

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLIED MATERIALS, INC.,
Petitioner,

v.

OCEAN SEMICONDUCTOR LLC,
Patent Owner.

IPR2021-01342
Patent 6,968,248 B1

Before MIRIAM L. QUINN, JOHN D. HAMANN, and DAVID COTTA,
Administrative Patent Judges.

QUINN, *Administrative Patent Judge.*

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314, 37 C.F.R. § 42.4

I. INTRODUCTION

Applied Materials, Inc. (“Petitioner”) filed a Petition (Paper 1, “Petition” or “Pet.”) requesting an *inter partes* review of claims 1–22 (“the challenged claims”) of U.S. Patent No. 6,968,248 B1 (Ex. 1001, “the ’248 patent”) pursuant to 35 U.S.C. §§ 311–319. Ocean Semiconductor LLC (“Patent Owner”) filed a Preliminary Response. Paper 10 (“Preliminary Response” or “Prelim. Resp.”). With our authorization, Petitioner filed a Reply to Patent Owner’s Preliminary Response (Paper 13, “Reply”), and Patent Owner filed a Sur-Reply in Support of Patent Owner’s Preliminary Response (Paper 14, “Sur-reply”).

The standard for institution is set forth in 35 U.S.C. § 314, which provides that an *inter partes* review may not be instituted unless the information presented in the Petition and the Preliminary Response shows that “there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314 (2018); *see also* 37 C.F.R. § 42.4(a) (“The Board institutes the trial on behalf of the Director.”). Upon consideration of the parties’ contentions and the evidence of record, we conclude that Petitioner has established a reasonable likelihood of prevailing in demonstrating the unpatentability of at least one challenged claim of the ’248 patent. Accordingly, we grant Petitioner’s request and institute an *inter partes* review of the challenged claims.

A. Related Matters

The parties indicate that the ’248 patent has been asserted in the following proceedings: *Ocean Semiconductor LLC v. Analog Devices*, No. 1:20-cv-12310 (D. Mass.); *Ocean Semiconductor LLC v. Infineon*, No. 1:20-cv-12311 (D. Mass.); *Ocean Semiconductor LLC v. Huawei*, No. 4:20-cv-

911 (E.D. Tex.); *Ocean Semiconductor LLC v. MediaTek*, No. 6:20-cv-1210 (W.D. Tex.); *Ocean Semiconductor LLC V. NVIDIA*, No. 6:20-cv-1211 (W.D. Tex.); *Ocean Semiconductor LLC v. NXP*, No. 6:20-cv-1212 (W.D. Tex.); *Ocean Semiconductor LLC v. Renesas*, No. 6:20-cv-1213 (W.D. Tex.); *Ocean Semiconductor LLC v. Silicon Labs*, No. 6:20-cv-1214 (W.D. Tex.); *Ocean Semiconductor LLC v. ST Micro*, No. 6:20-cv-1215 (W.D. Tex.); and *Ocean Semiconductor LLC v. Western Digital*, No. 6:20-cv-1216 (W.D. Tex.). Pet. 1–2; Paper 5, 2.

B. The '248 Patent

The '248 patent relates to “scheduling in an automated manufacturing environment.” Ex. 1001, 1:20–21. The '248 patent describes the manufacture of integrated circuits for modern semiconductor devices containing numerous structures or features, typically the size of a few micrometers. *Id.* at 1:38–41. The '248 patent further describes that the fabrication of integrated circuits generally involves processing a number of wafers through a series of fabrication tools, where layers of material are added to, removed from, and/or treated on a semiconducting substrate. *Id.* at 1:41–45. According to the '248 patent, controlling a semiconductor factory (“fab”) that fabricates such integrated circuits is a challenging task, where the fab is a complex environment where numerous parts (typically 40,000 wafers or more) and numerous part types (typically 100 part types or more) are simultaneously being manufactured. *Id.* at 1:65–2:3. As each wafer moves through the fab, it may undergo more than 300 processing steps, many of which use the same machines, where a large factory may contain approximately 500 computer-controlled machines to perform this wafer processing. *Id.* at 2:3–8. As described in the '248 patent, routing, scheduling, and tracking material through the fab is a difficult and

complicated task, even with the assistance of a computerized factory control system. *Id.* at 2:8–11.

Figure 3 illustrates an implementation of reactive scheduling of activities of a process flow for a semiconductor fabrication facility and is reproduced below.

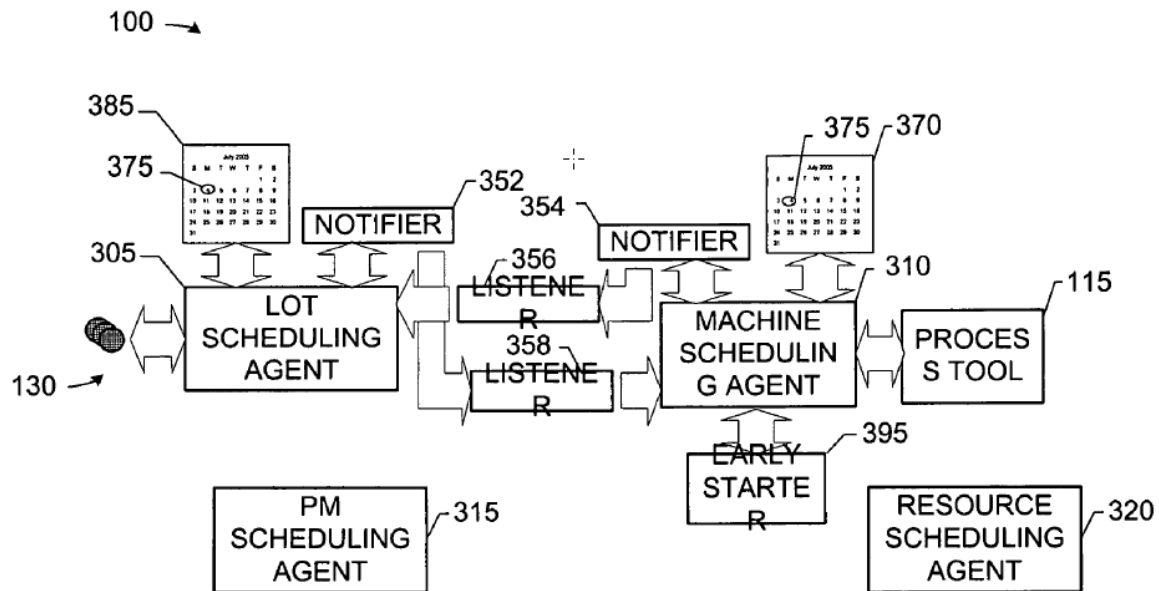


FIG. 3

Figure 3 shows a portion of process flow 100 from a semiconductor fabrication facility, and the manner in which it schedules appointments for the consumption of resources. *Id.* at 4:28–32. Process flow 100 includes stations 105, each station 105 including computing device 110 communicating with process tool 115. *Id.* at 5:17–19. Process tools 115 are processing lots 130 of wafers 135 that will eventually become integrated circuit devices, where process tool 115 may be a fabrication tool used to fabricate some portion of wafers 135. *Id.* at 5:24–26, 6:43–45.

Each computing device 110 includes software agent 265, where software agents 265, collectively, are responsible for efficiently scheduling

and controlling lots 130 of wafers 135 through the fabrication process. *Id.* at 6:24–26, 47–50. Collectively, software agents 265 reactively and proactively schedule activities for each lot 130 for operations on a specific qualified process tool 115. *Id.* at 6:63–7:3. More specifically, the software agents (or scheduling agents) 265 include: Lot Scheduling Agent (“LSA”) 305 that schedules activities on behalf of lots 130 of wafers 135; Machine Scheduling Agent (“MSA”) 310 that schedules activities on behalf of process tools 115; PM Scheduling Agent (“PMSA”) 315 that schedules activities on behalf of preventative maintenance (“PMs”) and equipment qualification (“Quals”) (not shown in Figure 3); and Resource Scheduling Agent (“RSA”) that schedules activities on behalf of resources (not shown in Figure 3). *Id.* at 7:20–30. Some of these activities are scheduled reactively (i.e., in response to events occurring in process flow 100). *Id.* at 7:36–37. For example, the ’248 patent describes the process as detecting an occurrence of a predetermined event in the process flow 100; notifying a subscribing software scheduling agent (e.g., LSA 305, MSA 310, PMAS 315, or RSA 320) of the occurrence; and reactively scheduling an action responsive to the detection of the predetermined event. *Id.* at 7:38–46.

C. Illustrative Claims

Of the challenged claims, claims 1 and 14 are independent. Each of challenged claims 2–13 and 15–22 depends from claim 1 or 14.

Claim 1 is illustrative:

1. A method for scheduling in an automated manufacturing environment, comprising:
 - automatically detecting an occurrence of a predetermined event in an integrated, automated process flow;
 - automatically notifying a software scheduling agent of the occurrence; and

reactively scheduling an action from the software scheduling agent responsive to the detection of the predetermined event.

Ex. 1001, 30:40–48.

D. Asserted Prior Art and Ground of Unpatentability

The asserted ground in this proceeding involves the following prior art references:

a) *Schulze*: US 2002/0116083, published August 22, 2002, filed as Exhibit 1007; and

b) *Gupta*: US 4,888,692, issued December 19, 1989, filed as Exhibit 1008.

Petitioner asserts the following ground of unpatentability (Pet. 16):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–22	103	Schulze, Gupta

Petitioner also relies on a Declaration of Dr. Stanley Shanfield, filed as Exhibit 1003 (“Shanfield Declaration” or “Shanfield Decl.”).

II. ANALYSIS

A. Level of Ordinary Skill in the Art

Petitioner contends that a person having ordinary skill in the art “would have at least a B.S. in computer science, mechanical engineering, electrical engineering, or a related field, and three years of experience working with automated manufacturing processes.” Pet. 17. For purposes of its Preliminary Response, Patent Owner does not dispute this contention. Prelim. Resp. 36. At this juncture, we do not find it necessary to define the level of skill with specificity save to note that the level of ordinary skill is evidenced by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (stating that the absence of specific findings on the level of skill in the art does not give rise to reversible error where the

prior art itself reflects an appropriate level and a need for testimony is not shown).

B. Claim Construction

In *inter partes* review proceedings based on petitions filed on or after November 13, 2018, such as this one, we construe claims using the same claim construction standard that would be used in a civil action under 35 U.S.C. § 282(b), as articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc), and its progeny. *See* 37 C.F.R. § 42.100(b).

Petitioner submits that no claim term needs to be construed, as the prior art relied on in the Petition discloses the subject matter of the challenged claims under any reasonable construction, including their plain meaning. Pet. 16. Patent Owner contends that claim construction is not necessary for the Board to make a decision on institution. Prelim. Resp. 36. We need not determine preliminarily the construction for any claim term as our decision does not rely on any.

C. Obviousness over Schulze and Gupta

We now analyze the ground asserted in the Petition—that claims 1–22 would have been obvious over Schulze and Gupta. Pet. 33–67.

1. Overview of Schulze (Ex. 1007)

Schulze is related to “systems and methods for monitoring and assessing the performance and operation of . . . semiconductor fabrication facilities.” Ex. 1007 ¶ 3. Schulze describes a need to identify which fabrication tools of large semiconductor fabrication facilities are idle in order to reduce the idle time of the fabrication tools and maximize production time, yield and profitability. *Id.* ¶¶ 6, 7.

Figure 1 illustrates a semiconductor fabrication system incorporating an automated monitoring and assessment system and is reproduced below.

FIG. 1

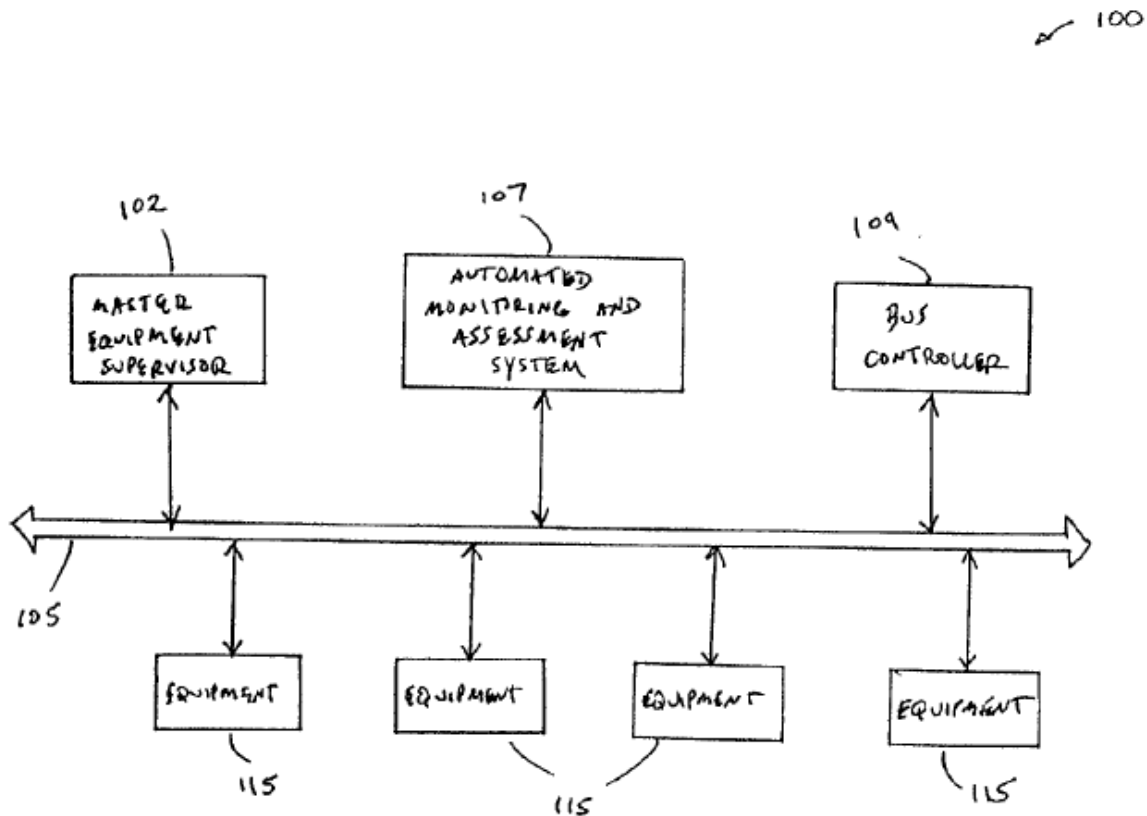


Figure 1 is a top-level diagram illustrating semiconductor fabrication system 100 incorporating an automated monitoring and assessment system. *Id.* ¶ 40. As illustrated in Figure 1, manufacturing execution system 102 is connected to system bus 105, along with a plurality of semiconductor fabrication tools 115. *Id.* Also connected to system bus 105 is automated monitoring and assessment system 107 and bus controller 109. *Id.* Bus controller 109 controls the routing of information over system bus 106, and automated monitoring and assessment system 107 subscribes to the information needed for performing the monitoring and assessment functions. *Id.* ¶ 41. Semiconductor fabrication tools 115 transmit or publish messages over system bus 105 to manufacturing execution system 102. *Id.* ¶ 42.

Automated monitoring and assessment system 107 receives information from the transmitted or published messages, and uses that information to track the operation states of the semiconductor fabrication tools 115. *Id.*

2. *Overview of Gupta (Ex. 1008)*

Gupta “relates to automated scheduling and planning systems.”

Ex. 1008, 1:9–10. More specifically, Gupta describes a system for scheduling the operation of interrelated machines (such as a manufacturing facility for integrated circuits), which perform a process flow. *Id.* at [57], 3:50–51. A global definition of the system is made once, and each machine has an individual profile describing its local interaction with the system. *Id.* at [57]. However, local scheduling decisions for each machine are made based on that machine’s individual profile and the state of the manufacturing facility at the time a decision is needed. *Id.*

Gupta states that the “real-time portion of the scheduling system depends on local optimization to function efficiently.” *Id.* at 13:43–44. Thus, Gupta explains, instead of recalculating the complete global state for the system, each time a decision must be made, only the relevant local state is recalculated. *Id.* at 13:44–48. Such a process reduces processor load. *Id.*

Each machine in the manufacturing facility has several data structures that determine the machine behavior. *Id.* at 13:49–52. “Decision-making is event driven, and a determination of what comes next for each machine is made whenever certain events take place.” *Id.* at 13:54–56. Gupta identifies events that drive the decision making process: machine loads and unloads, a machine going off-line and coming on-line. *Id.* at 13:56–58. According to Gupta, whenever one of these events occurs, “the scheduling system must calculate what that machine will do next.” *Id.* at 13:59–60. Those actions,

Gupta explain, may be to load a lot immediately and to take the lot from an input queue. *Id.* at 13:61–64. Other actions may involve requiring a machine to wait for a full load, or to proceed with a partial load. *Id.* at 13:64–66.

Gupta’s scheduler, therefore, makes decisions when machines are due to load, or when they unload. *Id.* at 14:19–21. “Since the schedule knows in advance when its computational resources will be in demand, it is in a position to look ahead and predict when its resources will be inadequate to fully compute each required decision.” *Id.* at 14:21–26. “If a heavy demand on computational resources will be required at some time in the future, the scheduling system will need to begin making decisions ahead of time.” *Id.* at 14:30–33.

3. Reasonable Likelihood Determination

After considering Petitioner’s contentions and Patent Owner’s arguments in opposition, and as we discuss below, we are persuaded that Petitioner has demonstrated a reasonable likelihood of prevailing on showing that claims 1–22 would have been obvious over Schulze and Gupta.

a) Independent Claim 1

Petitioner contends that Schulze describes an automated manufacturing environment with a non-intrusive, reliable, and comprehensive system or method for monitoring, assessing, and reporting the operation and performance of a semiconductor manufacturing facility (or “fab”) by connecting an automated monitoring and assessment system to a manufacturing execution system (MES) and fabrication tools via a system bus. Pet. 34 (citing Ex. 1007 ¶¶ 14, 40; Shanfield Decl. ¶ 111); Pet. 41 (citing Ex. 1007 ¶¶ 39–40); Shanfield Decl. ¶ 131. By disclosing that the

MES is connected to the system bus, along with a plurality of semiconductor fabrication tools, and disclosing that the MES monitors the connected fabrication tools activity by detecting changes on the machine operation, such as unscheduled downtime, Petitioner contends that Schulze teaches the limitation of claim 1 that requires “automatically detecting an occurrence of a predetermined event in an integrated, automated process flow.” Pet. 42 (citing Ex. 1007 ¶¶ 40, 55, 214; Shanfield Decl. ¶ 133). This assessment by Petitioner has not been challenged by Patent Owner at this juncture. We find that these arguments and the evidence presented for this “automatically detecting” limitation meet the reasonable likelihood threshold of institution.

For the remainder of the limitations of claim 1, Petitioner relies on Gupta’s teachings. And Patent Owner contests Gupta’s role in Petitioner’s case. We discuss each of the remaining limitations of claim 1 separately below.

(1) *“automatically notifying a software scheduling agent of the occurrence”*
(“automatically notifying” limitation)

Petitioner argues that Gupta discloses a scheduler implemented in software that constitutes the claimed “scheduling agent.” Pet. 42–43 (citing Ex. 1008, 30:3–16; Shanfield Decl. ¶¶ 65, 72–81, 134). According to Petitioner, Gupta’s scheduler makes decisions for a given machine in the process flow by applying the “local prediction” concept. *Id.* at 43 (citing Ex. 1008, 1:34–48, 3:57–66, 14:8–26, 16:8–17, 17:7–13, 20:5–8, 20:5–14, 25:22–41, 25:52–55; Shanfield Decl. ¶¶ 134). Therefore, Petitioner argues, Gupta’s decision-making is on a real-time basis, requiring the scheduler to be automatically notified of the event detected at the fabrication facility. *Id.* (citing Ex. 1008, 2:51–52; Shanfield Decl. ¶ 135). Patent Owner does not contest these assertions.

Petitioner's arguments and evidence at this juncture reasonably convey how Gupta in combination with Schulze teaches this "automatically notifying" limitation of claim 1. For instance, the Petition explains that implementing Gupta's scheduler in Schulze's automated monitoring and assessment system 107, which, in combination with Schulze's MES102 and system bus 105, would automatically receive the events detected about the various equipment 115. Pet. 43–45. We find that these arguments, and the evidence presented for this "automatically notifying" limitation, meet the reasonable likelihood threshold of institution.

(2) *"reactively scheduling an action from the software scheduling agent responsive to the detection of the predetermined event"* ("reactively scheduling" limitation)

Petitioner asserts that Gupta's scheduler, implemented as stated above in Schulze's automated monitoring and assessment system, performs a "local optimization" to reactively schedule an action to be performed by a machine. Pet. 45–46 (citing Ex. 1008, 13:56–60, 15:49–54, 19:5–44, 22:57–63, 23:34–51; Shanfield Decl. ¶¶ 139–140). For instance, Petitioner points out Gupta's disclosure that Gupta receives a notification that a machine just unloaded 2 out of 4 lots in its queue, and that based on that event, Gupta's scheduler performs local optimization to decide "whether to load those 2 lots now, or to wait some short period of time until 1 or 2 more lots arrive so that a larger load can be processed." Pet. 46 (citing Ex. 1008, 15:49–54; Shanfield Decl. ¶ 140). Petitioner proffers additional examples of actions scheduled by Gupta's scheduler in response to notifications from a machine. *Id.* (explaining how Gupta's scheduler revises the upstream processing schedule in response to a machine coming online after a repair

and Gupta’s scheduler may delay the upstream machine upon notification of a machine’s breakage).

Patent Owner presents several arguments challenging Petitioner’s reliance on Gupta for this “reactively scheduling” limitation. First, Patent Owner argues that Gupta is “predictive,” not “reactive” as the claim requires. Prelim. Resp. 43–47. Second, Patent Owner argues that Gupta teaches away from the asserted combination with Schulze. *Id.* at 37–43. Third, Patent Owner argues that Petitioner has relied on impermissible hindsight because the record lacks support for the asserted combination. *Id.* at 42–43. We address each argument in turn.

(a) Patent Owner’s Predictive Versus Reactive Argument

Gupta states that “[w]hen a machine must undertake local optimization, it runs a local simulation to determine what the future will bring.” Ex. 1008, 20:12–14. According to Patent Owner, Gupta uses prediction, even in cases where the existing scheduling for a given machine no longer makes sense due to breakdowns. Prelim. Resp. 43–44. In short, Patent Owner argues, Gupta “requires an intermediate predictive step,” “before any scheduling is completed.” *Id.* at 44 (emphasis omitted). Because Gupta performs a prediction or recalculation in its decision-making process, the argument goes, Gupta is “predictive” and not reactive as the claim requires. *Id.* at 44–45. At this juncture, we do not agree with Patent Owner’s contention.

As Petitioner asserts, Gupta’s local optimization is an event-driven decision-making process. Ex. 1008, 13:54–60. That decision-making process includes making predictions in advance, when computational resources are expected to be scarce. *Id.* at 14:21–25, 16:4–7. And it also

includes making a local prediction or simulation in real time, such as when the machine receives a demand signal. *Id.* at 19:45–59. That Gupta uses the word “prediction” to refer to the calculations it performs in response to an event does not appear to contradict or be the opposite of “reactively scheduling” as Patent Owner argues. Gupta’s “prediction” refers to calculations that consider the impact of future processing steps that may affect the local machine. *See id.* at 20:5–14. The local prediction process “consists of asking the upstream processes what they will be doing in that time frame,[a few tens of time steps away,] and applying the decision making process to the results.” *Id.* at 20:15–20. In case of events that are unpredicted, such as machine breakdowns, the calculations must be repeated upon receiving a demand signal. *Id.* at 20:22–27. Gupta’s local prediction thus appears to refer to obtaining and analyzing the data needed to calculate which action to take. The word “prediction” in Gupta alludes to the nature of the data analysis, being future-focused, such as tabulating what each machine is in the process of handling and the expected queue. *See, e.g., id.* at 22:3–26, Table 5 (describing the local prediction process for multi-lot machine optimization, which applies lot function minimization to the predicted lot and processing time for the machine).

But when Gupta refers to determining what actions to take, it appears to do so “reactively,” by responding to the events occurring in the machine. *See Ex. 1001, 7:35–37* (explaining that activities scheduled “reactively” are scheduled “in response to events occurring in, e.g., the process flow 100, in accordance with the present invention”). For example, Gupta explains that when a machine M1 is down, process P37 sends a negative request signal to P36 using a routine that places the negative request signal in the data

structures for the upstream processes. Ex. 1008, 24:6–16; *see also* Pet. 46 (citing Ex. 1008, 23:34–51, describing the negative request signal sent upstream to delay the original schedule for a certain amount of time). Thus, despite using prediction analysis to determine the processing time and queues for each machine, the actions Gupta takes, such as executing a routine to distribute negative request signals upstream, are reactive as they are taken in response to the event occurring in the machines. Therefore, at this juncture, we are not persuaded that Gupta’s local optimization or “prediction” calculations contradict the nature of its actions being “reactive” as required by the claim.

Patent Owner further argues that the “cadence of the scheduling process” of Gupta is slow and that the computational intervals of Gupta are too long for Gupta to be considered reactive. Prelim. Resp. 46–47. For instance, Patent Owner posits that Gupta is unlike the ’248 patent because the change of Gupta’s schedule is preceded by a predictive step and that lengthy interval makes Gupta unable to react to factory changes. *Id.* at 47. We do not agree with Patent Owner’s contention.

First, even if Gupta’s action occurs after it performs the prediction calculation, the action is nonetheless reactive, as it is performed in response to the received notification. As described above, when a machine M1 is down, the routine to distribute a negative request signal upstream occurs in response to the machine down event, which is what the claim requires. The intervening prediction analysis, even if there were one in the machine down situation, does not negate the reactivity of Gupta’s decision to send a negative request signal upstream, according to the claim. And we see no

claim requirement that limits “reactively scheduling an action” to an action that occurs without any intervening calculations.

Second, we understand Patent Owner’s argument to focus on “immediacy” based on embodiments in the ’248 patent. *See* Prelim. Resp. 46–47 (citing Ex. 1001, Table 3, 13:53–58). Without more, however, we do not read embodiments as claim limitations. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed. Cir. 2005) (warning against confining the claim to specific embodiments of the invention). Therefore, we are not persuaded by Patent Owner’s arguments that the ’248 patent includes two embodiments that use the words “as soon as possible” and “immediately,” yet Gupta’s six-minute calculation time is too long in comparison. Here again, we see no claim language that requires immediacy between the step of “automatically notifying” and “reactively scheduling an action.”

In sum, Patent Owner’s arguments that Gupta is “predictive” rather than “reactive” in terms of the claim limitation “reactively scheduling an action” are not persuasive at this juncture.

(b) Patent Owner’s Argument that Gupta Teaches Away

Petitioner provides a lengthy discussion on the combinability of teachings of Schulze and Gupta. Pet. 35–41. We point out for instance Petitioner’s argument that a person of ordinary skill in the art “would have appreciated that the distributed and localized nature of the software scheduler taught in Gupta would reduce the computational complexity involved in each scheduling decision.” *Id.* at 36 (citing Shanfield Decl. ¶ 118; Ex. 1021, 207; Ex. 1013, 566). Additionally, Petitioner argues that Gupta provides the advantage of avoiding the need to reconfigure the scheduling strategy for the entire process flow upon adding a new type of machine to the process flow because Gupta’s local scheduler can be adjusted

for the new machine. *Id.* at 36–37 (citing Shanfield Decl. ¶ 119; Ex. 1008, 14:60–61, 30:32–34; Ex. 1024, 46).

In its opposition, Patent Owner contrasts Schulze’s “all tools” monitoring with Gupta’s *individual* machine focus to argue that Gupta teaches away from implementing the local scheduler with Schulze’s teachings. Prelim. Resp. 36–40. For instance, Patent Owner posits that Gupta avoids taking actions that would involve the entire factory because Gupta teaches “local optimization.” *Id.* at 39–40. Patent Owner further argues that Gupta “counsels against attempts to scale up its scheduling method to the entire fab,” because Gupta seeks to conserve processing power. *Id.* at 41–42. Specifically, Patent Owner focuses on Gupta’s disclosure that [d]ecisions which consider many factors, such as those made for the entire facility at once, tend to require prohibitive computational resources,” and, therefore, a person of ordinary skill in the art would have been “actively discouraged” from adding “scheduling to Schulze’s fab-wide MES.” *Id.* at 41 (emphasis omitted).

We are not persuaded by Patent Owner’s argument. Gupta describes “global planning” and “local optimization” for the entire fab. Ex. 1008, 8:46–9:21, 13:41–14:26. Thus, arguing that Gupta’s scheduler would not be focused on an entire fab is belied by Gupta’s disclosure. Further, the portions of Gupta that Patent Owner relies on do not support what Patent Owner asserts—that Gupta’s scheduler is expressly designed to not work for the entire factory. We understand Gupta to teach a system design that makes a large number of simple computational decisions for each machine of the entire factory, rather than a computation heavy design that requires recalculating the global parameters for the entire factory each time a

decision is made. *Id.* at 13:67–14:11. This is different from how Patent Owner characterizes Gupta—i.e., as “implicitly counsel[ing] against attempts to scale up its scheduling method to the entire fab.” Prelim. Resp. 41 (*see also* Prelim. Resp. 39, arguing unpersuasively that Gupta expressly teaches that its local optimization should not be applied to an entire factory and likely would not work if it were so applied).

Furthermore, emphasizing Gupta’s local optimization as limiting the number of tools or number of actions is also unpersuasive. First, Gupta describes that the “range of actions which can be taken is fairly limited” in the context of explaining that the machine actions are rather simple: load a lot from its queue immediately, wait for a full load, or proceed with a partial load. Ex. 1008, 13:61–66. Gupta is not saying that its scheduler is somehow limited in actions—rather, the machine’s actions are simple, thus the number of options for the scheduler to decide are simple. Second, Gupta’s scheduler makes a decision for all the machines in the system by local prediction, regardless of the computational resources available. For instance, if the scheduler resources are tight, “such as a very large facility using a small computer system for scheduling and planning,” the more critical machines will have first call on the resources and the other machines employ simpler decision strategies or a default strategy, such as round-robin mode. *Id.* at 14:43–59. But if the scheduler knows how long it will take “for each machine,” it will need to begin making decisions ahead of time, such as six minutes in advance, so that when the machines unload, the results of the prediction are available to the machine. *Id.* at 14:27–42. Thus Gupta explains that its scheduler takes into account each machine and performs the expected decisions *for each machine*, regardless of the

computational strain. Therefore, the argument that Gupta teaches away from applying its scheduler to an entire facility, such as that of Schulze, because of its local optimization scheme, is untenable on the present record.

Consequently, we are not persuaded that Gupta teaches away from combining its teachings with those of Schulze as presented in the Petition.

(c) Patent Owner's Hindsight Allegation

In connection with the reasons to combine, Patent Owner alleges that Petitioner proffers conclusory arguments with insufficient factual support, and, therefore, Petitioner's theory relies on improper hindsight. Prelim. Resp. 42–43. We do not agree. Patent Owner takes issue with one of several reasons to combine proffered by Petitioner in which Dr. Shanfield states that a person of ordinary skill in the art would have recognized that the distributed and localized approach of Gupta's scheduler would reduce the computational resources and time needed. *Id.* at 42 (citing Shanfield Decl. ¶ 118). According to Patent Owner, Dr. Shanfield does not explain the connection between Gupta and a distributed and localized approach, and the missing link is found in secondary references, one of which is dated after the '248 patent's priority date. *Id.* Even if Patent Owner's argument had merit, which does not at this juncture appear to be the case given that Dr. Shanfield's testimony is unrebutted and appears reasonable on its face, Petitioner proffers several other explanations bearing on the analysis of reasons to combine. This additional explanation provides rational underpinning sufficient to meet the requirements of *KSR Int'l v. Teleflex*, 550 U.S. 398, 418 (2007). For instance, as stated earlier, one such explanation is that incorporating Gupta's scheduler implementation into Schulze provides a benefit of avoiding the need to reconfigure the scheduling strategy for the entire process flow upon adding a new type of

machine because Gupta's local scheduler can be adjusted for the new machine. Pet. 36–37 (citing Shanfield Decl. ¶ 119; Ex. 1008, 14:60–61, 30:32–34; Ex. 1024, 46).

Consequently, Patent Owner's arguments that Petitioner's reasons to combine fail for inadequate support or because Petitioner relies on hindsight are unpersuasive.

(3) Conclusion

Having reviewed the Petition and Patent Owner's arguments in opposition, we determine that Petitioner has shown a reasonable likelihood of prevailing on its assertion that claim 1 would have been unpatentable as obvious over Schulze and Gupta.

b) Independent Claim 14

Claim 14 recites substantively similar limitations to those recited in claim 1, except that claim 14 is an apparatus claim that requires “a plurality of scheduling agents” residing on a “computer system.” Ex. 1001, 32:6–11. Petitioner relies on the same combination of teachings of Schulze and Gupta, and further explains that “it would have been obvious to a [person of ordinary skill in the art] to implement different local schedulers for different types of machines in the process flow.” Pet. 49 (citing Shanfield Decl. ¶ 147). In support, Petitioner cites Gupta: “[t]he local optimization process for the bottleneck machines may need to be different from that of other machines.” *Id.* (citing Ex. 1008, 10:12–16) (alteration in original). According to Petitioner, because a local scheduler represents one machine or tool during a local optimization process, “a [person of ordinary skill in the art] would have found it obvious to implement a plurality of local schedulers performing parallel processing.” *Id.* (citing Shanfield Decl. ¶ 148).

According to Dr. Shanfield, such parallel processing structure of a plurality of local schedulers would shorten delays and increase scheduling efficiency. Shanfield Decl. ¶ 148.

Patent Owner argues that neither Schulze nor Gupta discloses a plurality of scheduling agents. Prelim. Resp. 48. Patent Owner contends that Gupta's disclosure consistently refers to "a scheduler" or "the scheduler" and "[n]othing in Gupta indicates that 'local schedulers' would be feasible or desirable." *Id.* According to Patent Owner, Petitioner's contention regarding Gupta is speculation, and not based on a sufficient factual basis. *Id.* at 48–49. We do not agree with Patent Owner.

As stated above, Petitioner has relied on a theory that it would have been obvious to implement the single scheduler in Gupta as parallel processing schedulers, each scheduler for a different type of machine. Patent Owner's arguments to the contrary do not respond to the obviousness theory advanced in the Petition and explained in the supporting testimony.

Consequently, we determine that Petitioner has shown a reasonable likelihood of prevailing on its assertion that claim 14 would have been unpatentable as obvious over the combination of Schulze and Gupta.

c) Dependent claims

Petitioner has provided a mapping of the further limitations recited in dependent claims 2–13 and 15–22 to disclosures in the cited references. Pet. 51–67. In addition to relying upon its arguments for independent claims 1 and 14, Patent Owner also provides separate arguments for the patentability of claims 6, 15, and 18. Prelim. Resp. 49–52.

Claims 6, 15, and 18 recite "publishers" and "subscribers" or "subscribing listener." Petitioner asserts that each equipment 115 in Schulze includes a "low-level driver," which constitutes the required "publisher"

because this driver receives the indication of a detected event and publishes a message that contains the event information over system bus 105.

Pet. 52–53 (citing Ex. 1007 ¶¶ 40–42, 46; Shanfield Decl. ¶ 156). Bus controller 109 of Schulze, i.e., the recited “subscriber” or “subscribing listener,” also connected to system bus 105, receives the message published by the driver of equipment 115 and, according to the implemented combination of teachings, the controller calls the local scheduler or “software scheduling agent” by routing some of the information in each message to automated and assessment system 107. *Id.* at 53 (citing Ex. 1007 ¶¶ 40–41; Shanfield Decl. ¶ 156).

Patent Owner argues that Petitioner’s contentions regarding Schulze’s bus controller and low-level drivers are based on the “unproven, erroneous assumption that the elements of Schulze can be integrated into the local optimization level of Gupta.” Prelim. Resp. 49–50. According to Patent Owner, Gupta teaches using a process data structure and a machine data structure in the local optimization and that Petitioner has not shown specifically how to connect these data structures with Schulze’s bus controller or low-level driver such that Schulze’s system would be compatible with Gupta’s scheduler. *Id.* at 50–51. We are not persuaded at this juncture by Patent Owner’s argument.

As described above, Petitioner has explained how specific teachings would have been combined in light of the disclosures of Gupta and Schulze. To the extent Patent Owner contends that Petitioner should have shown more detail in the interoperability between Gupta and Schulze, we note that at this juncture the testimony of Dr. Shanfield explains that Schulze’s system and controller are already configured to listen to the bus messages and that it

would have been obvious to configure the system and controller to further call the local scheduler in response to the received messages. Shanfield Decl. ¶¶ 156–157. Thus, we see an explanation that a person of ordinary skill in the art would have programmed the controller (and the monitoring system) to call or invoke another program, the local scheduler, based on the notification. Such an explanation at this juncture seems reasonable in light of the technology involved. And we note that “[a] person of ordinary skill is also a person of ordinary creativity, not an automaton.” *KSR*, 550 US at 420.

Having reviewed the dependent claims (including those not mentioned in this analysis) and the arguments in opposition, on the present record, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing on its assertion that the dependent claims would have been unpatentable as obvious over Gupta and Schulze.

D. Discretion to Deny Under 35 U.S.C. § 314(a)

Patent Owner contends the Board should exercise its discretion under 35 U.S.C. § 314(a) and deny institution in light of the advanced stage of the parallel district court proceedings involving the '248 patent. Prelim. Resp. 7–9; Sur-reply 1. Petitioner contends that Petitioner is not a party to any of the parallel district court proceedings involving the '248 patent, and resolution of those parallel proceedings would not resolve the dispute between Petitioner and Patent Owner with respect to the present proceeding. Pet. 8; Reply 1. In assessing whether to exercise such discretion, the Board weighs six non-exclusive factors, known as the *Fintiv* factors. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 6 (PTAB Mar. 20, 2020) (precedential) (“*Fintiv*”). Recognizing that “there is some overlap among these factors” and that “[s]ome facts may be relevant to more than one

factor,” the Board “takes a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review.” *Id.*

We have considered Patent Owner’s arguments in light of the *Fintiv* factors, together with Petitioner’s opposition, and we decline to exercise our discretion to deny the Petition as explained further below. An analysis of each of the *Fintiv* factors follows.

1. Factor 1: Whether a Stay Exists or Is Likely to Be Granted if a Proceeding Is Instituted

The ’248 patent is asserted in various district court proceedings. For instance, Patent Owner filed seven lawsuits in the Western District of Texas. Prelim. Resp. 9–10 (“WDTex litigation”). Patent Owner also filed one lawsuit in the Eastern District of Texas (*id.* at 10 (“EDTex litigation”)) and two lawsuits in the Massachusetts District Court (Exs. 1032–1033 (“Massachusetts litigation”)). Out of all these district court cases, the WDTex and the EDTex litigations have not been stayed. Reply 1 (identifying only the Massachusetts litigation as stayed). Nevertheless, Petitioner is not a party to any of these district court cases. Pet. 9.

Patent Owner urges us to find that Petitioner, as a non-party, “can never move for a stay” in any of the underlying district court litigation and, therefore, this factor should favor the exercise of discretion. Prelim. Resp. 14. In the alternative, Patent Owner argues that this factor is neutral. Sur-reply 1. We agree that this factor is neutral because although the WDTex and EDTex litigations are not stayed, Petitioner has no standing to request a stay.

2. *Factor 2: Proximity of the Court's Trial Date to the Board's Projected Statutory Deadline*

The projected statutory deadline for this proceeding would be, at the latest, February 2023. Patent Owner asserts that the jury trial in the WDTex litigation is set for December 7, 2022, and that the final pretrial conference in the EDTex litigation is set for August 15, 2022, “with a trial to begin shortly thereafter, likely at the end of August or in September.” Prelim. Resp. 8–9. These deadlines set the trial dates in district court to fall somewhere between *two and five months* before the projected statutory deadline. Petitioner argues that the trial dates are more fluid than what they appear and that other Board cases have held that where a petitioner is a non-party to the litigation, this factor weighs against the exercise of discretion. Reply 2 (citing *Bose v. Koss*, IPR2021-00680, Paper 15 at 15 (Oct. 13, 2021) (“*Bose*”).

We recognize that in *Bose*, a panel of the Board took notice of the fact that when a Petitioner is not a party to the litigation, this factor weighs strongly against exercising discretion. But here we have departure from facts in *Bose*, where the petitioner was not a defendant because Petitioner here has asserted that some of the defendants in the underlying litigation are “potential additional real parties-in-interest.” Petitioner contends, however, that these real parties-in-interest are identified as such “solely out of an abundance of caution to avoid burdening the Board with unnecessary disputes or discovery.” Pet. 1, 12. Acknowledging the nature of Petitioner as a non-party to the litigation and the identification of the defendants as potential real parties in interest, and balancing this with the proximity of the trial dates to the statutory deadline by a matter of two to five months, we consider that this factor weighs marginally in favor of exercising discretion.

3. *Factor 3: Investment in the Parallel Proceeding by the Court and Parties*

Patent Owner identifies work that has been completed in the WDTex and EDTex litigations to argue that “immense resources” have been expended. Prelim. Resp. 21–23. In particular, we note that the WDTex district court has issued a Markman order and the EDTex district court has ruled on a summary judgment motion. *Id.*; Sur-reply 3. In all pending district court matters, the preliminary infringement and invalidity contentions have been exchanged. Prelim. Resp. 22–23; Sur-reply 3. However, expert and fact discovery is ongoing. Prelim. Resp. 22–23.

Petitioner, on the other hand, argues that it filed the Petition before the invalidity contentions deadline in any of the parallel litigations. Pet. 10. Petitioner also points out that the work expended thus far is unrelated to the unpatentability issues related in the Petition because neither the Petition nor the Preliminary Response raises claim construction issues, and most of the motions have been largely pleading-related, not addressing the obviousness allegations presented in the Petition. Reply 2–3. Thus, Petitioner argues that this factor weighs against exercising discretion. Pet. 9–10. We agree with Petitioner. In particular, we acknowledge Petitioner’s diligence in filing the Petition before any of the invalidity contentions deadlines and that the resources and effort expended by the district courts in the pending litigations thus far have not been shown to have any substantial relation to the unpatentability issues presented in the Petition. Accordingly, we determine that this factor weighs slightly against exercising our discretion.

4. *Factor 4: Overlap Between Issues Raised in the Petition and in the Parallel Proceeding*

Patent Owner argues there is “complete” overlap between issues raised in the Petition and in the pending litigations while Petitioner argues that there is no substantial overlap. Prelim. Resp. 26–29; Reply 3; Sur-reply 4. We agree with Petitioner that there is no substantial overlap.

This proceeding involves all issued claims of the ’248 patent (claims 1–22), while the underlying litigation involves a subset of the claims. Reply 3. The ground asserted here also does not seem to “completely” overlap with the district court invalidity contentions. To start, Petitioner asserts a specific combination of teachings from Schulze and Gupta, yet the invalidity contentions, although identifying Schulze and Gupta, also mention fifty-three other references, many of which are asserted as anticipatory or primary references in a variety of obviousness theories. *Id.* (citing Ex. 2029, 69–85, 246–47, 249–56; Ex. 2030, 67–84, 162–69). Patent Owner argues that the prior art is the same, merely because both Schulze and Gupta are listed in the copious invalidity contentions. Prelim. Resp. 25–27. But that is not enough to support Patent Owner’s conclusion that the overlap of the issues is “complete,” when the ground asserted here is a specific combination of Schulze and Gupta, which is not identified in any of the invalidity contentions. Moreover, our analysis of this factor takes into consideration actions of the defendants in the litigation that avoid the duplication of issues presented to the Board and the district court. And considering that Petitioner is a non-party to the litigation, we acknowledge that even if Schulze and Gupta are identified as prior art in the invalidity contentions, there is no evidence that Petitioner has had or will have any

control over whether and how Schulze and Gupta will be presented to the jury. Accordingly, we determine that this factor weighs marginally against exercising discretion.

5. *Factor 5: Whether the Petitioner and the Defendant in the Parallel Proceeding Are the Same Party*

As stated above, Petitioner here is not a party to the litigation.

Reply 4. But, Patent Owner argues, Petitioner has identified some of the defendants as “potential” RPIs and, under *Fintiv*, Petitioner should have explained the need for duplication of resources. Prelim. Resp. 31–32; Sur-reply 5 (arguing that under *Fintiv* this factor weighs in favor of denial even where a petitioner is not a defendant in a co-pending action). We do not agree with Patent Owner.

Fintiv explains that an unrelated petitioner should address the co-pending litigation to discuss why the issues here would not be duplicative. *Fintiv*, at 14. Petitioner has explained that there was no substantial overlap and that it diligently filed its Petition before any invalidity contentions were exchanged in district court. Pet. 11; Reply 3. This explanation and the surrounding circumstances paint the picture of a non-party to the litigation diligently filing a Petition without having control over what argument may be raised by the parties in the litigation. *See* Pet. 11. Notably, there is no evidence that the defendants in the underlying litigation have any control over the IPR or how the prior art is presented here such that we could view Petitioner as an agent for the defendants. Accordingly, this factor weighs against exercising discretion.

6. *Factor 6: Other Circumstances that Impact the Board's Exercise of Discretion, Including the Merits*

Patent Owner contends that the merits of the case are particularly weak and challenges institution on substantive grounds. Prelim. Resp. 32–33, 36–52; Sur-reply 5. Petitioner asserts that the merits warrant institution and that it has no other forum in which to present these arguments. Pet. 13. Patent Owner responds that Petitioner has no “due process” right because it is free to litigate the ’248 patent claims’ validity in its own district court case. Prelim. Resp. 32 (citing *Mylan Labs. Ltd. v. Janssen Pharmaceutica, N.V.*, 989 F.3d 1375, 1383 (Fed. Cir. 2021)).

We are not persuaded by Patent Owner’s arguments. As discussed above, we were not persuaded by Patent Owner’s arguments that the merits of the Petition are weak. Whether Petitioner may challenge validity in a district court case of its own as an alternative to requesting an IPR does not impact our analysis, because the *Fintiv* factors do not assume a preference for any particular jurisdiction for determining a challenge of validity. Rather, Petitioner’s choice of forum is a litigation decision that falls entirely within Petitioner’s prerogative.

Consequently, noting that we have found that at least one claim in the Petition meets the reasonable likelihood of prevailing and that Patent Owner’s arguments to the contrary were unpersuasive, we determine that factor six is neutral.

7. *Balancing the Fintiv Factors*

We have considered the circumstances before us in light of the *Fintiv* factors. Except for the second factor, the proximity of trial dates, all other factors are either neutral or weigh against exercising discretion. Altogether,

balancing the factors, we decline to invoke our authority to deny the Petition on a discretionary basis under § 314(a).

III. CONCLUSION

We have determined that Petitioner demonstrated a reasonable likelihood of prevailing on its assertion that the challenged claims would have been obvious as asserted in the Petition. Therefore we institute trial on all challenged grounds and all challenged claims.

Our determination in this Decision is not a final determination on the patentability of any challenged claims and, thus, leaves undecided any factual issues necessary to determine whether sufficient evidence supports Petitioner's contentions by a preponderance of the evidence in the final written decision. *See TriVascular, Inc. v. Samuels*, 812 F.3d 1056, 1068 (Fed. Cir. 2016) (noting that “there is a significant difference between a petitioner's burden to establish a ‘reasonable likelihood of success’ at institution, and actually proving invalidity by a preponderance of the evidence at trial”) (quoting 35 U.S.C. § 314(a) and comparing § 316(e)).

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that pursuant to 35 U.S.C. § 314(a) the Petition is granted;
and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(a), *inter partes* review of the '248 patent is hereby instituted with trial commencing on the entry date of this decision, and pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of review.

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