiency in some instances. *See* Exhibit 2003, <https://www.inventionh.com/5-critical-variable-frequency-drive-limitations/> (“A VFD can also make a motor more efficient, but only at reduced load and/or reduced speed. A drive system will not use less power when the motor is running at rated speed and rated load. In fact, it uses slightly more due to the losses within the drive.”).

But it was also known before the '169 patent that VFDs have serious drawbacks, resulting in reasons to avoid using multiple VFDs in an electrical system when just one VFD will provide the same benefits. For example, one of Petitioner's cited references, WO2007/046794A1 to Taras (“Taras”), discloses some of the problems with VFDs:

In machinery that is driven by variable speed drives, there is

approximately a five to ten percent penalty in power and efficiency due to losses associated with the operation of the variable speed drive. This efficiency loss or additional power draw is one of the *drawbacks that has limited the application of variable speed drives* in industrial or other installations Further, *variable speed drive electronics generate heat* and are frequently required to be cooled with an external source... *Also, variable speed drives often present a source of unreliability reducing overall system maintenance and uninterrupted service intervals.*

Taras at para 2 (emphasis added). Taras taught that it was preferable to just use one VFD to vary the power output of all motors in a refrigeration system at once—especially when all that matters is the overall cooling output of the system. *See* Taras at Fig. 2. Similarly, U.S. Patent No. 7,207,183 recognized that it was undesirable to use a VFD on each compressor of a multi-compressor refrigeration system because “the overall chiller system becomes more expensive” compared to “a single drive of the same output power rating.” Exhibit 2004 at 1:35-40. And U.S. Patent No. 6,362,432 recognizes that VFDs can cause “electromagnetic noise and radio frequency interference.” Exhibit 2005 at 1:20-24.

Coupled with these known problems with VFDs is that before the ’169 patent, *POSITAs did not see any reason or benefit in providing a separate VFD associated with each compressor* of a multi-compressor refrigeration system, much less any reason that would overcome the above-discussed drawbacks with VFDs. Notably, despite VFDs existing since the 1960/1970’s, *none* of Petitioner’s references, the references cited during prosecution of the ’169 patent, or the references cited in the

Indian proceedings disclose using a VFD with each compressor in a multi-compressor aircraft PCA:

Date	Reference	Cited in	Discloses
1981	Exhibit 2006, US 4,272,967	Indian proceedings	No VFD
1982	Exhibit 2007, US 4,352,273	Indian proceedings	No VFD
1989	Exhibit 2008, US 4,835,977	Indian proceedings	No VFD
1991	Exhibit 2009, US 5,031,690	Indian proceedings	No VFD
1995	Exhibit 2010, US 5,383,335	Prosecution	No VFD; “variable” fan disclosed by using variable pitch fan blades
1998	US 5,715,701 (“Kreymer”)	IPR Petition	No VFD
1998	DE29622089 (“Lechmotoren”)	IPR Petition	One “regulator” associated with the central controller
2010	Exhibit 2011, US 2010/0031676A1	Prosecution	VFD on fan only (<i>see</i> [0049])

This makes sense, given that conventionally there would have been no reason to provide a VFD on each compressor in a PCA. In a PCA, the key factors are the temperature and airflow going from the PCA to the aircraft, which is much easier, less complex, less bulky, and less expensive to provide with either just a VFD on the blower fan or a single VFD that controls all motors (including compressors) at once. *See, e.g.*, Exhibit 2003, US 7,207,183 (disclosing that there is no need to provide a VFD for each compressor when “a single drive of the same output power rating” for all compressors can achieve the same thing).

Not surprisingly, most of Patent Owner’s competitors have therefore not used VFDs on *each* compressor and/or have seen no reason to do so. For example:

- **Adelte’s** PCA uses four compressors with four phases of cooling, but only one VFD, associated with its blower. *See* Exhibit 2012, <https://www.adelte.com/airports/preconditioned-air-zephir/>.
- **FCX System’s** PCA includes a VFD on its blower with no mention of using one on its compressors. *See* Exhibit 2013, <https://fcxinc.com/pre-conditioned-air/20-150-ton-rating-pre-conditioned-air/> (“All units are equipped with a Variable Frequency Drive (VFD) to reduce blower speeds for substantial energy savings.”).
- **Avicorp** only puts VFDs on its blowers and fans, as opposed to its compressors. *See* Exhibit 2014, <https://www.avicorp.com/civil->

[aviation/preconditioned-air](#) (“Utilizing environmentally sensitive refrigerants, VFD support of blowers and fans, the unit has proven itself superior to all others.”).

2. The ’169 Patent Inventors Went Against Conventional Wisdom

The inventors of the ’169 patent went against this conventional wisdom when they decided to provide *separate VFDs on each compressor* in their new, inventive ITW GSE 3500 PCA. They did so because they were the first to conceive of several entirely new synergistic reasons to provide separate VFDs on separate compressors.

One reason was to enable as an option the ability to make a PCA with self-contained cooling modules that could be swapped in or out, added, or removed based on the cooling demands for a specific customer, repairs, or cleaning. *See* ’169 patent at 6:47-51, 6:52-7:17.³ The inventors realized that by providing each cooling module

³ While the ’169 patent claims structure that *enables* a modular or self-contained PCA system (by reciting separate VFDs for each compressor), the claims do not *require* a modular or self-contained system. A patentee is not required to claim every reason behind an invention and can claim some or all of the structure of the invention. *See, e.g., IQRIS Techs. LLC v. Point Blank Enters.*, 2025 U.S. App. LEXIS 5316, *13 (Fed. Cir. March 7, 2025) (“It is the claims, not the preferred embodiments, that define the metes and bounds of the patentee’s invention.”).

with its own VFD rather than a central VFD to vary power to the overall system, any module experiencing a failure (including a VFD failure) could simply be swapped out with a replacement module by a person with no refrigeration experience and little-to-no electrical experience. *See id.* at 6:34-40. This was an advantage over a prior art refrigeration system with *one VFD for the system* where, if the single VFD fails, it would require shutting the entire system down, taking the entire system apart, and having a trained electrician repair the VFD. *See id.*

Additionally, the inventors realized that by having separate self-contained modules having their own VFDs, each module would also then have its own VFD controller. That is, the inventors conceived of including, as part of the controller for each cooling module, that each module could transmit a failure signal to the PCAs overall central control, so that if one of the cooling modules fails, the central controller can shut down that module and automatically adjust the cooling among the remaining modules of the PCA. *See* '169 patent at 4:16-24.

Finally, the inventors realized they could also provide (1) a power sharing control input with the central controller for controlling the PCA power consumption, i.e., the central controller could signal the VFD controllers of the individual modules to vary the power to the individual compressors to lower the PCA power consumption and (2) automatic adjustment of the cooling (not just airflow) based on specific aircraft type. *See id.* at 4:36-57, 3:64-4:3, 10:18-23. The '169 patent claims,

therefore, are directed to a PCA system having these features.

B. Prosecution of the '169 Patent

The claims of the '169 patent were extensively prosecuted, with multiple non-final and final Office Actions and an appeal brief filed by Patent Owner. *See* Exhibit 1002, '169 patent FH. Ultimately, the Examiner's last rejection of the claims was based on U.S. Patent No. 5,383,335 to Anderson ("Anderson") combined with U.S. Pat. Pub. No. 2010/0031676 to Urbain ("Urbain") and a paper titled "Understanding Variable Speed Drives (Part 3)" ("UVSD"). According to the Examiner, Anderson teaches a preconditioned air unit having a plurality of refrigeration systems, each of which includes a compressor, but does not disclose "at least one variable frequency driver for power supply of the at least one compressor" and a central controller configured to control the variable frequency drivers. Exhibit 1002 at 502-504. Moreover, according to the Examiner UVSD teaches that a VSD offers significant electrical efficiency savings, while Urbain teaches providing a central controller to manage the functioning of constituent elements of an air conditioning unit. *See id.* The Examiner then assumed, without discussion or analysis, that it would have, therefore, been obvious to add a VSD to each compressor as claimed. *See id.*

Petitioner asserts that the only reason the Examiner ultimately allowed the claims was because of an amendment to add specific additional limitations to claims 1, 2, and 16 (i.e., the "power sharing control input" of claim 1, the automatic

adjustment of output of claim 2, and the failure detection of claim 16.) *See* Petition at 1-2, 8-10. But that is not correct. To the contrary, the Examiner had already separately asserted that these claim limitations were also found in the prior art and would have been obvious. For example, the Examiner initially asserted that it would have been obvious to incorporate a “power sharing control input for control of the preconditioned air unit power consumption” in view of US 2007/0209383 to Hutton (“Hutton”), as recited in issued claim 1. *See* ’169 patent FH at 510. Similarly, the Examiner asserted that Anderson teaches adapting “for use with different types of aircraft” while Urbain teaches “how to control the system so as to accommodate the needs of different aircraft,” as recited by issued claim 2. *Id.* at 505. And the Examiner asserted that U.S. Patent No. 6,446,447 to Goth (“Goth”) teaches individual refrigeration units sending failure signals to a central controller, with the central controller adjusting cooling among the remaining systems in response to the failure signal. *Id.* at 511.

Ultimately, the Examiner reconsidered the obviousness rejections and found that the combination of these concepts in a PCA system was *not* obvious. *See id.* at 602-604. The Examiner did *not* issue the claims because the Examiner found that the only inventive features were these new limitations added via amendment. To the contrary, he allowed the pending claims because, taken as a whole, the inventions of the amended claims were not taught in the prior art.

Regardless, Petitioner's story is irrelevant. At no point did Patent Owner admit that the pre-amendment claims were unpatentable. *See, e.g., TorPharm Inc. v. Ranbaxy Pharms., Inc.*, 336 F.3d 1322, 1330 (Fed. Cir. 2003) (where applicant amended claims to add a narrowing density limitation instead of refuting Examiner's obviousness argument, applicant was not precluded from later arguing that the claims were non-obviousness apart from the density limitation; a "patentee is not required to fight tooth and nail every possible adverse thought an examiner commits to paper, nor to advance redundant arguments for patentability"); *Woodrow Woods & Marine Exhaust Sys., Inc. v. Deangelo Marine Exhaust, Inc.*, 692 F.3d 1272, 1287 (Fed. Cir. 2012) (rejecting argument that amending the claims constitutes an admission or acquiescence to an examiner's rejection). The concept of using a separate VFD in each refrigeration system of a multi-refrigeration PCA system was never disclosed in the art before the Examiner (or the art cited by Petitioner in the Petition) and the applicant maintained that position throughout prosecution.

C. Background of the Dispute Between the Parties

Petitioner and Patent Owner are not involved in any litigation regarding the '169 patent in the United States. Patent Owner has, however, sued an affiliate of Petitioner (i.e., Dabico Airport Solutions Pvt Ltd. & Ors) for infringement in India on related Indian Patent No. 330145, which has nearly identical claims to those of the '169 patent. *See* Exhibit 2015, Judgment on Interim Injunction (High Court of

Delhi). That proceeding is still pending, but Patent Owner was granted a preliminary injunction against Petitioner's affiliate. *See id.*

Among the unsuccessful arguments against the preliminary injunction, Petitioner's affiliate argued invalidity of the Indian patent based on alleged lack of "inventive step" (similar to obviousness) in view of several prior art U.S. patents and other publications. *See id.* at 44-61. The Indian court, however, found there was not even a "credible" challenge to the validity of the Indian patent. *See id.* at 63. Instead, the Indian court found that: (1) none of the prior art taught or rendered obvious using a VFD on each of a plurality of refrigeration systems in a PCA separately, as opposed to one VFD to control all the refrigeration systems at the same variable frequency, (2) non-PCA (e.g., general HVAC) prior art was not analogous to PCA prior art and general teachings of HVAC prior art cannot necessarily be applied blindly to PCA systems, and (3) Petitioner's sister company (Ipalco BV) filed and obtained a similar patent two years after Patent Owner (U.S. Patent No. 10,569,905), which supported that innovations to the control of PCAs are not obvious in view of HVAC general technology. *See id.* at 26-27, 58. While the findings of the Indian Patent Office are not considered under U.S. law persuasive authority *per se*, the Indian Patent Office proceeding findings constitute evidence as to the understanding of a POSITA regarding the applicable technology. *See Tanabe*, 109 F.3d at 733 (finding that representations made to foreign patent office relate to the determination of how one

of skill in the art would understand interchangeability of chemical solvents).

Also telling is that in its IPR Petition, Petitioner switched to new prior art compared to the art it asserted in the Indian court, perhaps seeking to avoid getting the same result as in India. However, none of the prior art raised in the Petition presents a stronger invalidity case compared to the art already considered by the Examiner or in the Indian proceedings.

D. The Asserted Prior Art

A consistent bare thread that weaves through the Petition is the argument that all refrigeration systems work in the same way and all of them would benefit from adding VFDs, and that therefore adding VFDs to each compressor in any refrigeration system is obvious. But Petitioner provides no evidence supporting these arguments beyond conclusory expert assumptions and statements. And Petitioner's own prior art references show they work in distinct ways from each other and from the '169 patent, such that the modification the Petition requires is not obvious.

Below is a summary chart briefly identifying Petitioner's various Grounds and the claims challenged by each Ground, followed by a summary of each of the asserted prior art references:

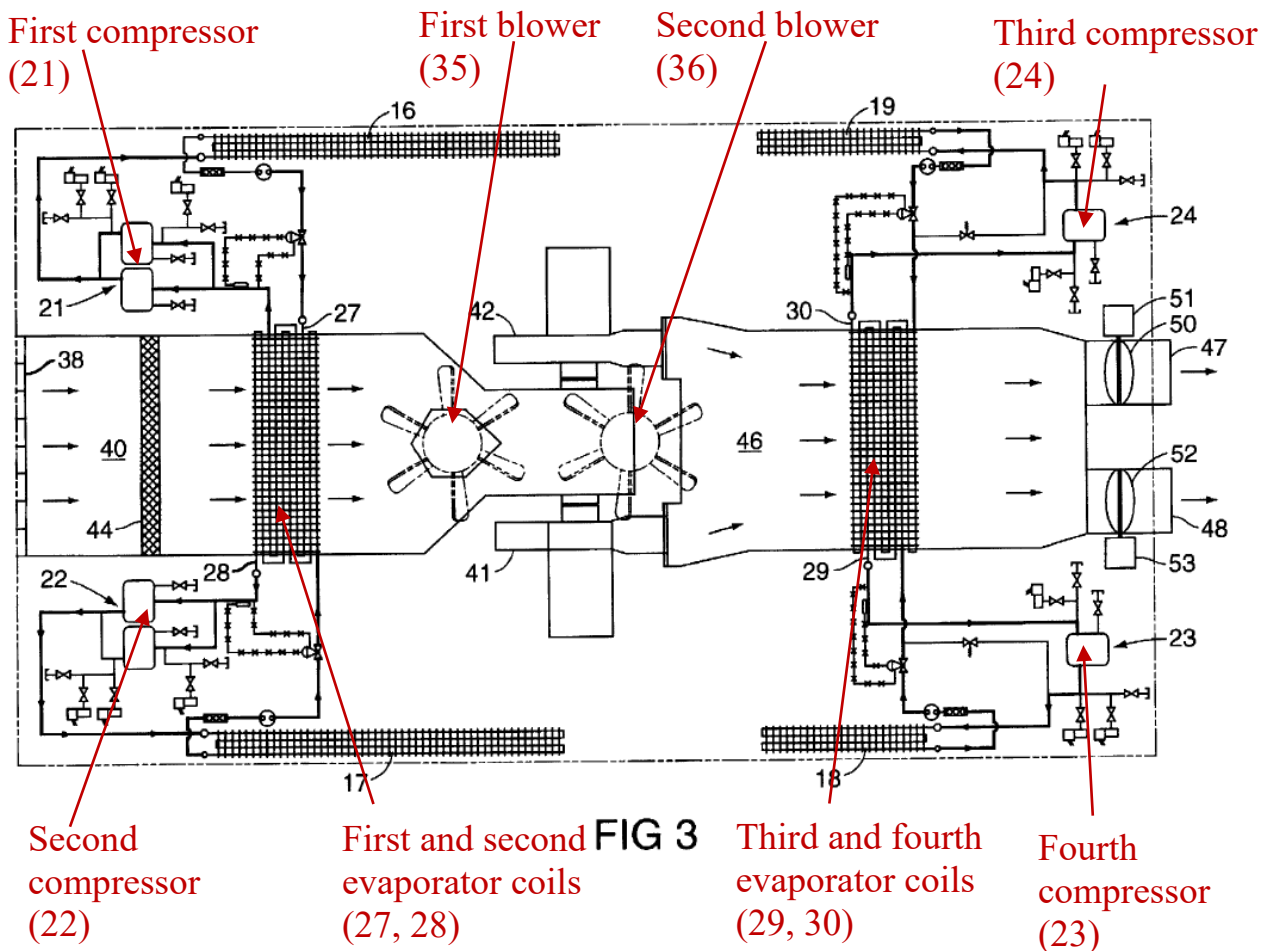
	Claims Challenged							
	1	2	3-8	9	10	11-12	13	14-22
Ground 1 (Kreymer + Taras)		X	X	X		X		
Ground 2 (Kreymer + Taras + Takahashi)		X	X					X
Ground 3 (Kreymer + Taras + Carrier)				X	X			
Ground 4 (Lechmotoren + Taras)	X	X					X	
Ground 5 (Lechmotoren + Taras + Takahashi)								X

1. Kreymer

Petitioner’s Grounds 1-3 are based on alleged obviousness in view of U.S. Patent No. 5,715,701 to Kreymer (“Kreymer”) combined with additional secondary references. Petitioner argues that Kreymer discloses “four refrigerant circuits, each with a compressor (compressors 21-24), evaporator coil (27-30), and condenser coil (16-19) and that Kreymer’s “use of multiple compressors allows for some

adjustment in the amount of cooling provided, i.e., by turning individual units off or on to provide less or more cooling. Petition at 14. Petitioner also argues that Kreymer discloses a “mode selector switch” that can be used to “adjust operation (including the number of operating compressors) for a specific aircraft type.” Petition at 15.

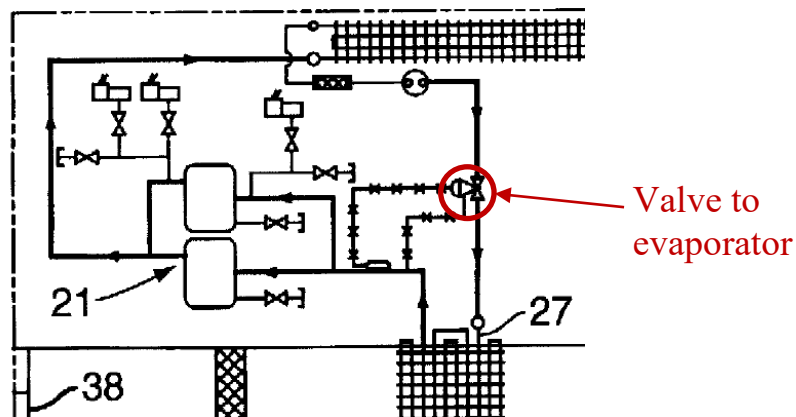
But in fact, Kreymer discloses *neither* “turning individual units off or on to provide less or more cooling” *nor* adjusting the “number of operating compressors” based on the specific aircraft type. Kreymer’s PCA system is shown below, with relevant features identified:



Kreymer provides the ability to vary cooling by increments of four levels or stages (or more, if additional cooling units are added). Kreymer avoids the need to turn any cooling units on/off to do so (as the '169 patent discloses is undesirable from a power efficiency standpoint, *see* '169 patent at 2:12-15) by instead using *valves* to supply or not supply refrigerant to successive linked evaporator coils and/or by turning on or off one or two *blowers* and opening or closing corresponding dampers to introduce additional cooled air. For example, Kreymer discloses:

The first condenser coil 16 supplies a refrigerant to the first evaporator coil 27, where it evaporates. The refrigerant is then drawn into the first compressor 21, and then supplied to the first condenser coil 16. *If additional cooling is desired, the second coil 17 supplies refrigerant to the second evaporator coil 28, where it evaporates.* The refrigerant then passes to the second compressor 22 and then back to the condenser coil 17. *If additional cooling is desired, the third condenser coil 18 supplies refrigerant to the third evaporator coil 29, where it evaporates.* The refrigerant then passes to the third compressor 23 and then back to the third condenser coil 18. If additional cooling is desired, the fourth condenser coil 19 supplies refrigerant to the fourth evaporator coil 30, where it evaporates. The refrigerant then passes to the fourth compressor 24 and then back to the fourth condenser coil 19.

Kreymer at 2:63-3:12 (emphasis added). In other words, Kreymer isolates the refrigerant in the respective condenser coils until additional cooling is needed. If additional cooling is needed, Kreymer opens successive valves in the condenser coils to supply refrigerant to successive evaporators (and their corresponding compressors for cycling back into the condenser coils). Kreymer's valves are shown below:



Kreymer at Fig. 3 (excerpted). Nowhere does Kreymer disclose turning any of the compressors on or off to adjust cooling. It instead discloses that its cooling method avoids “cycling an entire cooling system on and off” to provide “a more efficient capacity control system.” Kreymer at 3:10-12.

Additionally, Kreymer discloses that depending on the size of the aircraft to be cooled, successive *blowers* can be activated or deactivated and corresponding dampers opened or closed to draw in additional air to be cooled (while maintaining static pressure). Kreymer states:

Referring to the schematic illustration in FIG. 3 and to FIG. 2, if the mode selector switch 62 is set to a narrow body aircraft, then only the first blower 41 is activated and the first damper motor 51 opens the first damper 50, while the second damper motor 53 keeps the second damper 52 closed.. ...

If the mode selector switch 62 is set to a jumbo body aircraft, then the first blower 41 and second blower 42 are activated and the first damper motor 51 opens the first damper 50 while the second damper motor 53 opens the second damper 52. Jumbo body aircraft have two connections, so both the first hose 13 and the second hose 14 are connected to the aircraft 9.

Kreymer at 3:13-4:3. Kreymer does not disclose turning the *compressors* on or off based on the aircraft size, as Petitioner incorrectly states. And Kreymer only allows selecting one or two blowers to be activated depending on a selection between a few sizes of aircraft—not automatically adjusting the cooling based on the specific *type* of aircraft. *See, e.g.*, Exhibit 2001 (recognizing that one benefit of the ITW GSE 3500 that embodies the '169 patent invention is that “Automated aircraft type detection makes the 3500 the only PCA on the market to automatically adapt its airflow to the specific aircraft type – and not just to an aircraft category.”)

2. Taras

All of Petitioner’s invalidity theories (Grounds 1-5) rely on WO2007/046794A1 to Taras (“Taras”) as a secondary reference for disclosure of using VFDs in a refrigerant system. But Taras does not disclose a PCA. It discloses a conventional HVAC system. *See* Exhibit 1006. As discussed below, PCAs are uniquely different from conventional HVAC systems. *See infra* at 31. Nevertheless, Petitioner relies on Taras for its disclosure of using VFDs to vary the power to compressors in a refrigeration system. *See* Petition at 16. And it argues that it would have been obvious to add Taras’ disclosure of VFDs in a conventional refrigeration system to any refrigeration system, including a PCA system. And that it would have been obvious to add *separate* VFDs to each compressor in any multi-refrigeration unit system (despite no disclosure in Taras or elsewhere to do so).

The review of the full text, however, shows that Taras actually teaches away from providing separate VFDs on each motor of a PCA. More specifically, Taras discloses that VFDs have serious drawbacks and should be used sparingly:

In machinery that is driven by variable speed drives, there is approximately a five to ten percent penalty in power and efficiency due to losses associated with the operation of the variable speed drive. This efficiency loss or additional power draw is one of the *drawbacks that has limited the application of variable speed drives* in industrial or other installations Further, *variable speed drive electronics generate heat* and are frequently required to be cooled with an external source... Also, variable speed drives often present a source of unreliability reducing overall system maintenance and uninterrupted service intervals.

Taras at para 2 (emphasis added). In this regard, Taras discloses that its invention uses VFD with bypasses to circumvent the VFD when normal frequency operation is sufficient, to avoid the unnecessary use of VFDs. Taras at Abstract. Taras discloses that one way to avoid the drawbacks of VFDs is to just use one VFD to vary the power output of *all* motors at once—especially when overall output is all that matters (as in cooling systems where there is just one air stream to be cooled at one temperature). This is shown in Fig. 2 of Taras below:

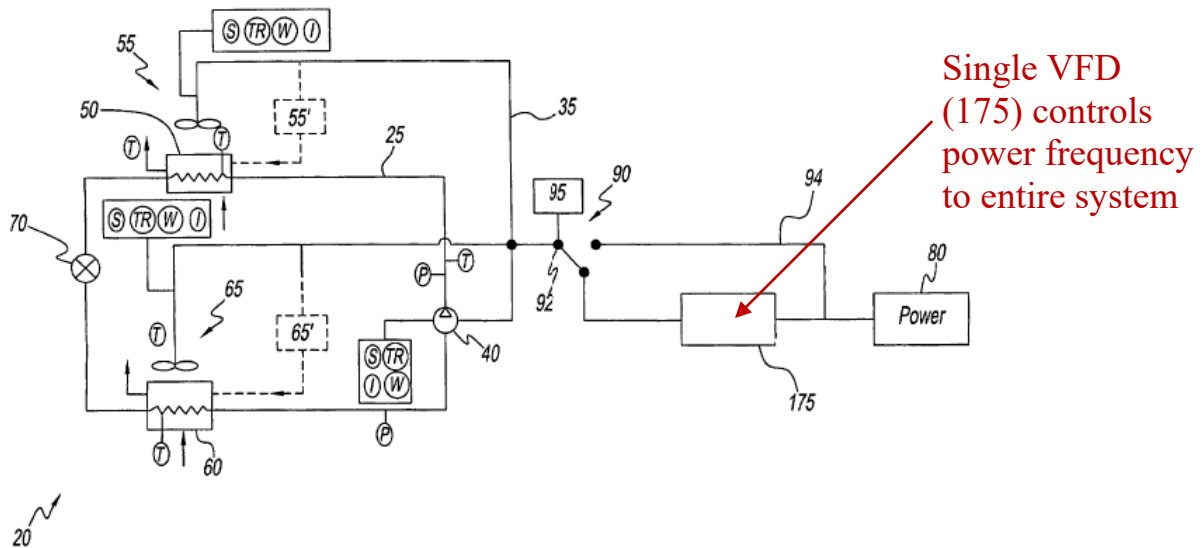


Figure 3 of Taras discloses at most providing separate VFDs for different functions of a refrigeration system, e.g., to control the compressor (40) on one VFD and fans (55 and 66) separately to separately adjust *cooling* and *air flow*:

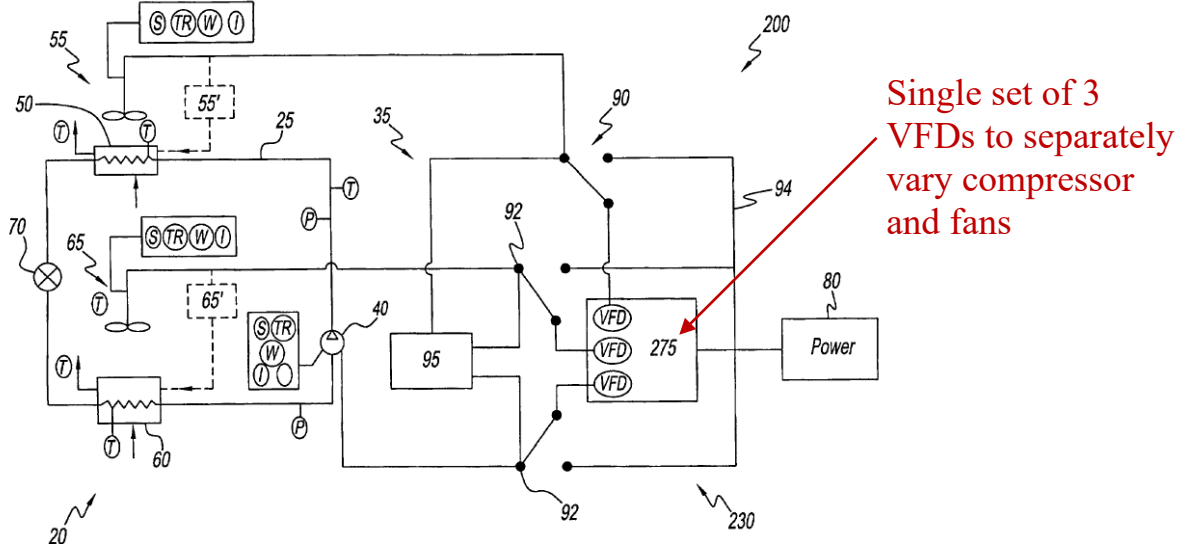


Fig. 3

Taras never discloses providing separate VFDs for *each compressor* in a multi-compressor, multi-refrigeration unit system. Taras only discloses one compressor.

It discloses a refrigeration system having *one* compressor (40) and two *blowers* that can be separately varied (just as in Kreymer). *See* Taras at Fig. 3.

Taras contains no disclosure teaching the use of separate VFDs to individually control separate compressors when all that matters is the cooling level of the output air from the overall system, which can be adjusted with one VFD for all the compressors. Where VFDs are unnecessary, Taras teaches to avoid using them.

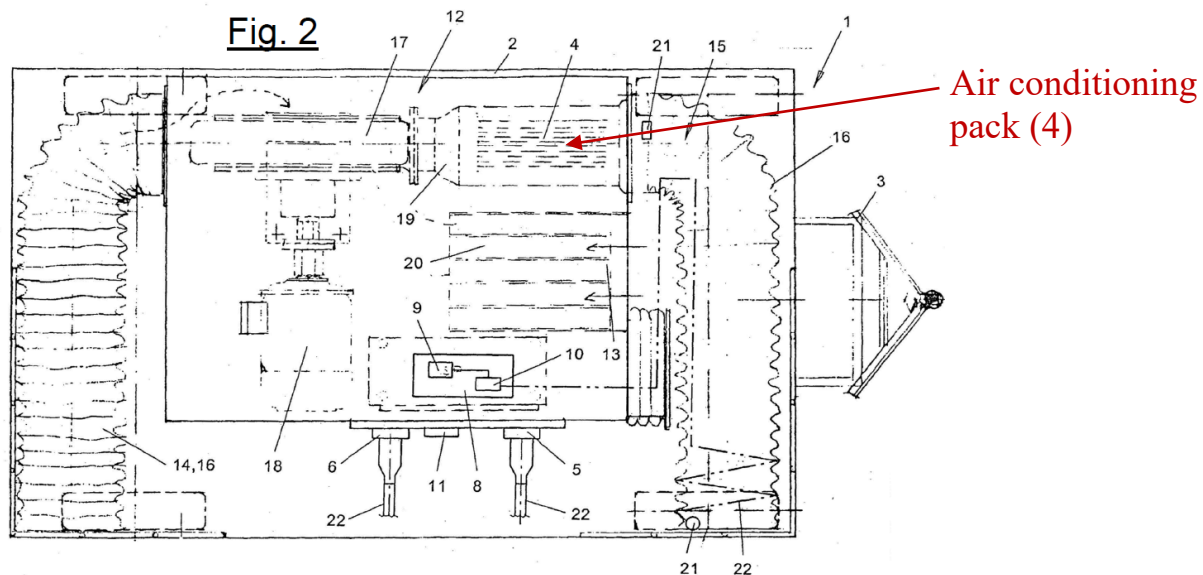
3. Carrier

Petitioner relies on Carrier Corp., Variable Frequency Drive: Operation & Application of Variable Frequency Drive (VFD) Technology (Oct. 2005) as an obviousness reference in Ground 3 regarding claims 9-10 of the '169 patent, which require, in addition to the VFD of claim 2, a “rectifier connected to a mains power supply input of the air unit for generation of a power DC voltage supply.” *See* '169 patent at claims 9-10. Petitioner relies on Carrier for disclosure that “a VFD generally includes a rectifier.” Petition at 52. Otherwise, Petitioner also cites to Carrier as support for the general proposition that VFD offers the “greatest operational savings” compared to alternatives, while ignoring that Carrier never addresses the use of multiple VFDs when a single VFD would provide the same benefit. *See* Petition at 18.

4. Lechmotoren

Petitioner relies on German Utility Model Patent DE 29622089U1 to Lechmotoren (“Lechmotoren”) for two reasons: (1) as the only reference that allegedly discloses the “power sharing” element of claim 1 of the ’169 patent and (2) as a back-up primary reference to Kreymer. *See* Petition at Grounds 4-5. Much of Petitioner’s characterization of Lechmotoren, however, is incorrect.

Contrary to Petitioner’s assertions, Lechmotoren does not unambiguously disclose the use of two or more *refrigeration* systems as required by the ’169 patent claims. Lechmotoren’s figures and description describe a PCA unit with at least one “air-conditioning pack”:



Lechmotoren at Fig. 2. Lechmotoren does state that its system can include “one *or more* air-conditioning packs (4)” —but it uses the term “air-conditioning pack” to refer to both heating and cooling units. *See id.* at 1:22-25 (“The air conditioning unit

can have one or more air-conditioning packs ... this may involve heating and/or cooling devices.”) Then, Lechmotoren only discusses in detail an “air-conditioning pack” that is a *heating* pack. *See id.* at 9:4-17 (“In the exemplary embodiment shown, the air-conditioning pack (4) consists of an electric heating system, in particular a resistance heating system with several plate-shaped or rod-shaped heating elements.”).

Moreover, while Lechmotoren states that its air conditioning units have “variable and controllable output,” it only discloses this in connection with *heating*—not cooling. Lechmotoren discloses that its heating can be adjusted by utilizing “four heating levels” provided by “several plate-shaped or rod-shaped heating elements” that can be “activated individually by the control system (8).” Lechmotoren at 9:4-17. In fact, Lechmotoren’s only express disclosure of a *refrigeration* system is a vague reference that this “air-conditioning pack (4) can also be designed *as a cooling device (not shown)* or can have a cooling pack in addition to the heating pack.” Lechmotoren at 10:3-6 (emphasis added). And Lechmotoren’s only reference to including multiple “air-conditioning packs” is to provide both “heating and/or cooling devices” at the same time so that the overall “air conditioning unit can be used in both warm and cold zones,” i.e., one heating pack and one cooling pack. *See id.* at 4:9-12.

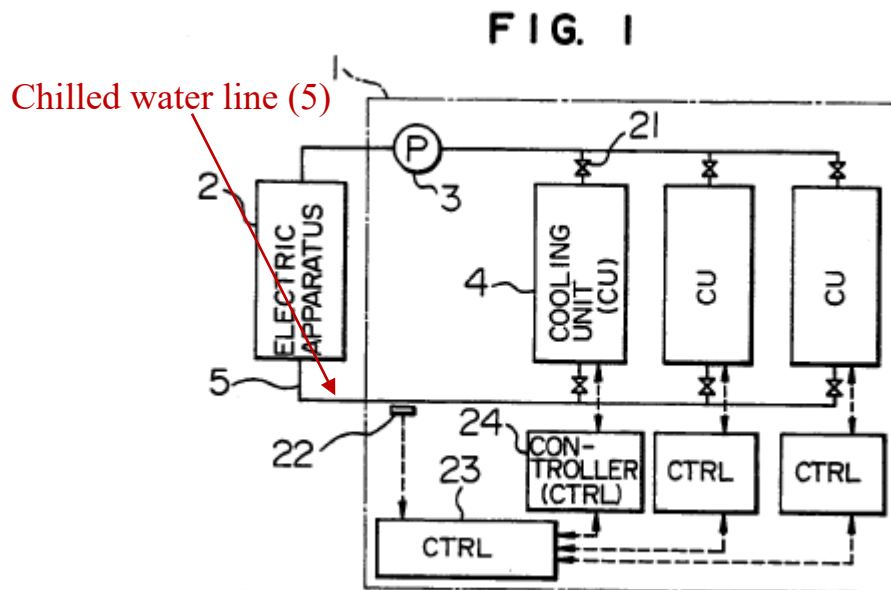
Additionally, Lechmotoren does not disclose that its air conditioning units use a VFD to control any output (heating or cooling). Lechmotoren only discloses that it regulates its air-conditioning packs via a single “regulating device” at the central control system. Lechmotoren at 8:27-32. For heating, this “regulating device” could be as simple as a dimmer switch—Lechmotoren does not specify. And even though Lechmotoren discloses that multiple air conditioning packs can be implemented, it still discloses using just one “regulating device” as opposed to a regulating device on each air conditioning pack. *See* Lechmotoren at *passim*.

5. Takahashi

Petitioner relies on U.S. Patent No. 5,351,498 to Takahashi (“Takahashi”) in Grounds 2 and 5 challenging claims 14-22 of the ’169 patent. Those claims require that “each refrigeration system of the plurality of refrigeration systems is configured for failure detection so that, in the event that one of the refrigeration systems fails, *the failing refrigeration system transmits a failure signal to the central controller.*” *See* ’169 patent at dependent claims 14 and 15 and independent claim 16. Claims 15, 17, and 22 further require that “the central controller is further configured to automatically adjust the required amount of cooling among the remaining properly operating refrigeration systems of the plurality of refrigeration systems in response to the failure signal.” *Id.* at claims 15, 17, 22.

Petitioner asserts that Takahashi discloses a cooling system with “multiple

‘cooling units 4’” that individually detect unit failures and send signals to a central controller to adjust the non-failed units to compensate. Petition at 38-39. Takahashi’s system, however, is different from the aircraft PCA of the ’169 patent. Takahashi’s system is *a small, compact system* for cooling an “electrical apparatus *such as a computer.*” Takahashi at 1:7-8 (emphasis added). As illustrated below, Takahashi *does not cool airflow* at all—its cooling units instead cool *water* in a tube circulated through the computer:



Takahashi at Fig. 1. Takahashi’s only disclosure of cooling air is that its cooling units can use an “air-cooling condenser” to cool the water line (5)—not an airflow

path.⁴ See Takahashi at 3:42-64.

Faced with these different types of cooling systems, which operate in distinct ways with distinct purposes, Petitioner speculates that each cooling system will nevertheless work in the same way with interchangeable components and allegedly predictable results. The fatal problem is this: Petitioner provides no evidentiary support.

E. Claim Construction

The Petition proposed no claim terms for construction. However, Petitioner's incorrect use of one term shows that it requires construction, i.e., the term "aircraft type." Petitioner uses the term synonymously with aircraft *category*, but in aviation usage, "aircraft type" means: *the specific make and model of aircraft*. See Exhibit 2016, Code of Federal Regulations: Definitions and Abbreviations, Title 14 –

⁴ Takahashi generically states that its invention "may" be applicable to "other electronic apparatuses such as an air-cooling type electronic apparatus" (Takahashi at 8:11-17). But such vague disclosure is not enabling and does not support that a POSITA would have looked to Takahashi for disclosure relevant to a PCA. *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1361 (Fed. Cir. 2011) ("To render a claim obvious, prior art cannot be 'vague' and must collectively, although not explicitly, guide an artisan of ordinary skill toward a particular solution.").

Aeronautics and Space (1985) at 12 (“‘Type’: (1) as used with respect to the certification, rating, privileges, and limitations of airmen, means a specific make and basic model of aircraft, including modifications thereto... (2) as used with respect to the certification of aircraft, means those aircraft which are similar in design. Examples include DC-7 and DC-7C; 1049G and 1049H; and F-27 and F27-F.”); Exhibit 2017, ECCAIRS Air Type Designators by Manufacturer (2010) (listing the various aircraft “types” by designation).

Otherwise, Patent Owner agrees that the Board need not formally construe any other terms to deny institution. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (only terms in “controversy” need to be construed). Petitioner does, however, implicitly construe some other terms when mapping the prior art to the challenged claims. But as explained in Section IV below, Petitioner’s implicit constructions contradict the claims’ express language and ordinary meaning and should not be adopted.

F. Level of Ordinary Skill in the Art

Petitioner’s proposed definition of a person of ordinary skill in the art is merely someone with “at least a Bachelor’s degree in Mechanical or Electrical Engineering or related field, and two years of work experience in HVAC&R engineering” or graduate experience. Exhibit 1003, Leeb Decl. ¶36. Petitioner’s

definition, however, is incomplete because it does not include or require any experience in aircraft PCAs.

Here, a POSITA would also have had at least two years of work experience in aircraft PCA engineering given the unique challenges and requirements of PCAs as compared to only generic HVAC systems. Among other differences are size constraints (e.g., both that a PCA is typically larger than a domestic air-conditioning unit, but must also be as small as possible to not be an obstacle at an aircraft gate) and that PCAs, unlike domestic air conditioners (1) generally do not recirculate air, and must therefore often cool air over a much larger temperature difference, and (2) must also provide heating in the same system (as opposed to separate AC and heating units for a building). *See, e.g.*, Exhibit 2018, <https://aviationlearnings.com/pre-conditioned-air-pca-unit/>.

III. THE PETITION DOES NOT ESTABLISH A “REASONABLE LIKELIHOOD” OF UNPATENTABILITY

The Board should deny institution because Petitioner has failed to raise a reasonable likelihood of prevailing on its obviousness theories. Petitioner’s Grounds 1-5 each fail because (1) the prior art (e.g., Taras) expressly teaches away from Petitioner’s proposed prior art combinations, (2) Petitioner does not provide supported, non-conclusory motivations to modify the primary references to satisfy the claims, particularly where the primary references already provided the same

benefits and advantages as the proposed combinations, or other less complex alternatives existed to achieve the same benefits and advantages, (3) the proposed combinations would fail to satisfy all limitations of at least several claims, (4) a key prior art reference (Takahashi) is non-analogous art, and (5) several of the proposed combinations would either result in an inoperable system or would change the fundamental principle of operation of the primary reference. For these and the additional reasons discussed in more detail below, *inter partes* review should not be instituted because Petitioner has failed to present a *prima facie* case of obviousness.

A. *All Grounds, All Claims: Taras Teaches Away From Providing VFDs With Each Compressor In A Multi-Refrigeration Unit System And The Petition Provides No Motivation To Provide VFD With Each Compressor*

The Petition focuses almost entirely on whether it would have been obvious to simply add the concept of VFD in general to Kreymer and Lechmotoren. *See, e.g.*, Petition at 18 (“Kreymer, however, was filed in 1996. By 2009, a POSITA would have understood that VFDs offered an even more efficient approach.”), (“A POSITA, thus, would have sought the energy savings of VFDs in Kreymer’s PCA ... The POSITA would have found Taras, and recognized that Taras’ VFD-driven compressors provide such benefits.”).

But the claims of the ’169 patent do not simply require adding “VFD” in general to a PCA. To the contrary, the claims require “a plurality of refrigeration

systems, each of which includes ... at least one variable frequency driver for power supply of the at least one compressor.” ’169 patent at claims 1, 2, 16. Specifically, the ’169 patent claims require separate VFDs *for each* compressor in a multi-compressor refrigeration system. Notably, the Indian court recognized this distinction in connection with the identical claim language in related Indian Patent No. 330145. *See* Exhibit 2015 at 60 (“The inventive step of the suit patent...hinges in the ability of the central controller to control multiple refrigeration systems (each having 1 VFD controlling 1 controller) at the same time in a PCA unit.”). Importantly, Dabico did not dispute in the Indian proceedings that separate VFDs for each compressor in a multi-refrigeration unit system is required by the patent claims. *See id.* at 21-25.

Petitioner argues that Taras discloses using VFDs in a conventional *HVAC* system, and that it would have been allegedly obvious to transfer this concept to *PCAs* and include a VFD on each compressor in a multi-compressor refrigeration system. *See* Petition at 16-21. But Taras only discloses a system having a single refrigeration unit with a single compressor, i.e., compressor 40. *See* Taras at Figs. 1-3, ¶ 0017. Taras does not disclose “VFD driven compressors” (plural) as Petitioner erroneously and conclusorily implies. *See* Petition at 18. And Taras *affirmatively teaches away* from using more VFDs than are absolutely necessary for several reasons.

First, Taras teaches that VFDs have serious drawbacks and that one should minimize their use. The whole point of Taras—the invention of Taras—was directed to a way to have an optional bypass to go around a VFD whenever normal power was sufficient and a VFD was not required. In this regard, Taras states:

In machinery that is driven by variable speed drives, there is approximately a five to ten percent penalty in power and efficiency due to losses associated with the operation of the variable speed drive. This efficiency loss or additional power draw is one of the drawbacks that has limited the application of variable speed drives in industrial or other installations Further, variable speed drive electronics generate heat and are frequency required to be cooled with an external source... Also, variable speed drives often present a source of unreliability reducing overall system maintenance and uninterrupted service intervals.

Taras at ¶ 2. Taras discloses that its invention includes bypass circuitry to avoid using any VFD when normal frequency operation is sufficient. *See id.*

Second, Taras teaches that if one uses a VFD, one way to minimize its use is to provide a single central VFD that varies the power frequency to all the motors in the system at once—something that is particularly suitable when overall power consumption and cooling output is all that matters and there is no need or point to vary individual cooling sub-units separately, e.g., in an air conditioning system all that matters is that the air that is output from the system is at a certain temperature and blowing at a certain volume. That is shown in Taras Figs. 1 and 2 below:

Motors (compressor (40), fans (55, 65))

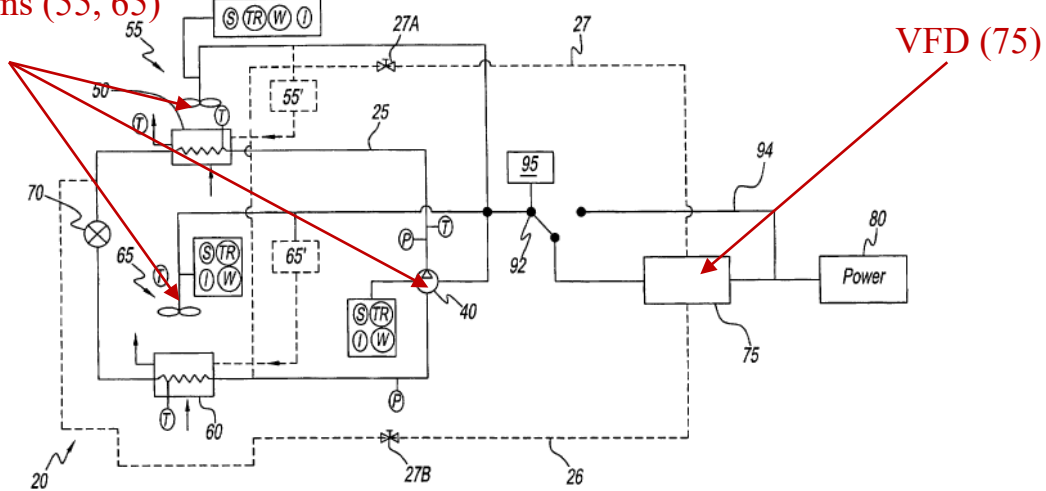


Fig. 1

Motors (compressor (40), fans (55, 65))

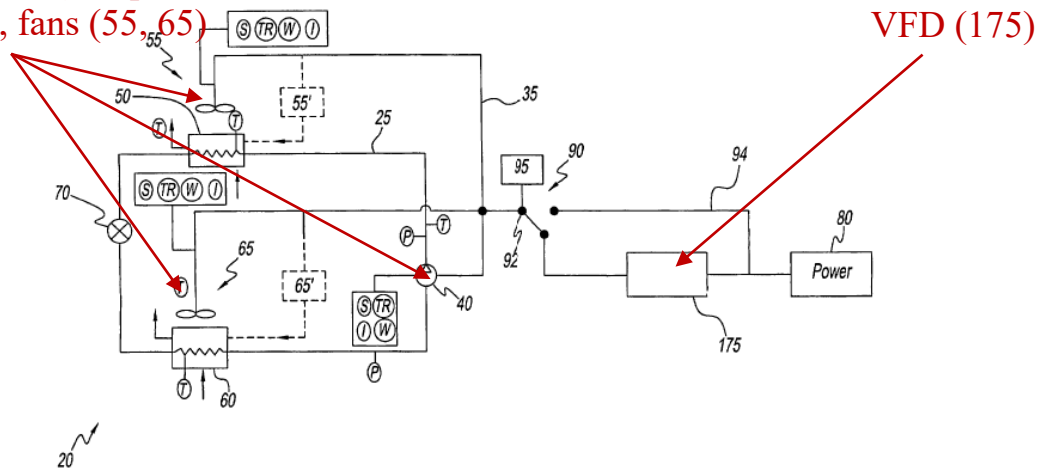


Fig. 2

Third, while Taras does disclose using separate VFDs when control over different “components of the refrigerant system” would increase “system flexibility,” the only instance in which it discloses such flexibility is desirable is to

separately vary the *cooling* (via the compressor) and the *airflow* (via the fans). This is shown below in Fig. 3 of Taras:

Motors (compressor
(40), fans (55, 65))

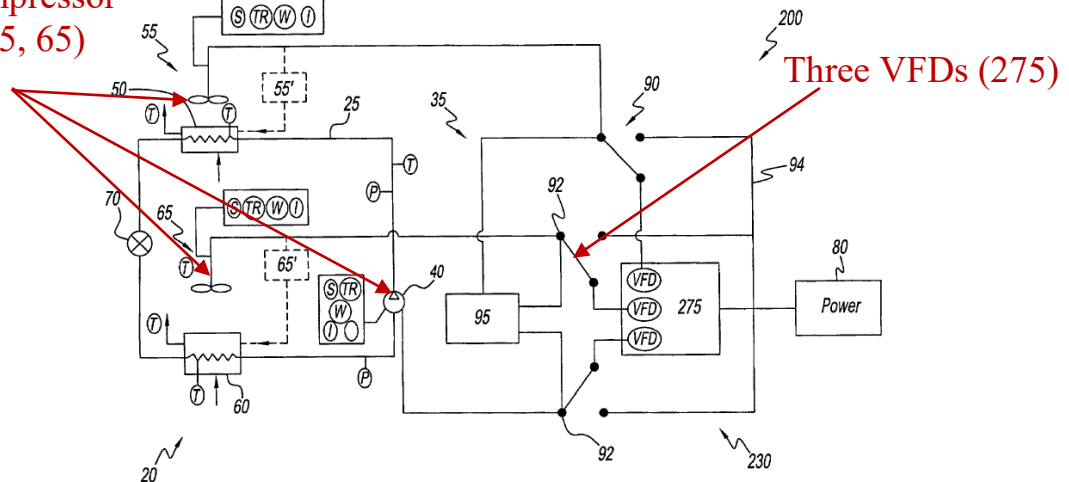


Fig. 3

By having separate VFDs for the fans and the compressor, the system of Taras Fig. 3 would allow operating the fans at lower power frequency (and higher power efficiency) if high fan speed was not required, while still operating the cooling (compressor) at normal power, or vice versa. Taras reflects the well-known concept that it may be desirable to separately adjust *cooling* (air temperature) versus *blowing* (air flow). But Taras provides no reason or disclosure to extend that concept to vary each compressor in a multi-refrigeration unit separately because doing so would not provide any “system flexibility” in a typical PCA. If the power frequency of two compressors are *separately* raised/lowered to adjust the output air cooling to 65°F, or *both* raised/lowered by the same frequency amount to adjust the output air to 65°F, the result is the same. Similarly, if one is trying to achieve an output air temperature

of 65°F with a two-compressor system, one could set both compressors to 65°F, or one to 60°F and one to 70°F—the output air temperature will be the same.

Taken as a whole, therefore, Taras teaches away from using a VFD on each compressor of a multi-compressor system, or at the very least Taras shows that a POSITA would not have been motivated to do so. *See Galderma Labs., L.P. v. Tolman, Inc.*, 737 F.3d 731, 738 (Fed. Cir. 2013) (the prior art teaches away “when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken” in the claim); *Provisur Techs., Inc. v. Weber, Inc.*, No. 2021-1851, 2022 WL 17688071 (Fed. Cir. Dec. 15, 2022) (affirming Board finding of no motivation to combine in an IPR where the proposed combination would have added “needless complexity”); *In re Schweickert*, 676 Fed. Appx. 988 (Fed. Cir. 2017) (where proposed combination would result in “additional complexity,” was “unnecessary” to achieve benefits and “would do little more than add unwanted cost and complexity to the system” the Board “needed to explain why a skilled artisan would still have a reason to combine [the references] to achieve the claimed invention.”).

B. *Grounds 1-3 (Based on Kreymer), Claims 2-12, 14-22: The Petition Has No Valid Motivation to Add Separate VFDs to Kreymer's Compressors—Separate VFDs Would Provide No Benefit Or Functionality in Kreymer*

Grounds 1-3, all based on Kreymer, also fail for another reason: Petitioner fails to show it would have been obvious to add separate VFDs to Kreymer's compressors. Petitioner provides no evidence that a POSITA would have been motivated to do so, especially when it would have been redundant of what Kreymer already provided, or would have been less desirable than other easier, less complex, and less expensive prior art alternatives. *See, e.g., In re Schweickert*, 676 F. App'x 988, 995 (Fed. Cir. 2017) (reversing obviousness finding where proposed modification of prior art is "unnecessary" to prior art system that "already" performs function of proposed additional feature and "would do little more than add unwanted cost and complexity to the system"); *Provisur Techs., Inc. v. Weber, Inc.*, No. 2021-1851, 2022 WL 17688071 (Fed. Cir. Dec. 15, 2022) (a POSITA would have lacked motivation to combine where the proposed combination would have added "needless complexity ... increasing the likelihood of malfunction"); *Salem Fabrication Techs. Grp., Inc. v. Uniglass Eng'g Oy*, No. IPR2022-01516 (P.T.A.B. March 22, 2023) ("Petitioner fails to provide any persuasive argument or evidence as to how the addition of a second air compressor would have provided any benefit...").

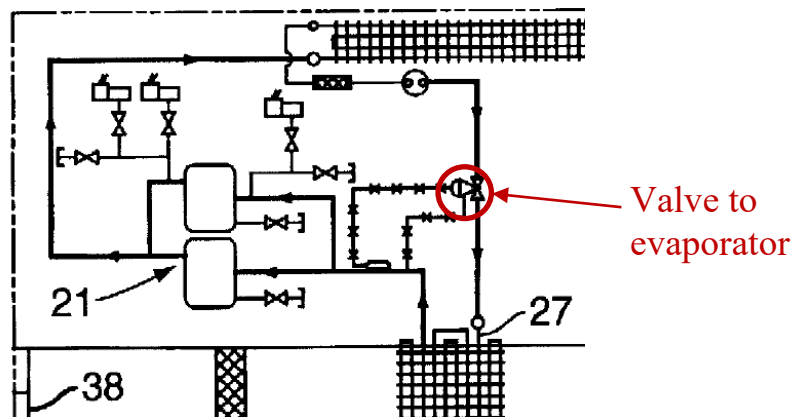
First, Kreymer discloses that it can already adjust its cooling *with no VFDs*.

Kreymer adjusts the amount of its cooling over four or more stepwise levels by supplying or not supplying refrigerant to successive evaporator coils. For example,

Kreymer discloses:

The first condenser coil 16 supplies a refrigerant to the first evaporator coil 27, where it evaporates. The refrigerant is then drawn into the first compressor 21, and then supplied to the first condenser coil 16. *If additional cooling is desired, the second coil 17 supplies refrigerant to the second evaporator coil 28, where it evaporates.* The refrigerant then passes to the second compressor 22 and then back to the condenser coil 17. *If additional cooling is desired, the third condenser coil 18 supplies refrigerant to the third evaporator coil 29, where it evaporates.* The refrigerant then passes to the third compressor 23 and then back to the third condenser coil 18. If additional cooling is desired, the fourth condenser coil 19 supplies refrigerant to the fourth evaporator coil 30, where it evaporates. The refrigerant then passes to the fourth compressor 24 and then back to the fourth condenser coil 19. The adding of cooling systems as needed to obtain the desired cooling, instead of cycling an entire cooling system on and off, provides a more efficient capacity control system.

Kreymer at 2:52-3:13 (emphasis added). Kreymer isolates the refrigerant in the respective condenser coils until additional cooling is needed. If additional cooling is needed, then Kreymer discloses opening successive valves in the four condenser coils to supply refrigerant to successive evaporators (and their corresponding compressors for cycling back into the condenser coils). Kreymer's valves are shown below:



Kreymer at Fig. 3 (excerpted). And if more than four steps are needed for more precise temperature control, Kreymer discloses that additional units can be used “as needed.” *See* Kreymer at 3:10-12.

There is no indication in Kreymer that its ability to adjust cooling was not, therefore, already sufficient. *See In re Schweickert*, 676 Fed. Appx. 988 (Fed. Cir. 2017) (where prior art reference “worked without trouble” without the proposed modification and the proposed modification would “add additional complexity”, the Board “needed to explain why a skilled artisan would still have a reason to combine” the prior art); *South-Tek Systems, LLC v. Engineered Corrosion Solutions*, 748 Fed. Appx. 1003, 1006 (Fed. Cir. 2018) (substantial evidence supported PTAB’s finding in an IPR that one of skill would not have added to a primary reference a drain described in a secondary reference because the primary reference already disclosed a different drain that served the same purpose; because the proposed modification would be redundant there was no motivation to combine); *In re Anova Hearing Labs*,

Inc., 809 Fed. Appx. 840, 843 (Fed. Cir. 2020) (no motivation to modify primary reference where it already provided the alleged benefit, and the Board did not explain why a POSITA would conclude that the primary reference needed to be modified).

Second, Petitioner and its alleged expert (Leeb) provide no reason to add *separate* VFDs to each of Kreymer's compressors, i.e., any benefit or advantage that cannot be accomplished in Kreymer much more simply with a *single* VFD. Below is the entirety of Leeb's conclusory discussion of an alleged motivation to provide a VFD with each of Kreymer's compressors:

[A] POSITA would have been motivated to add a VFD to each refrigeration circuit to maximize energy gains and efficiency of each refrigeration circuit and the system as a whole. *See, e.g.*, Ex. 1020 ("Schnetzka") at FIG. 1B (illustrating variable-speed drive applied to multiple motors). A POSITA would have also been motivated to add a VFD from Taras to each of Kreymer's refrigeration circuits because multiple refrigeration circuits provides well-understood failure and cooling capacity redundancies. Kreymer at 3:67-4:2. A POSITA would have been motivated to fine tune the capacity of each refrigeration circuit, as taught by Taras, based on Kreymer's teachings that having multiple refrigeration levels is beneficial in having a PCA for cooling multiple aircraft types with varying cooling capacity needs.

Leeb Decl. at ¶ 126. A careful reading of Leeb's statement shows he never actually provides a reason for including a VFD in *each* of Kreymer's refrigeration circuits. Rather, he only separately provides (1) a reason to have multiple refrigeration circuits in the first place and (2) a reason to use VFD in general (not specifically a reason to include a VFD on *each* compressor as opposed to one VFD for the entire

system). *See Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1366 (Fed. Cir. 2016) (conclusory statements by expert supporting obviousness analysis may not be relied upon). In fact, the “evidence” that Leeb cites to support his motivation to combine (Schnetzka at Fig. 1-B) specifically discloses using only *one* VSD (another term for VFD) to control multiple motors—not separate VFDs for each motor:

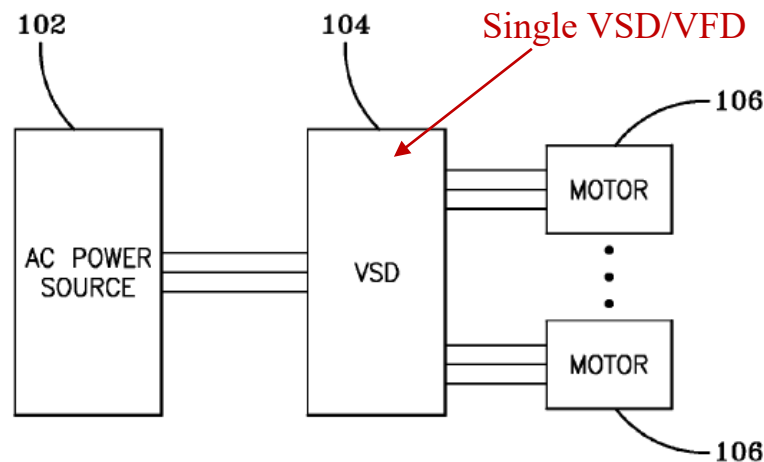


FIG-1B

Ex. 1020, Schnetzka at Fig. 1-B.

As such, Leeb’s stated motivations either ignore the full language of the claims or are merely circular. *See Wireless Protocol Innovations, Inc. v. TCT Mobile, Inc.*, 771 Fed. Appx. 1012, 1016 (Fed. Cir. 2019) (obviousness must address “every limitation required by [the] claims”); *see also Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1361 (Fed. Cir. 2016) (“conclusory statements and unspecific expert testimony” cannot be used to “supply a limitation that was admittedly missing from the prior art”); *TRW Automotive US LLC v. Magna Electronics, Inc.*, Case IPR2014-

00259, Paper No. 19 (P.T.A.B. June 26, 2014) (“TRW argues that one of ordinary skill in the art would include a control functioning as claimed to accomplish the function claimed. Accordingly, TRW's rationale is circular at best”); *2Wire, Inc. v. TQ Delta, LLC*, Case IPR2015-00421, Paper 18 (P.T.A.B. May 29, 2015) (denying institution and finding that the argument was merely circular, “as it merely states the result of the asserted combination, i.e., the basic components of Suzuki '614 performing the random number calculations described in Suzuki '415.”).

Third, the state of the art shows that a POSITA would not have been motivated to add a VFD to each of Kreymer's compressors. Here, if a POSITA wanted to increase power efficiency, or fine tune the output of Kreymer, a single VFD at the power source of Kreymer—which would adjust the power frequency the same to all components of Kreymer—would accomplish the same result, as taught in Taras'

Figure 1 below:

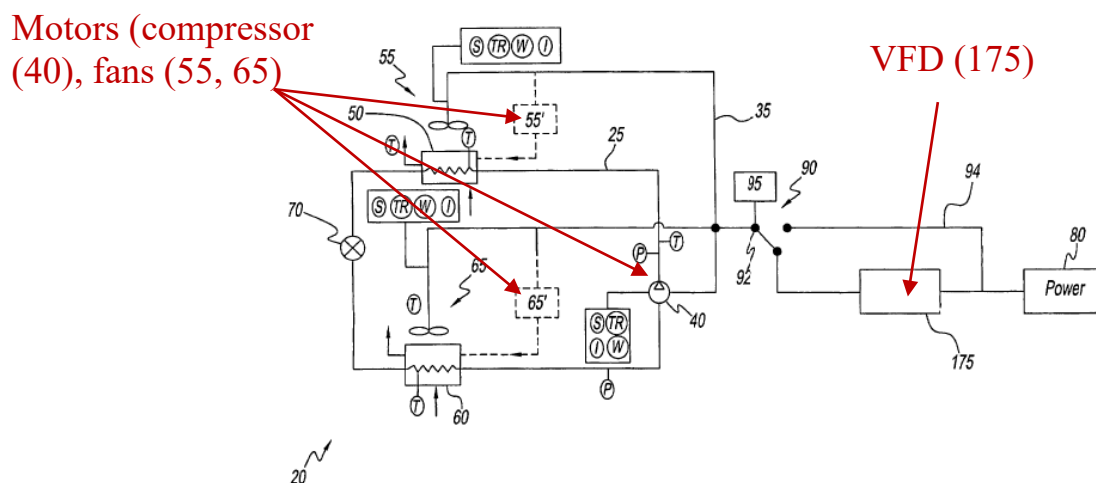


Fig. 2

See Exhibit 1006, Taras at Fig. 2; *see also* Exhibit 1020, Schnetzka at Fig. 1-b (also disclosing controlling multiple motors with a single VFD/VSD).

Again, Taras discloses that VFDs have drawbacks such as power and efficiency losses, heat generation, and are a source of unreliability, such that unnecessary VFDs are to be avoided. *See supra* at § II.D.2. And that adding unnecessary VFDs adds additional components that can fail, and additional expenses. *See, e.g.*, Exhibit 2019, U.S. Patent No. 7,661,274 (“One drawback of using a variable speed drive for each compressor is that the overall chiller system becomes more expensive because multiple drives with a given cumulative power rating are more expensive than a single drive of the same output power rating.”); Exhibit 2020, EP3243032B1 (teaching even after the ’169 patent to use only a single VFD for multiple compressors; “Variable speed drives are expensive and therefore, multiple compressor systems requiring multiple variable speed drives also become extensively more expensive. In addition, the use of multiple speed drives adds to the complexity and space requirements of the air conditioning or refrigeration system.”).

Where a simpler, easier, and more advantageous alternative solution exists, a party alleging invalidity must provide a motivation to *specifically* use the *claimed* solution—something Petitioner has failed to do here. *See, e.g., In re Nouvel*, 493 Fed. Appx. 85, 93 (Fed. Cir. Aug. 29, 2012) (“[T]he key question in this appeal (as well as before the Board) is why an ordinary artisan would thicken only one arm of

Liou’s pliers. ... In its briefs and at oral argument, Nouvel provided multiple reasons, grounded in mechanics, why an ordinary artisan aiming to increase strength by increasing size would enlarge both arms of the pliers.”); *see also Janssen Prods., L.P. v. Lupin Ltd.*, 109 F. Supp. 3d 650, 684 (D.N.J. 2014) (“Under Mylan’s obviousness theory, a person of ordinary skill in the art would have rejected an acceptable manufacturing process for making darunavir taught in the prior art, despite the absence of any reason for doing so, and would then have formulated a longer and more expensive process that combined aspects of the prior art methods with isolated features chosen from non-analogous, non-darunavir references. Without the benefit of hindsight, there is no reason why a person of ordinary skill in the art would have done that.”).

C. *Grounds 1-3 (Based on Kreymer), Claims 2-15: Neither Kreymer nor Taras Discloses Automatically Adjusting Cooling Based on Aircraft Size*

Grounds 1-3 based on Kreymer also fail for another reason: independent claim 2 (and thus dependent claims 3-15 as well) also require the PCA unit have “a central controller that is configured for controlling the operation of the preconditioned air unit including variable frequency drivers of the plurality of the refrigeration systems, wherein *the central controller automatically adjusts the **cooling** performed by the preconditioned air unit according to at least one of: the selected type of aircraft, the*

ambient temperature, the humidity, the cabin temperature, or the outgoing airflow from the preconditioned air unit.”

Tellingly, the text of claim 2 itself distinguishes between “cooling” and the “outgoing airflow from the preconditioned air unit”—that is, where “cooling” refers to the *temperature* decrease that the PCA imparts on the air, the term “outgoing airflow” is the volume and speed of the air. *See* ’169 patent at 4:4-15 (requiring that the controller adjusts “the cooling” according to variables including “the outgoing airflow from the preconditioned air unit”). The term “cooling” cannot mean the same thing as “outgoing airflow.” Otherwise, the claim language would be rendered superfluous.

Petitioner relies primarily on Kreymer for disclosure of this feature, pointing to Kreymer’s “mode selector” that can be used to select between several sizes of aircraft, after which (according to Petitioner) Kreymer’s unit allegedly “automatically configures itself to provide the amount of cooling.” Petition at 27. But Kreymer does not automatically adjust the *cooling* based on aircraft size. To the contrary, Kreymer only discloses that it automatically adjusts the *airflow* based on a selection of the aircraft size. *See* Kreymer at 1:11-14, 3:27-51 (“If the mode selector switch 62 is set to a wide body aircraft, then the first blower 41 and second blower 42, being in parallel fluid connection with the first blower 41, are activated and the first damper motor 51 opens the first damper 50 while the second damper motor 53

keeps the second damper 52 closed ... If the mode selector switch 62 is set to a jumbo body aircraft, then the first blower 41 and second blower 42 are activated and the first damper motor 51 opens the first damper 50 while the second damper motor 53 opens the second damper 52.”). Moreover, Kreymer does not adjust for the specific aircraft “type,” but only adjusts between several aircraft sizes. *See id.*

Petitioner also relies on Kreymer’s statement that “[t]he air conditioning unit 10 is operated automatically after being turned on by the remote control” (Kreymer at 2:52-53). But Kreymer explains that the only “automatic” operation it is referencing is the above-quoted changing of the blower and damper configurations to provide single or dual air output. *See id.* Nothing in Kreymer discloses *automatically* adjusting the *cooling* as opposed to needing to adjust cooling manually—Kreymer certainly does not disclose automatically adjusting cooling in response to the selection of an aircraft type.

Petitioner alternatively alleges that Taras also satisfies this claim element because Taras has a “power/control system 230” that drives a “vapor compression system 20” that allegedly “adjusts the PCA cooling performance based on the required ‘conditioned space thermal load.’”⁵ Petition at 28. But Petitioner again

⁵ Taras also does not disclose a PCA—it only discloses a general-purpose HVAC system. *See supra* at § II.D.2.

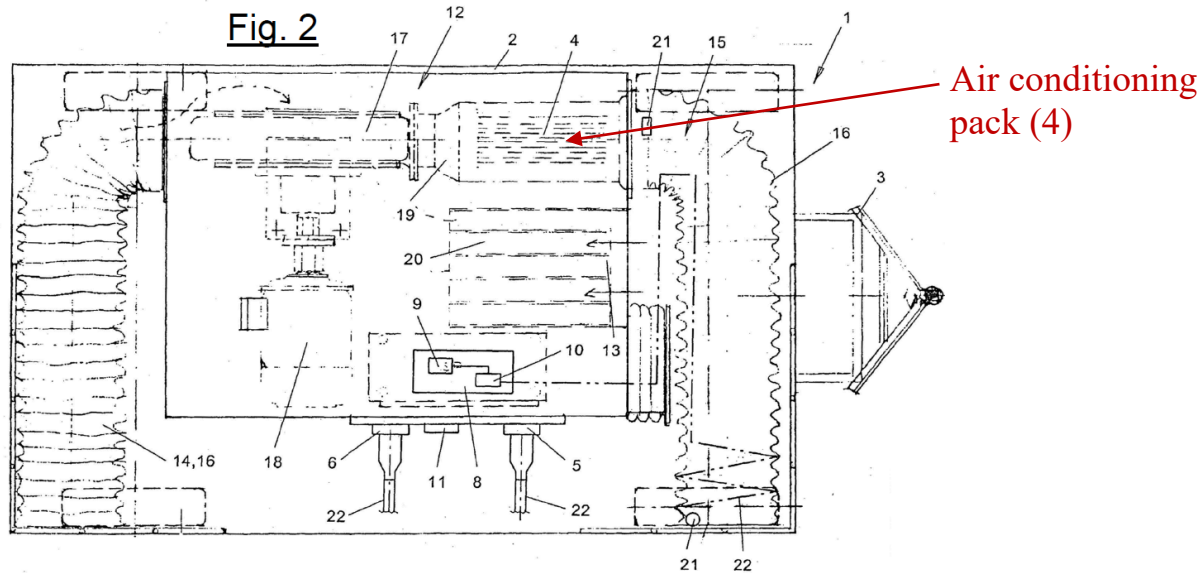
misstates what the prior art actually discloses. Taras does not disclose that its system *automatically* adjusts anything in response to the “conditioned space thermal load”—only that the speed *can be reduced or increased* manually to satisfy the thermal load demands.

**D. *Grounds 4-5 (Based on Lechmotoren), Claims 1, 2, 13, 14-22:*
The Petition Provides No Motivation to Add Separate VFDs to
Lechmotoren’s Compressors Because Lechmotoren Already
Discloses “Variable and Controllable Output” With One
“Regulator” Associated With the Central Controller**

Petitioner’s Grounds 4-5 based on Lechmotoren similarly fail. Just as with Kreymer, Petitioner provides no motivation to add separate VFDs to multiple refrigeration systems in Lechmotoren.

First, Lechmotoren does not disclose the use of *two or more refrigeration* systems as required by the ’169 patent claims. Lechmotoren states only that its system can include “one or more air-conditioning packs (4),” but uses the term “air-conditioning” to refer both to cooling and heating. *See* Exhibit 1008, Lechmotoren at 1:22-25. Lechmotoren’s only disclosure of a refrigeration system is a vague reference that this “air-conditioning pack (4) can also be designed as a cooling device (not shown) or can have a cooling pack in addition to the heating pack.” Lechmotoren at 10:3-6. The only specific reason Lechmotoren discloses for having multiple packs is to provide “heating and/or cooling devices” so that “air conditioning unit can be used in both warm and cold zones.” *Id.* at 4:9-12. Otherwise,

Lechmotoren's figures and description only describe a PCA unit with one air-conditioning pack, i.e., a heating pack:



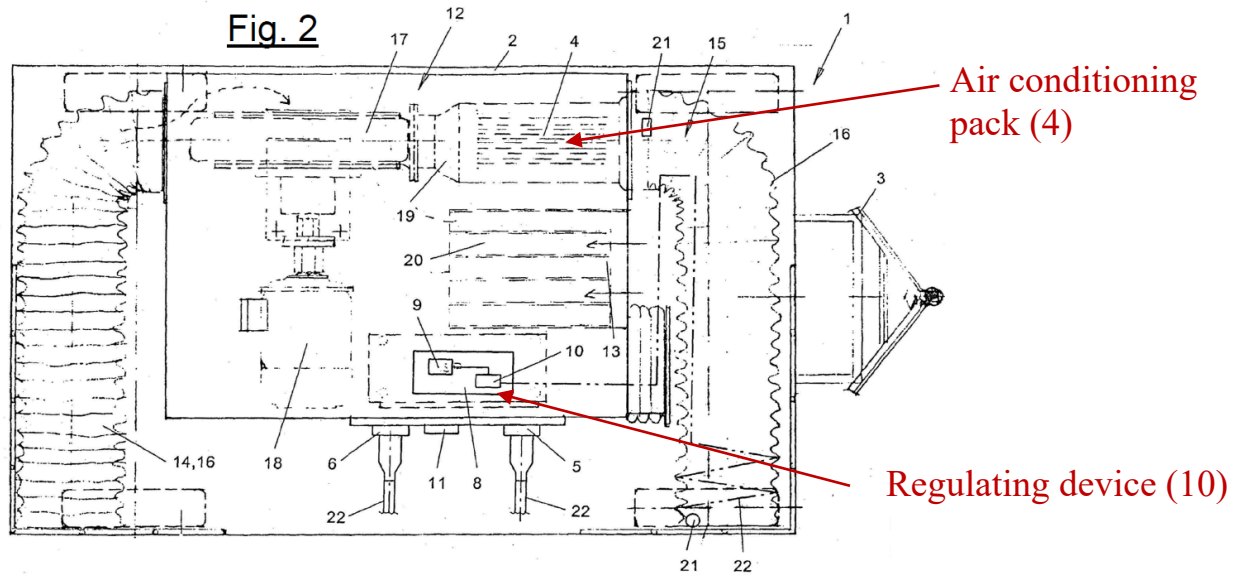
Lechmotoren Fig. 2. Vague disclosures in the prior art, however, cannot support obviousness. *See, e.g., Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1361 (Fed. Cir. 2011) (“To render a claim obvious, prior art cannot be ‘vague’ and must collectively, although not explicitly, guide an artisan of ordinary skill toward a particular solution.”).

Second, Lechmotoren states that its air conditioning units have “variable and controllable output.” But again, it only expressly discloses this in connection with *heating*—not cooling. Lechmotoren discloses that its heating can be adjusted by using “four heating levels” provided by “several plate-shaped or rod-shaped heating elements” that can be “activated individually by the control system (8).” Lechmotoren at 9:4-17. This heating by variously activating electrical resistive

heating elements would require no VFD. Even if varying the heating is done by varying the power to the electrical resistive heating elements, that does not require VFD as opposed to a simple dimmer switch. And Lechmotoren has no specific or enabling disclosure of providing variable or controllable output *of cooling*. Lechmotoren at 10:3-6.

Accordingly, there is nothing in Lechmotoren to support that its air conditioning unit necessarily uses VFD to control anything, or that it would benefit from VFD. Petitioner has not shown beyond conclusory expert assertions that Lechmotoren's vague and high-level disclosure that "a cooling device (not shown)," together with its separate vague disclosure of "variable and controllable output" in connection with heating, would guide a POSITA toward using multiple cooling packs with variable cooling provided by separate VFDs on each cooling pack.

Third, Lechmotoren only discloses that it regulates its air-conditioning packs via a *single* "regulating device" at the central controller (not as part of the individual air-conditioning packs themselves). Lechmotoren at Fig. 2, 8:27-31 ("The control system (8) also has a suitable regulating device (10) that adjusts the output of the air-conditioning pack (4) ..."). This is shown below:



Lechmotoren at Fig. 2. As such, when Petitioner characterizes Lechmotoren’s statement—i.e., that Lechmotoren’s “air-conditioning pack (4) has a variable and controllable output”—to mean that “each” pack in a multi-pack embodiment has its own variable control, Petitioner is simply not correct. *See* Leeb Decl. at §207.

Although Lechmotoren discloses that multiple air conditioning packs can be implemented, it does not disclose adding additional “regulating devices.” That is because, like Kreymer, Lechmotoren is only concerned with regulating the output of its air conditioning unit *as a whole* as there would have been no reason or need to separately adjust its individual air conditioning packs. *See* Lechmotoren at 3:25-30 (“For optimization, it is advantageous to equip the air conditioning unit with a suitable control system that adjusts *the air conditioning output*, i.e., the heating or cooling output and the air circulation output...”) (emphasis added).

Thus, even if Lechmotoren’s “regulating device” was referring to VFD (and contrary to Petitioner’s arguments there is nothing in Lechmotoren to suggest that it is, given that its four-stage heaters can be adjusted without VFD), Lechmotoren would already be teaching the use of a *single* VFD regulating device at the central controller to vary the power to all the air-conditioning units. Petitioner points to no reason to instead provide individual VFDs on individual cooling packs in Lechmotoren—especially when doing so would be contrary to Lechmotoren’s fundamental principle of operation. The only statement by Petitioner’s alleged expert (Leeb) in this regard is that “For reasons similar to those discussed above regarding Kreymer and Taras, a POSITA would have been motivated to use VFDs to drive compressor motors in Lechmotoren’s air conditioning packs to achieve the well-known energy and operational benefits of implementing VFDs to refrigeration circuits.” Leeb Decl. at § 210. But again, having a reason to simply provide VFD in general to Lechmotoren (i.e., a single VFD) is not a reason to provide *separate* VFDs for each compressor, as claimed in the ’169 patent. *See KSR*, 550 U.S. at 418 (for obviousness it is “important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements *in the way the claimed new invention does.*”).

Again, the prior art taught to *avoid* separate VFDs in a multi-refrigeration unit system because they only add complexity, expense, bulk, and additional components

that can fail with no added benefit. *See* Taras at para 2; Exhibit 2004, U.S. Patent No. 7,207,183 at 1:35-40 (recognizing that it was undesirable to use a VFD on each compressor of a multi-compressor refrigeration system because “the overall chiller system becomes more expensive” compared to “a single drive of the same output power rating.”); Exhibit 2005, U.S. Patent No. 6,362,432 at 1:20-24 (VFDs can cause “electromagnetic noise and radio frequency interference.”).

Where Lechmotoren already provided all the benefits of variability, fine tuning cooling, and efficiency with a single “regulator,” and Petitioner has provided no rationale for using additional redundant VFDs, Petitioner has failed to show *prima facie* obviousness. *See, e.g., Provisur Techs., Inc. v. Weber, Inc.*, No. 2021-1851, 2022 WL 17688071 (Fed. Cir. Dec. 15, 2022) (affirming Board finding of no motivation to combine where proposed combination would have doubled steps involved and added unnecessary complexity); *In re Schweickert*, 676 Fed. Appx. 988 (Fed. Cir. 2017) (“The Board found that a ‘lockless’” Birrell worked without trouble and that the application of Cunniff’s semaphore to Birrell’s RAM would “add[] additional complexity and computations” to Birrell. Given these findings, the Board needed to explain [in its decision] why a skilled artisan would still have a reason to combine Birrell and Cunniff to achieve the claimed invention.”); *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324 (Fed. Cir. 2019) (the benefits “both lost and gained” must be weighed in analyzing obviousness).

E. *Grounds 3, 5 (Based on Takahashi), Claims 14-22: A POSITA Would Not Be Motivated to Apply Takahashi to Kreymer or Lechmotoren Because Takahashi is Not Analogous Art*

In addition to the foregoing reasons why Petitioner's grounds regarding Kreymer and Lechmotoren fail, Petitioner's Grounds 3 and 5 directed to claims 14-22 also fail for an additional reason: claims 14-22 also require that "each refrigeration system of the plurality of refrigeration systems is configured for failure detection so that, in the event that one of the refrigeration systems fails, *the failing refrigeration system transmits a failure signal to the central controller.*" In this regard, Petitioner relies on Takahashi as allegedly disclosing this feature. Takahashi, however, is not analogous art to the '169 patent and thus is not relevant for purposes of alleged obviousness.

To be relevant to an obviousness analysis, prior art must be "analogous" to the challenged patent. *Sanofi-Aventis Deutschland GmbH v. Mylan Pharms. Inc.*, 66 F.4th 1373, 1377 (Fed. Cir. 2023). "Two separate tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed and, (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved." *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004). When determining whether the "field of endeavor" test is met, one must consider "explanations of the invention's subject matter in the patent application,

including the embodiments, function, and structure of the claimed invention.” *Airbus S.A.S. v. Firepass Corp.*, 941 F.3d 1374, 1380, 2019 USPQ2d 430083 (Fed. Cir. 2019). For a reference to be “reasonably pertinent” to the problem, it must “logically [] have commended itself to an inventor’s attention in considering his problem.” *In re ICON Health and Fitness, Inc.*, 496 F.3d 1374, 1379-80 (Fed. Cir. 2007).

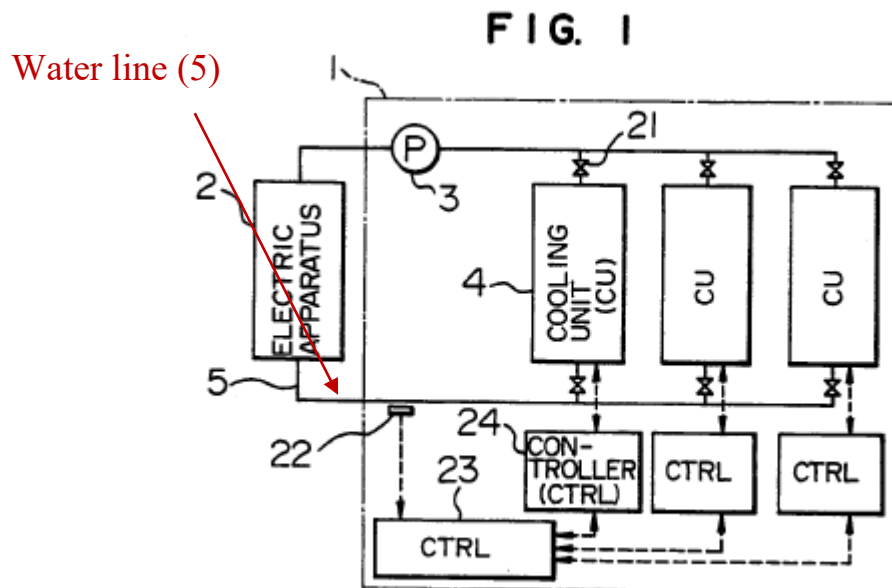
Here, the ’169 patent specifically states that its invention “related to a preconditioned air unit supplying preconditioned air, i.e., heated air or cooled air, to an aircraft parked on the ground.”⁶ ’169 patent at 1:13-15. That is, the cooling output must be sufficient to cool an aircraft. The ’169 patent provides an illustration demonstrating that the preconditioned air units it contemplated were extremely large units, requiring heavy machinery to move. *See* ’169 patent at Fig. 4. The problems raised in the ’169 patent with respect to the prior art include “cost, efficiency, flexibility, and serviceability ... in known preconditioned air units.”

⁶ The Indian patent court found that general HVAC art is not relevant to aircraft preconditioned air units. *See* Exhibit 2015 at 60 (“In this regard, plaintiff’s submission that mere use of known refrigeration components would not make the chiller system a prior art to PCA units finds favour with the Court. Indeed, as submitted by plaintiffs, if defendant’s approach is adopted, all innovations in the filed of air-conditioning would be non-eligible for patents.”).

Takahashi's disclosed apparatus is wholly different from an aircraft preconditioned air unit. It does not involve the same field of endeavor. And it is not reasonably pertinent to solving cost, efficiency, flexibility, or serviceability issues in preconditioned air units.

First, Takahashi only discloses a very small, compact system for cooling an "electrical apparatus such as a computer." Takahashi at 1:7-8. The power levels and frequencies involved, size of components, etc., are all different. And the efficiency and heat generation "drawbacks" of VFD raised in Taras regarding a larger HVAC unit would not have been as appreciable in Takahashi.

Second, Takahashi does not cool *airflow*. Takahashi's cooling units cool *water* in a tube that is then circulated through the computer:



Takahashi at Fig. 1. Petitioner offered no evidence to support that cooling a line of *water* would implicate the same cooling concerns compared to cooling *air*. Water and air, for example, have different specific heat capacities such that more heat must be drawn away from water to cool it compared to air. *See, e.g.*, Exhibit 2025, https://masweb.vims.edu/bridge/datatip.cfm?Bridge_Location=archive0909.html (“because of water’s much higher heat capacity than air; and because of its higher heat capacity, it takes longer for water to gain and lose heat (cool), than it does for air. In both cases, either heating or cooling, there will be a lag between the air and water temperatures.”) Therefore, Takahashi’s multiple cooling units for a *water* line do not directly translate to cooling *air*. Takahashi’s only disclosure of cooling air is that its cooling units can use an “air-cooling condenser” to cool the water line (5)—not an airflow path.⁷ (*See* Takahashi at 3:42-64.)

⁷ Takahashi vaguely states that its invention “may” be applicable to “other electronic apparatuses such as an air-cooling type electronic apparatus,” but such vague disclosure is not enabling and cannot support obviousness. *See, e.g., Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1361 (Fed. Cir. 2011) (“To render a claim obvious, prior art cannot be ‘vague’ and must collectively, although not explicitly, guide an artisan of ordinary skill toward a particular solution.”); *see also Storer v.*

Petitioner failed to consider the significant differences between Takahashi (on the one hand) and the '169 patent and asserted prior art (on the other hand) to show that a POSITA would have nevertheless considered Takahashi, or combined it with Kreymer or Lechmotoren. *See In re Klein*, 647 F.3d 1343, 1350 (Fed. Cir. 2011) (prior art references directed to separating “solid objections” were not analogous art to a patent directed to a “divider to prepare different ratios of sugar and water” because they had different purposes); *Apple Inc. v. INVT SPE LLC*, 851 Fed. Appx. 200, 202-203 (Fed. Cir. April 13, 2021) (affirming no obviousness where “[a]lthough Keskitalo and Lindell both involve measuring transmission power, they do so for different reasons, on different time scales, and compare the results to different thresholds.”).

F. *Ground 2 (Based on Kreymer, Taras, Takahashi), Claims 14-22: The Petition Provides No Motivation to Add Takahashi’s Refrigeration Unit Failure Compensation to Kreymer—Adding Takahashi’s Structure Would Fundamentally Change the Principle of Operation of Kreymer*

But even if Takahashi were analogous art to the '169 patent, Petitioner’s Ground 2 also fails because Petitioner has failed to show that it would have been obvious to add to Kreymer the concept required by claims 14-22: that “each

Clark, 860 F.3d 1340, 1350 (Fed. Cir. 2017) (to be enabling a disclosure “must be more than an invitation for further research”).

refrigeration system of the plurality of refrigeration systems is configured for failure detection so that, in the event that one of the refrigeration systems fails, *the failing refrigeration system* transmits a failure signal to the central controller.” See ’169 patent at claims 14-22. It is not enough under the claims for a PCA to have sensors to detect a failed refrigeration system, for the system to determine that a refrigeration system has failed some other way, or even for the system to adjust its refrigeration systems or components to compensate for a failing refrigeration system—the claims require that *the failing refrigeration system itself* must transmit a failure signal.

Here, Petitioner points to no reason in the Petition to have Kreymer’s refrigeration circuits separately and by themselves send a signal that one of them is failing, as is allegedly disclosed in Takahashi. Petitioner instead conclusorily alleges that “Takahashi’s fault-tolerant architecture allows a refrigeration system with multiple refrigerant circuits, such as Kreymer’s, to preserve its cooling output upon failure of one of the refrigerant circuits, by increasing the operation of the remaining coolers to compensate the loss resulting from the failure.” Petition at 41. And that “the POSITA would have modified the Kreymer-Taras controller with features taught by Takahashi’s control system, including use of individual unit controllers to control respective refrigerant circuits.” *Id.* But Petitioner provides no reason why Kreymer did not already maintain its cooling output upon failure of one of the

refrigeration circuits, or any reason to provide individual unit controllers and individual failure signals in Kreymer.

That is because Kreymer operates in the complete opposite manner taught in Takahashi. Takahashi discloses that it has separate, independently operating cooling units that can all be cooling with the compressors at low power to increase power efficiency. Takahashi at 2:8-11. If one cooling unit fails, Takahashi's controller needs to know which one failed to adjust the power to the other cooling units to increase their cooling output—because they are all separate, independently operating cooling units operating in parallel, and Takahashi cannot increase the overall power frequency to all of the cooling units at once. *Id.* at 7:17-8:4.

Kreymer, on the other hand, adjusts cooling by introducing refrigerant into evaporators one-by-one based on a desired level of overall cooling output. *See* Kreymer at 2:63-3:12. If one of Kreymer's compressors or evaporators fails, for example, Kreymer's cooling output would not meet the desired level and so the next refrigeration circuit would need to introduce refrigerant into the next evaporator. *See id.* In other words, Kreymer already provides that its system will compensate for a failed refrigeration circuit. Having the specific refrigeration circuits send a *failure signal* to a central controller in Kreymer would be redundant, wasteful, and not provide any additional benefit. *See supra* at § III.B (citing law that obviousness is

not shown where alleged combination is redundant, superfluous, or would increase added complexity or disadvantages).

Additionally, modifying Kreymer to be compatible with Takahashi's independent failure detection and signaling would both be incompatible with Kreymer and would require changing its fundamental principle of operation. While Takahashi's refrigeration circuits operate independently of each other, Kreymer's refrigeration circuits are co-dependent. In Takahashi, if one refrigeration circuit fails, the other refrigeration circuits can be adjusted to compensate for that failure. But Kreymer works very differently. Kreymer discloses:

The first condenser coil 16 supplies a refrigerant to the first evaporator coil 27, where it evaporates. The refrigerant is then drawn into the first compressor 21, and then supplied to the first condenser coil 16. *If additional cooling is desired, the second coil 17 supplies refrigerant to the second evaporator coil 28, where it evaporates.* The refrigerant then passes to the second compressor 22 and then back to the condenser coil 17. *If additional cooling is desired, the third condenser coil 18 supplies refrigerant to the third evaporator coil 29, where it evaporates.* The refrigerant then passes to the third compressor 23 and then back to the third condenser coil 18. If additional cooling is desired, the fourth condenser coil 19 supplies refrigerant to the fourth evaporator coil 30, where it evaporates. The refrigerant then passes to the fourth compressor 24 and then back to the fourth condenser coil 19.

Kreymer at 2:63-3:12 (emphasis added). Kreymer's circuits share connected evaporator coils that operate in sequence. If, for example, the second compressor fails, the first compressor would not be adjusted at all to compensate for that failure—it would already be operating at full power capacity. *See id.* Instead, the

valve from the *third* compressor would be opened and, if necessary, the valve from the *fourth* compressor to provide additional refrigerant to the evaporator coils. *See id.* In other words, it is not necessary to adjust all of the remaining compressors in Kreymer to compensate for one failed compressor.

Accordingly, Petitioner has not shown that it would have been obvious to modify Kreymer in view of Takahashi. *See, e.g., Plas-Pak Indus. v. Sulzer Mixpac AG*, 600 Fed. Appx. 755, 758 (Jan. 27, 2015) (rejecting obviousness findings where the necessary alterations would fundamentally change a prior art reference's principle of operation); *In re Mouttet*, 686 F.3d 1322, 1332 (Fed. Cir. 2012) (caution must be exercised "before holding a claimed invention obvious when combining references would violate the principle of operation of the modified reference").

G. *Ground 5 (Based on Lechmotoren, Taras, Takahashi), Claims 14-22: The Petition Provides No Motivation to Add The Ability to Send Failure Signals From Each "Failing Refrigeration System" In Lechmotoren*

Finally, Petitioner has not provided a non-conclusory motivation to add to Lechmotoren the concept that "each refrigeration system of the plurality of refrigeration systems is configured for failure detection so that, in the event that one of the refrigeration systems fails, *the failing refrigeration system transmits a failure signal to the central controller.*" *See* '169 patent at claims 14-22. Petitioner's arguments are merely directed to the alleged obviousness of having the *overall*

system detect faults—not any reason for each individual failing refrigeration system to send a failure detection signal to a central controller.

Petitioner argues that “[a] POSITA would have been motivated to combine Takahashi with Lechmotoren and Taras to obtain a fault-tolerant PCA system.” Petition at 68. And that a “POSITA would have been motivated to modify [] Lechmotoren to implement the architecture disclosed in Takahashi, to implement this fault-tolerant feature. ... the POSITA would modify the controller by introducing individual unit controllers to control a respective refrigerant circuit, and that are themselves controlled by a central controller.” *Id.*

But Petitioner ignores that Lechmotoren’s configuration would already be fault tolerant, with no need for adding individual unit controllers or the ability to transmit failure signals from the individual units. Again, Lechmotoren has one “measuring device” that measures power demands and one “regulator” to adjust cooling output, both of which are associated with the central controller of the PCA instead of the individual air-conditioning packs. *See* Lechmotoren at 8, 27-29 (“The control system (8) also has a suitable regulating device (10) that adjusts the output of the air-conditioning pack (4) to the available residual energy and controls it in a suitable manner.”), 4:37-5:3 (“Preferably, the sensor and/or switch measures the temperature of the heating or cooling air coming from the air conditioning unit at the aircraft in order to maintain predefined conditions.”); *see also* Lechmotoren at claim

7 (“the “air conditioning unit” (i.e., the overall unit) has a “measuring device (9) for the power demand of the aircraft (23) and a regulating device (10) for adjusting the power supply of the air-conditioning pack (4)”).

Even if one assumes that Lechmotoren’s disclosure of multiple “air conditioning packs (4)” means multiple *cooling* systems (*see above*), a failure in one of these cooling systems would result in the measuring device registering a decreased power draw and/or the temperature sensor registering an increased output air temperature. As a result, Lechmotoren’s control system (8) would per its disclosure adjust the power with the regulating device (10) to effectively increase the power to the remaining working air-conditioning packs (4) to “maintain predefined conditions.” In Lechmotoren there is therefore no need for a separate “failure detection signal” to be transmitted by “*the failing refrigeration system*” (as required by claims 14, 15, and 16). If an air conditioning pack fails and the combined output decreases, the output of the remaining pack(s) would already be increased in Lechmotoren by its regulating device (10) at the central controller.

None of Petitioner’s alleged motivations to modify Lechmotoren support a combination with Takahashi given that all of Petitioner’s reasons for doing so are already met by Lechmotoren’s existing structure. Petitioner’s failure to provide a reason to modify Lechmotoren specifically to use the claimed structure instead of Lechmotoren’s existing structure is fatal to Petitioner’s obviousness theory. *See*

Annotated Patent Digest (Matthews), Feb. 2025 at § 18:53.50 (“Generally, a motivation to modify or combine will not be found if the resulting feature will be merely redundant to what the prior art device already had.”); *South-Tek Systems, LLC v. Engineered Corrosion Solutions, LLC*, 748 Fed. Appx. 1003, 1006 (Fed. Cir. 2018) (affirming finding of no motivation to modify prior art reference to provide redundant structure; petitioner’s attempt to belatedly argue a specific motivation was rejected where it was not raised in the petition); *In re Anova Hearing Labs., Inc.*, 809 Fed. Appx. 840, 843 (Fed. Cir. 2020) (where the primary reference already solved the problem solved by the [challenged patent] there must be evidence as to why there would be a motivation to include an additional or redundant solution).

IV. CONCLUSION

The Board should deny institution because Petitioner has failed to show a reasonable likelihood that any challenged claims are unpatentable.

Dated: April 30, 2025

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CERTIFICATE OF SERVICE

I certify that the Patent Owner Preliminary Response to Petition for *Inter Partes Review* under 35 U.S.C. § 42.107 in connection with *Inter Partes Review* Case IPR2025-00408 and exhibits 2020-2025 were served on April 30, 2025 by electronic mail to:

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CERTIFICATE OF WORD COUNT

Under 37 C.F.R. § 42.24(d), the undersigned attorney for the Patent Owner, AXA POWER APS, declares this Patent Owner Preliminary Response has 13,663 words, according to Microsoft Word® word count tool, excluding the parts of the Response exempted by 37 C.F.R. § 42.24(a)(1).

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