

In the United States Court of Federal Claims

No. 11-268C

(Originally filed: August 31, 2021)¹

(Re-filed: October 22, 2021)

SECURITYPOINT HOLDINGS, INC.,

Plaintiff,

v.

THE UNITED STATES,

Defendant.

28 U.S.C. § 1498(a)
(Jurisdiction Over Patent
Claims); Post-trial decision;
Infringement; Reasonable
and entire compensation;
Implied license; Running
royalty.

Bradley C. Graveline, Rebecca L. Mackin, Chicago, IL, with whom
was *Laura M. Burson*, Los Angeles, CA, for plaintiff.

Gary L. Hausken, Director, Commercial Litigation Branch, Civil
Division, United States Department of Justice, *Joseph L. Hunt*, Assistant
Attorney General, Washington, DC, with whom were *Conrad J. DeWitte, Jr.*,
Lee Perla, *Carrie E. Rosato*, *Brian N. Gross*, and *Shahar Harel*, for
defendant.

OPINION

BRUGGINK, Judge.

This is an action for patent infringement brought under 28 U.S.C. § 1498 (a) against the United States, acting through the Transportation Security Administration (“TSA”). SecurityPoint Holdings, Inc. (“SecurityPoint”) is

¹ This opinion was originally issued under seal to afford the parties an opportunity to propose redactions of any protected information. Because the parties did not propose any redactions, the opinion appears in full below.

the plaintiff. It owns a method patent, U.S. Patent No. 6,888,460 (“the ‘460 patent”), which we held valid after a trial in 2016. The parties agreed to two stipulations regarding infringement. Trial was then held in 2020 to establish the extent of infringement and compensation owed. Following post-trial briefing and argument, we conclude that, no later than January 1, 2008, TSA universally adopted plaintiff’s patented method as its default means for screening at all Category X and Category I airports and thereby, with certain exceptions later adopted, infringed plaintiff’s patent. Plaintiff is owed a royalty, plus interest, through the date of the judgment as compensation for TSA’s unauthorized use of its method.

BACKGROUND

I. The Patent

The ‘460 patent concerns a system of recycling trays through security screening checkpoints by use of movable carts. JX 1 (the ‘460 patent).² The ‘460 patent’s priority date is July 3, 2002, which is when the inventor, Mr. Joseph Ambrefe, first filed a provisional patent application at the U.S. Patent and Trademark Office (“PTO”). As described in the patent, the purpose of the ‘460 patent is to provide:

a cost effective way of providing security trays for a security checkpoint while at the same time generating revenue from the advertising that is contained thereon. Further, the present system provides an efficient system for moving the trays for use and removal after they are used. Security checkpoints are both a time consuming and frustrating part of traveling for frequent fliers and people on vacation alike. The present invention provides a system of speeding up the process of processing people through these checkpoints to decrease the likelihood of delays for travelers. The present invention also has the advantage of increasing passenger flow through checkpoints and increasing traveler satisfaction due to the lack of delays.

JX. 1 col. 6 ls. 10-24.

² “JX” refers to admitted exhibits offered jointly by both parties. “PX” refers to admitted exhibits offered by plaintiff. “DX” refers to admitted exhibits from defendant.

During patent prosecution, the PTO examiner initially rejected the application as obvious, but that rejection was overcome by the addition of language to the first claim, which will be set forth below. The '460 patent was issued on May 3, 2005.

The patent is comprised of one independent claim and 14 dependent claims. Claim 1 is the independent claim and is exemplary of the method. It discloses a method comprising:

- a. positioning a first tray cart containing trays at the proximate end of a scanning device through which objects may be passed, wherein said scanning device comprises a proximate end and a distal end,
- b. removing a tray from said first tray cart,
- c. passing said tray through said scanning device from said proximate end through to said distal end,
- d. providing a second tray cart at said distal end of said scanning device,
- e. receiving said tray passed through said scanning device in said second tray cart, and
- f. moving said second tray cart to said proximate end of said scanning device so that said trays in said second cart be passed through said scanning device at said proximate end.

JX 1 col. 11 ls. 58-59, col. 12 ls. 1-14.

The final step in the method of claim 1, “moving said tray cart to said proximate end of said scanning device,” was added at the PTO to overcome the examiner’s initial obviousness rejection. That final step differentiated the claimed method from the combination of three prior art references which disclosed a system to move and/or store trays in a security screening setting.

Claim 2 teaches that the scanning device is “selected from the group consisting of a manual inspection station, an x-ray machine, a conveyor belt, and a particulate matter sensor.” *Id* at col. 12 ls. 17-19. Claims 3 and 4 add that the trays are “nestable” and have “exposed sides capable of displaying advertising.” *Id* at ls. 21, 23-24. Claim 6 instructs that the “tray carts are adapted to be rollable.” *Id* at ls. 28-29. Claim 7 adds that the method of

Claim 1 also includes “the step of repositioning said second tray cart from said distal end to said proximate end.” *Id.* at ls. 31-33. Claims 8 and 9 inform that a plurality of the trays is “adapted to receive” various items such as a laptop, camera, purse, coat, wallet, cell phone, and other similar items. *Id.* at ls. 34-37, 40-41. Claim 12 adds a third cart to be used in the method described in Claim 1. *Id.* at ls. 48-49. Claim 13 inserts a step in which the third cart “containing a plurality of trays” is substituted to replace the first cart. *Id.* at ls. 50-52. Claim 14 makes the bottoms of the trays adapted to display advertising on the interior surface of the trays, and Claim 15 teaches that the trays are adapted to display a tag number. *Id.* at ls. 53-54, 57.

II. Procedural History

Plaintiff commenced this action on May 2, 2011, alleging that the United States, acting by and through the TSA, operates and controls security screening at security checkpoints at more than four hundred airports throughout the United States and utilizes carts, trays, and scanning devices at these checkpoints in a manner that infringes one or more of the claims of the ‘460 patent at all or most of the airports under its control. After extensive discovery and motion practice, the parties filed a joint status report agreeing that the liability and damages phases of this case should be bifurcated.

Following the parties’ submission of their joint claim construction statement, they asked the court to construe eight terms or phrases from claim 1 of the patent. We held a *Markman* hearing on November 14, 2012, after which we construed the disputed terms as follows:

The Patent Term	The Court’s Construction
tray	a base with upwardly extending walls
trays	no construction
tray cart	a movable cart capable of holding one or more trays
proximate end	proximal or nearest to; referring to the end of the scanning device where an object enters the device
distal end	farthest from; referring to the end of the scanning device where an object exits the device
nestable	capable of fitting compactly within one another
adapted	suited

receiving said tray passed through said scanning device in said second tray cart	no construction
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SecurityPoint Holdings, Inc. v. United States, 111 Fed. Cl. 1, 11 (2013).

On November 16, 2012 the parties executed a stipulation regarding use of plaintiff's patent at ten airports. ECF No. 45. The November 2012 stipulation was conditional:

If SecurityPoint establishes infringing use of the '460 patent by or for the United States, . . . SecurityPoint shall be adjudged to have proved, and the United States shall be adjudged liable for, such infringing *use . . . on a continuous basis* at each and every passenger security screening checkpoint used at each of the Airports from January 1, 2008 through the date of SecurityPoint's judgment on the merits

Id. ¶ 7 (emphasis added).

On June 6, 2013 the parties executed a second stipulation. In it, defendant conceded that it had infringed the '460 patent:

In accordance with the prior stipulation of the parties dated November 16, 2012 (Docket No. 45), accepted by the Court on November 28, 2012 (Docket No. 46) . . . the parties hereby further stipulate . . . that SecurityPoint be adjudged to have proved that each method described in and covered by claims 1, 2, 3, 4, 6, 7, 8, 9, 12, 13, 14, and 15 of *the '460 Patent has been used by the United States* . . . pursuant to 28 U.S.C. § 1498(a).

ECF No. 71 ¶ 5 (emphasis added). In addition to admitting infringement, at least to some degree, the June 2013 stipulation also defined infringing use of the '460 patent as constituting:

performance of each step of each such claim . . . on a continuous basis. . . *where "continuous basis" is defined as such use at least once per day* that each checkpoint was open. . . through the date of this Stipulation, and further as to each such patent claim listed in this paragraph through the date of any judgment ultimately obtained by SecurityPoint"

Id. ¶ 5 (emphasis added).

In short, defendant has admitted using the methods of claims 1, 2, 3, 4, 6, 7, 8, 9, 12, 13, 14, and 15 of the ‘460 patent, at least once per day, from January 1, 2008, to the date on which judgment is entered at the same ten U.S. airports that were the subject of the prior stipulation, namely, Fort Lauderdale Hollywood International, Dallas/Fort Worth, Phoenix Sky Harbor, Philadelphia International, Boston Logan, Washington Dulles, Portland International, Detroit Metropolitan Wayne County, Baltimore-Washington International, and Ronald Reagan Washington National.

The issue of liability remained open, however. Defendant takes the position that the stipulations merely concede *some* use, albeit continuously, but not the extent of use, and only at ten airports. In addition, the government raised a number of defenses, including anticipation and obviousness. The latter two defenses were addressed by trial in 2015, following which we held that the defendant did not meet its burden of proving that a person of ordinary skill in the art would have combined the prior art references to teach the steps of plaintiff’s independent claim 1.³ We thus affirmed the validity of the patent. *SecurityPoint Holdings, Inc. v. United States*, 129 Fed. Cl. 25 (2016).

Thereafter, the case entered discovery with respect to the extent of infringement and damages. During pretrial motion practice, plaintiff asked the court to impose an adverse inference. In plaintiff’s view, the government had failed to maintain records of TSA’s use of the ‘460 method, making it impossible for plaintiff to prove the extent of the government’s use of the patent. We found that it was premature to draw an adverse inference and allowed additional time for discovery. During a hearing on November 1, 2017, we noted, however, that plaintiff was not expected to accept at face value defendant’s argument that “we didn’t use your patent at these airports for this period of time.” Tr. at 47:11-19 (Transcript from November 1, 2017 hearing, ECF No. 303).

On March 16, 2020, we granted in part defendant’s motion for summary judgment regarding the existence of an implied license from plaintiff to TSA for the use of the ‘460 method at those airports at which plaintiff had an agreement with the airport operator permitting such use. *SecurityPoint Holdings, Inc. v. United States*, 147 Fed. Cl. 499 (2020). We left open, however, the question of the scope of those licenses in terms of the relevant dates and number of lanes at the airports implicated by our finding of an implied license. *Id.* at 503-04.

³ Defendant dropped anticipation as a defense prior to trial.

On July 10, 2020, defendant filed a motion *in limine* to preclude plaintiff from offering evidence and argument at trial regarding the doctrine of equivalents. On September 16, 2020, we granted defendant's motion, but only in so far as it concerned plaintiff's case in chief: "If, however, defendant's expert, Mr. Tarakemeh's, testimony is inconsistent with the court's prior ruling regarding claim construction, then plaintiff's expert, Dr. Jacobson, will be allowed to testify on rebuttal to what is stated in his report regarding the doctrine of equivalents." ECF No. 538 at ¶ 1.

III. Trial

From October 5, 2020 through October 21, 2020, trial was held on the issues of the extent of infringement at Cat X and Cat I airports⁴ and damages. Plaintiff presented ten witnesses, six of whom testified as experts. Defendant presented five witnesses in its case in chief and one rebuttal witness. Three of defendant's witnesses testified as experts. We list the witnesses below and give a brief summary of their testimony, while discussing the particulars of their testimony in more detail later.

Following post-trial briefing, closing argument was heard on April 23, 2021. The parties thereafter filed supplemental briefs related to a study conducted by the government's expert, Mr. Amon Tarakemeh, as well as their respective positions on delay damages.

A. Plaintiff's Fact Witnesses

1. Mr. Joseph Ambrefe

Mr. Ambrefe is the inventor of the '460 patent and the founder and CEO of SecurityPoint. He testified about the origins of SecurityPoint and his business plan to sell his patented method to airports and the TSA, which in some respects had its genesis in the fallout from the attack on the World Trade Center Towers in New York in 2001. He also testified about the success of the '460 method in early tests and the patent's eventual commercial success after the patented method was adopted for use in airports.

⁴ Category X and I are the two largest classifications of commercial airports in the United States. Airports are classified by TSA primarily according to the volume of passenger traffic. Category X is the largest. Plaintiff maintains a claim with respect to the other smaller airports. The parties agreed to limit this trial to the two largest categories.

2. Mr. Douglas Linehan

Mr. Linehan is the Vice President of Operations at SecurityPoint. He testified about efforts to market the method to airports and TSA and the initial success in commercializing the '460 method. He also testified about plaintiff's negotiations with TSA, airport operators, and advertising brokers.

3. Mr. Scot Thaxton

Mr. Thaxton is TSA's Deputy Federal Security Director ("FSD") for the state of Arizona. He has seventeen years of experience working for the agency. His responsibilities within the State of Arizona are related to security screening checkpoints, including oversight of 1,500 employees at nine commercial airports in Arizona. He was also called to testify by defendant with respect to the one-cart method, an alternative system to the '460 patent that he developed for returning bins at security screening checkpoints. Plaintiff offered Mr. Thaxton to testify about Federal Aviation Administration ("FAA") and TSA airport design and planning guides, specifically the nature, scope, and timing of efforts to standardize and optimize the use of tray carts at airport security screening checkpoints.

4. Ms. Lisa Smithson

Ms. Smithson is a certified public accountant and SecurityPoint's chief financial officer. She testified concerning SecurityPoint's financial records.

B. Plaintiff's Expert Witnesses

1. Mr. Marcus Arroyo

Mr. Arroyo testified in the most recent trial as well as during the validity trial. He served as the FSD at Newark International Airport from 2001 to 2006. Among other things, Mr. Arroyo was asked to provide expert opinion and testimony regarding the condition of security checkpoints at airports before and after 9/11.

Prior to his time at Newark airport, Mr. Arroyo worked for the FAA, starting in 1986 as a special agent, and later as a security specialist and federal air marshal coordinator from September to December of 1986. In

January 1987, he was promoted to the interim attorney branch manager, Eastern Region, Eastern Division. In 1993, Mr. Arroyo was promoted to Assistant Manager for FAA security for the entire region, as well as Assistant Manager in Brussels, Belgium. There, he was responsible for Europe, the Middle East, and Africa from 1993 to 1995. He then returned to the Eastern Region in 1995 and resumed his position as the division manager of security for the Eastern Region until July 2002.

After leaving TSA in 2002, Mr. Arroyo did consulting work for Aerospace International. While there, he advised on projects such as the construction of a new airport in the United Arab Emirates. As a result of his education, work experience and training, he developed a “comprehensive understanding of the operation of security screening checkpoints.” Tr. 677:22-678:1. At trial, he testified as an expert with respect to airport security screening checkpoints. He also testified concerning TSA checkpoint design guides and how they are incorporated into the layout of airport security designs.

2. Mr. Erik Bottema

Mr. Bottema is the vice president of sales and business development at Adkom, a media company. Mr. Bottema has worked in aviation media and airport advertising. He was responsible for sales and account management related to in-airport advertising for airport media concessionaires JCDecaux and Clear Channel. Currently, he is responsible for media generation and media sales at Adkom. He testified as an aviation media-airport advertising expert concerning the value of SecurityPoint’s plan to market its patented process to advertisers.

3. Dr. Sheldon Jacobson

Dr. Jacobson has been a professor of computer science and industrial engineering in the Department of Statistics at the University of Illinois since 2002. He began work on aviation security issues in 1995, working with the FAA Office of Civil Aviation Security. His research on multi-level aviation security passenger screening at airports helped in the design and implementation of TSA’s PreCheck system. Dr. Jacobson has published in the field of aviation security, and the court found him to be a person of ordinary skill in the art (“POSA”) with regard to the ‘460 patent.

Dr. Jacobson testified as an expert on the extent of use of the patented method by defendant at checkpoint lanes in Category X (“Cat X”) and

Category I (“Cat I”) airports, the value of passenger time savings, TSA’s executed stipulations of infringement, admissions by TSA employees, TSA Checkpoint Design Guides, and how the ‘460 patent enhances security, safety, and efficiency.

4. Mr. Timothy Hollifield

Mr. Hollifield is a manufacturing and mechanical engineer who was involved in security checkpoint operations at the National Safe Skies Alliance (“NSSA”) in Knoxville, Tennessee from 2001 to 2011. He testified regarding the testing conducted by the NSSA for TSA of security screening checkpoint operations after September 11, 2001, the live testing of the ‘460 method at the McGhee Tyson Airport in Knoxville, and increased efficiency and security at checkpoints brought about by use of plaintiff’s patent.

5. Mr. Mark Hosfield

Mr. Hosfield testified concerning the economic indicators that would be relevant to negotiations with the U.S. government for a license to the ‘460 patent. Mr. Hosfield is the owner of Davis & Hosfield Consulting LLC and has his bachelor's degree from the University of Illinois and an MBA from Northwestern. He has 37 years of experience analyzing damages. He testified as an expert in forensic accounting as it relates to economic indicators of patent damages. He testified concerning cost savings resulting from fewer transportation security officer (“TSO”) injuries and from employing fewer TSOs and the effective royalty rate of the Adason agreement.⁵ He also testified about the economic indicators that would be relevant to a hypothetical negotiation with the U.S. government for a license to the ‘460 patent.

6. Mr. James Malackowski

Mr. Malackowski is the Chairman and Chief Executive Officer of Ocean Tomo, LLC, an investment banking firm which provides services related to intellectual property, including financial expert testimony, valuation, and patent analytics. He has worked extensively in the area of assessing damages for use of intellectual property. Mr. Malackowski is a certified public accounting, certified licensing professional, and inventor of 20 patents. He testified as an intellectual property damages expert.

⁵ The Adason agreement settled litigation between SecurityPoint and the Adason Group concerning, *inter alia*, Adason’s infringement of the patent.

C. Defendant's Fact Witnesses

1. Mr. Scot Thaxton

Mr. Thaxton testified regarding TSA security screening checkpoint operations in Arizona and the use of a bin return system that he developed as an alternative to plaintiff's method, which defendant refers to as the "One-Cart Method," and which plaintiff refers to as the "moveable pallet cart" ("MPC"). Mr. Thaxton testified about the components of the MPC, namely the dolly cart (a hand truck) and small pallets, as well as how it operated. He also testified about TSA's Bin Advertising Program as well as the use of TSA's Checkpoint Design Guides ("CDGs").⁶

2. Mr. Dale Mason

Mr. Mason is a program analyst with the Operational Improvements Branch of TSA. In 2002, Mr. Mason held a number of positions at TSA before being promoted to TSA Headquarters, where he is in charge of drafting and maintaining CDGs. He testified about the CDGs and their intended use.

3. Mr. Joseph T. Ambrefe

Mr. Ambrefe provided testimony as an adverse witness regarding SecurityPoint's accounting practices and economic business records, the Safe Skies demonstration and report, the Knoxville airport demonstration, and Mr. Ambrefe's visit to Denver International Airport in August 2019.

D. Defendant's Expert Witnesses

1. Mr. Amon Tarakemeh

Mr. Tarakemeh is an operations research analyst with a bachelor's degree in systems engineering and a master's degree in operations research. Mr. Tarakemeh testified regarding his background and work at the Science Applications International Corporation ("SAIC"). At SAIC, Mr. Tarakemeh tests procedures and equipment used at airport security checkpoints and baggage areas to ensure that they meet safety requirements. As part of Mr.

⁶ The parties' positions with respect to whether the MPC or One Cart Pallet method is infringing is implicit in the two different names. We use plaintiff's term simply for ease of reference without addressing here the legal questions related to infringement.

Tarakemeh's employment at SAIC, he works on contracts for TSA. He testified as an expert in operations research analysis and the use of the tray and cart method at security checkpoints.

The government engaged Mr. Tarakemeh to develop a study that estimated non-usage of the '460 method at airport checkpoints. Mr. Tarakemeh testified that during the study he visited 36 airports during an eight-month period in 2018 and 2019 for the purpose of determining the frequency with which checkpoint operations infringed the '460 patent. He also testified about data he collected related to the movement of passenger and non-passenger items at checkpoints. Mr. Tarakemeh concluded that plaintiff's patented method was only used sporadically.

2. Dr. Arnold Irvin Barnett

Dr. Barnett testified as an expert in applied mathematics, including applied probability and statistics. Dr. Barnett is a professor of Management Science and Statistics at the Massachusetts Institute of Technology ("MIT"). He has a degree in physics from Columbia University, a Ph.D. in mathematics from MIT, and he has taught probability and statistics at MIT for over 40 years. He testified regarding inferences that can be drawn regarding the extent of use of the '460 patent based upon survey data and observations of security screening checkpoints by defendant's expert, Mr. Tarakemeh.

3. Mr. Daniel McGavock

Mr. McGavock has a Bachelor of Science degree in accounting from Indiana University and currently serves as the Vice President of Charles River Associates, a consulting firm. He is the firm's Intellectual Property Practice leader. He is an expert in accounting and in the valuation and licensing of intellectual property. Mr. McGavock testified as to the compensation due to SecurityPoint and responded to plaintiff's damages experts.⁷

⁷ Two days into trial, defendant sought to introduce Mr. McGavock's supplemental report, which presented a new damages theory. In response, plaintiff filed a motion to strike (ECF No. 554) those portions of Mr. McGavock's supplemental report which concerned the new damages theory. Acknowledging plaintiff's motion to strike, on October 20, 2020, defendant moved to admit Mr. McGavock's supplemental expert report "minus paragraphs 8 and 9, figures 2 and 3, and the corresponding schedules which were the subject of Plaintiff's motion to strike." Tr. 2833:13-2834:11. We

IV. Fact Findings

A. Security Screening at Airports Prior to Implementation of Plaintiff's Patented Method

Prior to September 2001, security screening of airline passengers was beset by inefficiencies and complaints from passengers about long waits at security checkpoints. Mr. Arroyo explained that trays were generally used to hold passengers' belongings during screening, but the lack of standardization of equipment and hand carrying of trays back and forth led to the frequent mismanagement of passenger property, clutter, and disorganization. After the attacks of September 2001, the problem became more acute as security became a greater concern. Adding space to address the clutter was not an option at many airports.

There were also operational concerns at checkpoints. After 9/11, Mr. Arroyo recalled: "divestiture requirements [at screening checkpoints] were incrementally ratcheted up to where people were having to take off their shoes, their belts. It was quite invasive . . . [which] created more of a workload for the screeners." Tr. 692:25-693:1-4. Mr. Arroyo explained that, "It got so chaotic—I can speak for Newark personally because I witnessed it and experienced it and received many of the complaints—where the queueing lines were so backed up that they congested the concession stands, the entire operation." Tr. 693:17-21. "So, it was really chaotic situation that we had to address immediately." Tr. 694:1-2

When asked his opinion of the state of security screening prior to the implementation of plaintiff's method, Mr. Arroyo testified that checkpoints were:

chaotic because of trays and all of the divestiture requirements, but primarily because of the trays were—were just in a disorganized fashion. They were all over the screening checkpoint, creating a lot of tripping hazards, creating a lot of commotion. They were not readily available for the passengers to use the trays to start the divestiture process, which slowed down the screening checkpoint operation, caused frustration for the screeners . . . caused a lot of anxiety for the passengers . . . which ultimately bogged down the entire system"

agreed to strike the portions of Mr. McGavock's supplemental report concerning his newly introduced damages theory and DX 1814 was admitted into evidence, as amended.

Tr. 690:17-691:8.

The solution was to implement a “process to have some sort of standardization to meet the expectations of an efficient and steady flow of bags and passengers through the screening checkpoint.” Tr. 696:22-24. (Arroyo). Mr. Arroyo was asked at trial, “[d]id TSA do anything to . . . develop a system to organize trays and move them from the sterile to the non-sterile side . . . in the time period of—when you first joined TSA [2002]” up to the time you left? Tr. 700:18-23. He responded that TSA executed a phased approach and “started to roll out the employment” of screeners, terminal by terminal at Newark. Tr. 700:24-701:1. Despite TSA’s phased-approach and “evolving process,” TSA did not have a “uniform system in place at any point prior to September 1, 2005 [for managing checkpoints].” Tr. 708:4-6. The lack of uniformity in turn created safety problems “[f]or the traveling public, when you have trays in a congested area, it creates a tripping hazard You have a big crowd trying to get through this funnel, and anything that could obscure or block the movement is a safety hazard.” Tr. 709:4-12. TSA expert Gloria Bender also confirmed TSA’s failed efforts to develop a solution. During the validity trial, Ms. Bender testified that her company attempted to remedy the checkpoint efficiency problems, but ultimately did not succeed. Validity Tr. 1037:16-1038:8.

As a frequent business traveler, Mr. Ambrefe recognized the need for a uniform system to manage checkpoints. He observed the differences in security checkpoint layouts from airport to airport, the crowds, delays, long lines and increasing problems after September 2001. He concluded that what was needed was greater efficiency and standardization of the screening process. In 2002, Mr. Ambrefe sketched out what he believed would be a solution to the problem through the use of standardized trays and carts and recycling of trays by using carts to move trays from the non-sterile to the sterile side of checkpoints. He then sought legal advice and filed a patent application for his invention on July 2, 2003. On May 3, 2005, the ‘460 patent issued.

Mr. Ambrefe formed SecurityPoint as a corporate means to exploit the patent and what he viewed to be its potential as a means of introducing advertising into the screening process. That same year he offered an unsolicited proposal to TSA to provide the SecurityPoint method along with standardized trays and carts for security screening in exchange for the exclusive right to sell advertising on those trays at all 429 federalized

airports. TSA would receive the method and equipment at no cost to the government.⁸

TSA was skeptical, however, about introducing new equipment into security checkpoints out of concern that it would increase congestion and negatively impact passenger throughput. SecurityPoint nevertheless persisted in marketing its method to TSA, and in 2005, when plaintiff's patent had been issued, TSA agreed to permit a test of the '460 method at its Safe Skies testing facility in Knoxville, Tennessee. The results of the test were sufficiently favorable that TSA implemented the '460 method at the McGhee Tyson Airport in Knoxville as part of a pilot program. The pilot program also proved successful. Thereafter, TSA implemented the '460 method at Los Angeles International Airport ("LAX") in another pilot program.⁹

The evidence of the '460's success was highlighted in a TSA Information Bulletin, dated December 22, 2006, citing an 80 percent increase in screening efficiency and a 90 percent reduction in injuries after implementing SecurityPoint's trays and carts method during a three-month pilot program at LAX. *See* PX 84. Those figures were again recited in a TSA publication several days later. *See* PX 202 at 3 (TSA Public Affairs Guidance, December 28, 2006). Further, in a 2007 press release, a TSA Spokesperson, Mr. Nico Melendez, acknowledged that "the free trays, carts and tables did help TSA officers work more efficiently. . . . [and] [t]hey suffered fewer . . . injuries." PX 1126 (News article from TampaBay.com).

⁸ On October 14, 2020, plaintiff moved for judicial notice (ECF No. 555) of: (1) its assertion that TSA has had the authority since at least May 3, 2005 (issuance of U.S. Patent No. 6,888,460) to grant SecurityPoint sole access to all category X and I airport checkpoints to implement its patented method; and (2) its assertion that TSA has had the authority since the issuance of the '460 patent to charge a fee to recoup costs for security related expenses, including costs related to acquiring patented technology via a license. Plaintiff's motion is denied as not the proper subject for judicial notice.

⁹ On June 30, 2006, TSA and SecurityPoint entered into a Memorandum of Agreement ("MOA"), in which plaintiff was to provide TSA equipment (such as tables, bin carriers, and bins) at LAX "in order to assist TSA in providing more efficient and effective security screening operations at LAX." PX 1583 ¶ 3. (TSA/SecurityPoint MOA, dated June 30, 2006).

B. Events Leading to the Lawsuit

Because of the success of the two pilot programs, SecurityPoint was expecting TSA to approve its proposal. TSA, however, maintained its rejection of SecurityPoint's original offer. Nevertheless, the government began using the '460 method at airports nationwide, starting on September 1, 2005, at Washington Dulles International Airport ("IAD"), while using its own equipment. It did not execute a contract with plaintiff.

Seventeen months later, in January of 2007, TSA hosted an Industry Day event at which TSA solicited proposals from prospective vendors to furnish equipment, trays, and carts to TSA at security checkpoints. TSA's pilot program presentation proposed the following arrangement:

- 1) Vendors seeking airport advertisement opportunities will contact Airport Operators corresponding to the locations at which they wish to advertise;
- 2) Vendors then enter into an agreement with the Airport Operator;
- 3) The Airport Operator submits a proposal to TSA prior to the date designated by the Contracting Officer;
- 4) TSA evaluates all proposals received by the designated date; and
- 5) An MOA is executed between the TSA and the Airport Operator

PX 1578 (TSA Bin Advertising presentation, January 11, 2007). TSA specified the technical criteria for the equipment to be furnished, such as the required dimensions and materials for the bins, carts, and divestiture tables.

Having exhausted its efforts to market its method on an exclusive basis to TSA, SecurityPoint elected to compete with other vendors in TSA's solicitation. Eventually, SecurityPoint entered into separate agreements or memoranda of understanding ("MOUs") with airport operators for the right to place advertising on the trays, usually in exchange for a portion of that revenue.¹⁰

¹⁰ PX 1415 (Advertising contract chart prepared by Mr. Ambrefe listing the airports with which SecurityPoint contracted to provide trays and carts).

One of the other companies that submitted a successful bid to an airport operator in response to TSA's proposal process was the Adason Group, LLC. Adason won a contract to provide carts and trays to TSA at five airports in exchange for advertising access. In March of 2007, SecurityPoint sued Adason for infringement of the '460 patent. The suit resulted in a settlement in favor of SecurityPoint, with Adason paying a lump sum of \$650,000. Because Adason eventually went bankrupt, plaintiff only received roughly \$300,000. The suit underscored the difficulties SecurityPoint faced in competing against other companies that were offering what it alleged was its own invention.

Ultimately, plaintiff brought suit against the government in 2011, alleging that, beginning in 2005, TSA utilized carts, trays, and scanning devices at airport checkpoints in a manner that infringed the '460 patent. That led to more roadblocks in SecurityPoint's efforts to market the '460 method to other airport operators because TSA changed its MOU with airport operators in 2012 to require indemnification in the event of patent infringement, making it less appealing for airports to enter into agreements with SecurityPoint. Mr. Linehan testified that TSA's change to its MOUs was the "poison pill that stopped airports from signing up with us." Tr. 489:13-14.

C. Plaintiff's Proof of the Extent of Infringement

Plaintiff relies on four types of evidence to establish the extent of infringement: the parties' stipulations regarding infringement; TSA's use of Design Guides, which control the setup of security checkpoints; admissions by TSA employees; and expert testimony.

1. Stipulations of Infringement

While the parties disagree about the effect of the stipulations, the disagreement is ultimately immaterial. Plaintiff is correct that the stipulations establish use of the '460 patent on a continuous basis at each of the ten initial airports, beginning in January 2008 and continuing to the date of judgment. Given the improbability that TSA would set up different methods at the same airports for handling security screening, we find this concession highly relevant. Defendant is correct, however, that "continuous basis" merely means "at least once per day," as stated in the June 2013 stipulation. Defendant also cites to language from a 2011 discovery scheduling order issued during the liability phase of this action in which the court recognized that defendant did "not concede that the allegedly infringing

activities conducted at these airports are representative to establish infringement at the nation's other airports or to calculate damages." ECF No. 14 ¶ 2.

"At least once per day" thus merely provides a starting point for plaintiff's obligation to prove the extent of use of the '460 patent. Nevertheless, when viewed in light of the inherent difficulties plaintiff had in proving use, we treat defendant's concession as allowing the court to assume that, in the absence of evidence to the contrary, "once a day" was not an unusual occurrence. I.e., that the stipulations point to a regular practice.

2. TSA's Design Guides

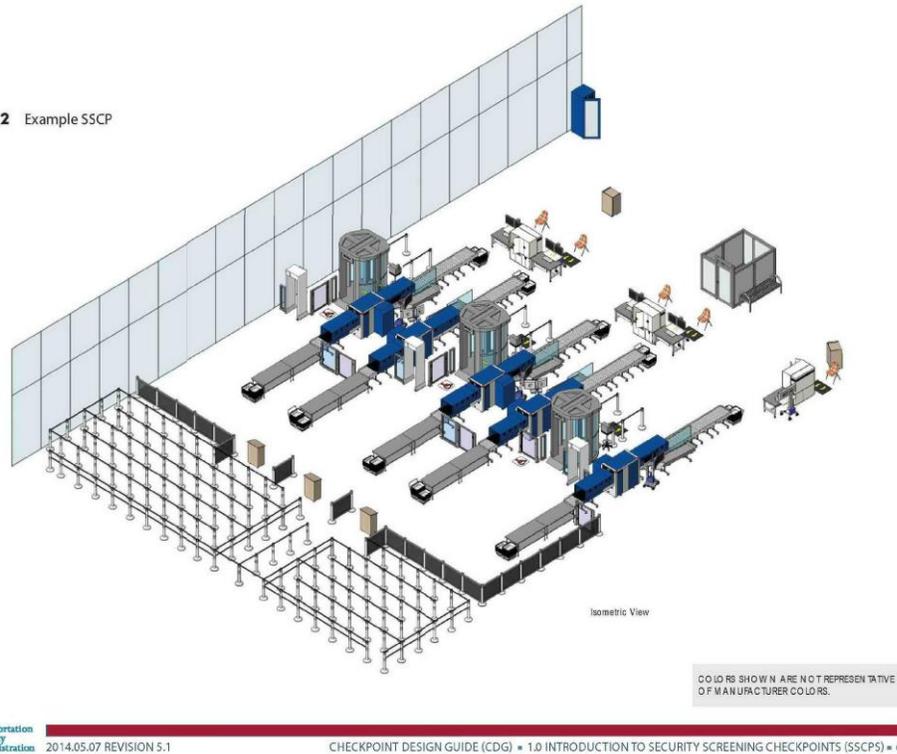
TSA is responsible for control of the design of airport security checkpoints. It therefore periodically issues or updates Checkpoint Design Guides ("CDGs") which direct the configuration of airport security lanes at all Cat X and Cat I airports. Plaintiff contends that these guides, which airport designers are required to use in laying out security screening checkpoints, are proof that use of plaintiff's patent is built into the very structure of virtually all screening lanes.

Mr. Arroyo had experience with the use of CDGs in the layout of airport security checkpoints and relied on CDGs when he worked for TSA because they "laid out the principal parts of a screening checkpoint." Tr. 711:12-13. CDGs specify checkpoint operations, as well as optimized checkpoint configurations.

Mr. Dale Mason, a program analyst with the Operational Improvements Branch of TSA, testified that, "The primary functions of the [design] guides are basically for airport architects and program managers to have some guidance on when they're building a new checkpoint and for our system integrators to have some guidance if we are integrating new equipment into the security checkpoint." Tr. 2265:25-2266:5. When asked if CDGs are the "bible" for reconfiguration and construction of processes at Security Screening Checkpoints ("SSCPs"), Mr. Mason replied, "yes." Tr. 2261:24-2262:1. He also confirmed that compliance with the CDG is mandatory.

TSA published new design guides in 2009, 2014, 2016 and 2020. The following diagram from the 2014 CDG is illustrative:

Figure 1-2 Example SSCP



2014.05.07 REVISION 5.1

CHECKPOINT DESIGN GUIDE (CDG) • 1.0 INTRODUCTION TO SECURITY SCREENING CHECKPOINTS (SSCPs) • 6

PX 1543 at 6. Notably, the 2009, 2014, and 2016 CDG’s all contain the same figure depicted above of a security screening checkpoint with trays and carts at the proximate and distal ends of lanes. The 2020 CDG also depicts a similar checkpoint configuration with trays and carts at the proximate and distal ends of lanes.

Plaintiff provided a chart comparing claims 1, 2, 3, 4, 6, 7, 8, 9, 12, 13, 14, and 15 of the ‘460 patent to language in the guides, which we find a fair use of both. An excerpt from the chart highlighting claim 1 appears in plaintiff’s post-trial brief:

Claim 1	Design Guides
<p>A method comprising: positioning a first tray cart containing trays at the proximate end of a scanning device through which objects may be passed, wherein said scanning device comprises a proximate end and a distal end,</p>	<p>“A fully loaded bin cart should be located at the start of the divest tables on the non-sterile side of the lane awaiting passenger pick up.” (See PX 159 at 26; see also PX 1543 at 24; see also PX 1173 at 36) “Bin carts are similar to a hand cart or dolly to transport a large number of bins without requiring excessive</p>

	<p>lifting or carrying by a TSA agent from the X-ray extension rollers on the sterile side of the lane to the divest tables on the non-sterile side of the lane.” (<i>Id.</i>)</p> <p>“Each lane requires at least two bin carts per lane and TSA recommends maintaining about 60 bins per lane.” (<i>Id.</i>)</p> <p>Carry-on bag screening “can be accomplished by three different types of x-ray equipment ...” (<i>Id.</i>)</p> <p>Carry-on bag screening includes a “[s]canning [b]elt.” (<i>Id.</i>)</p>
removing a tray from said first tray cart,	“Bins are the gray containers at the front of the checkpoint lane used for divesting of passenger personal belongings such as purses, carry-on bags, backpacks, laptops, shoes, coats/jackets, etc.” (<i>Id.</i>)
passing said tray through said scanning device from said proximate end through to said distal end,	“Feed the passenger bins to the scanning belt at the infeed tunnel.” (<i>Id.</i>)
providing a second tray cart at said distal end of said scanning device,	“The other bin cart should be positioned at the end of the roller tables on the sterile side so that the TSA agent can collect empty bins after passengers have picked up their belongings.” (<i>Id.</i>)
receiving said tray passed through said scanning device in said second tray cart, and	“The other bin cart should be positioned at the end of the roller tables on the sterile side so that the TSA agent can collect empty bins after passengers have picked up their belongings.” (<i>Id.</i>)
moving said second cart to said proximate end of said scanning device so that said trays in said	“TSA recommends that bin carts are pushed upstream against passenger

second cart be passed through said scanning device at said proximate end	flow through an ADA gate by a TSO.” (<i>Id.</i>) “In the past, bin cart [sic] transport by TSOs was a primary cause of on-the-job injuries. Hand-carrying of bins is no longer endorsed by TSA.” (<i>Id.</i>)
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Pl.’s Post-Trial Br. at 14-15.

Dr. Jacobson analyzed the claim limitations of the ‘460 patent in view of the language found in the CDGs and concluded that every limitation in claim 1 was met. Similarly, Dr. Jacobson compared the dependent claims of the ‘460 patent with the design guides and came to the same conclusion that each limitation of the ‘460 patent was met by the language in the design guides.

The 2009 CDG (PX 159) was the first guide to depict trays and carts in a diagram of a checkpoint.¹¹ Dr. Jacobson “went to the [‘460’s] patent description to see how the information was in line with it” and concluded that TSA’s 2009 CDG (PX 159 at 77, Security Checkpoint Diagram) and the ‘460 patent “were exactly in line.”¹² Tr. 993:15-23. He explained that the only method the CDGs provided for moving trays from the sterile side to the non-sterile side of checkpoints was by tray cart, as called for in the ‘460 patent.

¹¹ The 2006 guide (PX 158) did not include a diagram, but instead referenced a tray return system and stated that TSA was considering different options for processing trays: “At this time, there is no single TSA standard bin return system to eliminate the need for TSOs to lift and carry bins; two possible systems which can be considered are a roller/slide system and a non-metallic bin cart system.” PX 158 at 16 (TSA’s 2006 CDG). From this, Dr. Jacobson inferred that TSA was debating which type of tray management systems to employ in 2006.

¹² In describing instructions in the 2009 CDG regarding how bin carts should be used, Dr. Jacobson testified, “In particular, it recommends the bin carts are pushed upstream. On gates, passengers flow through the ADA gate by a TSO. So it shows also the flow of the bin carts and it also explicitly says that there should be at least two bin carts per lane.” Tr. 993:9-14. Dr. Jacobson identified where trays and bin carts were located in TSA’s 2009 CDG showing an optimized security screening checkpoint that was consistent with the ‘460 patent.

He also testified that he was unable to find any deviation permitted from the trays and carts method in the design guides. Dr. Jacobson's review of the 2020 CDG showed that the placement of tray carts was the same as shown in the previous design guides diagrams. Thus, in Dr. Jacobson's view, the CDGs called for infringement of the '460 patent.

In post-trial briefing, defendant argues that the CDGs say nothing about the last step of the patent, namely, moving said second cart to the proximate end. We disagree. The CDG guidelines state that, "TSA recommends that the bin cart be pushed upstream through the ADA or access gate. Upstream is bringing [a bin cart] back out to the non-sterile area at the beginning of the screening checkpoint process." Tr. 833:5-8. The 2009 design guide is illustrative:

In the past, bin cart transport by TSOs was a primary cause of on-the-job injuries. Hand-carrying of bins is no longer endorsed by TSA. TSA recommends that bin carts are pushed upstream against passenger flow through an ADA gate by a TSO.

PX 159 at 26 (TSA's 2009 CDG); *see also* PX 1173 at 36 (TSA's 2016 CDG); PX 1543 at 24 (TSA's 2014 CDG). As Mr. Arroyo explained, there is no option other than

to bring [a bin cart] back to the proximate end of the screening checkpoint. You are not going to leave it in the metal detector or in the ADA lane. You have to push it all the way upstream to bring it out to the proximate end of the nonsterile area, where the trays will be available and accessible to passengers.

Tr. 833:24-834:5.

A logical inference is that the reason the carts are "pushed upstream" is to return the trays to the proximate end of the scanner, thus accomplishing the last step of Claim 1. We find that the CDGs teach all the steps of the '460 method.

The question remains whether the CDGs actually controlled security lanes at airports. Mr. Arroyo testified that approval from headquarters was necessary to deviate from the configurations published in the CDGs: "[W]hatever we proposed I would submit to headquarters to get approval so that . . . we could move forward with it." Tr. 712:13-15. When asked if a FSD has the discretion to move ancillary equipment, Mr. Mason replied,

“No.” Tr. 2296:7. Mr. Mason also testified that he was familiar with TSA’s 2020 guide, confirming TSA employees did not have discretion to vary the layout of checkpoints. Mr. Mason testified that the only method the CDGs portrayed for moving trays from the sterile side to the non-sterile side of checkpoints was by tray cart.¹³

Dr. Jacobson explained that the Checkpoint Design Guides:

gave me the standardized optimized security checkpoint configuration . . . [and] made it very clear that if there were any deviations from this optimized security checkpoint configuration, it would require . . . [an] approval process, through the TSA headquarters . . . So there was a process put in place for deviations from the design guide.

Tr. 988:10-15, 18-19.¹⁴

In response, defendant argues that “the guides do not govern *operation* of the Checkpoints; local TSAs can and do deviate from the arrangements disclosed in the Guides during operation.” Def. Post-Trial Br. at 43 (emphasis supplied). Citing TSA’s 2001 CDG, defendant asserts the CDGs merely are for “planning and design of new or expanded airport facilities.” PX 1546 at i. Defendant further argues that, once operational,

¹³ Mr. Mason replied “no” when asked, “in the course of redesigning a checkpoint, if a local TSA wants to move ancillary equipment, would they need to seek TSA approval or headquarters approval?” Tr. 2302:3-7. He also testified, however, that local TSA personnel do not have discretion to change the layouts called for by the design guides; we assume that discretion was limited to accommodating the default design to minor obstructions.

¹⁴ The government moved to exclude Dr. Jacobson’s testimony as it relates to the CDGs because he was never employed by TSA and had no prior knowledge of the CDGs before working on this case. We reserved ruling until after trial. We accepted Dr. Jacobson as an expert and a person of ordinary skill in the art with regard to the ‘460 patent based on his extensive experience on aviation security matters. His work with the FAA, research and writing of 188 published articles on aviation security, as well as his work in airport baggage screening, which led to the establishment of TSA precheck, demonstrates his generalized knowledge and skill in the field of airport security operations. We find that Dr. Jacobson was qualified to opine on how the instructions for checkpoint design in the CDGs read on the claims of the patent.

airport checkpoints do not necessarily display all elements of a checkpoint as depicted in the CDGs. It cites Mr. Mason's testimony:

[T]here's 440 airports out there, 2200 and something lanes. If I had an optimal space and the airport said, Dale, what do you need to make this perfect, I would say do that, but because we are often . . . retrofitting checkpoints, we have to deal with column issues, expansion joints, ceiling heights . . . So we have to make sure that we adjust the hard equipment and the ancillary equipment to fit . . . and we do our best with the space that we're provided

Tr. 2273: 2-12.

At no point did defendant's witnesses explain how column issues, ceiling heights, and expansion joints materially affected the design templates' function as the default design. Although defendant hints that the preferred checkpoint configurations might not always be used, it offered not a single example in which a non-complying design was used; no evidence was offered of instances in which equipment was relocated in a way that the patent would not be infringed. We are persuaded that, if there were deviations in practice, they amount to minor tweaks of the location of trays or carts, not deviations from the use of the patented method. We find that the CDGs are strong proof of comprehensive use of the '460 patent at all Cat X and Cat I airports.

3. Admissions by TSA Employees

Plaintiff also relies on statements from TSA employees and one defense expert to confirm comprehensive use of its patent.¹⁵ Scot Thaxton, Deputy FSD for Arizona, has seventeen years of experience working for TSA. He testified that, after the LAX test in 2006, TSA headquarters agreed to allow FSDs from individual airports to use the '460 method under a Memorandum of Understanding ("MOU"): "headquarters made the decision at that point that if other [airport] locations wanted to advance it under the MOU, it would be up to the FS[D]." Tr. 532:11-13. He also affirmed that he personally recommended that TSA headquarters use SecurityPoint's method. Mr. Thaxton also testified about why he supported using the '460

¹⁵ The expert statement relied on was from Mr. McGavock. We agree with defendant, however, that plaintiff took the statement out of context. It was merely an assumption made for purposes of valuing the hypothetical license and not an independent opinion on infringement.

method. “My recommendation . . . I saw Doug and Joe as small business owners advancing, they could reduce the cost for the taxpayers of not having to buy tables and carts and replenish bins, and I thought it was viable.” Tr. 533:2-7.

Plaintiff also cites Ben Sears’ deposition, accepted in lieu of live testimony at trial. Mr. Sears is a TSA program manager with TSA’s Innovative Task Force, where he manages demonstrations of new technologies. Mr. Sears testified as a Rule 30(b)(6) deponent that he was unaware of a single Cat X or Cat I airport that did not infringe the ‘460’s claimed methods. Mr. Sears stated that TSA continued to use the ‘460 method at the conclusion of the LAX pilot program. While defendant attempts to minimize the import of his testimony by suggesting that it was beyond the scope of his Rule 30(b)(6) designation, we disagree. He was testifying as to his knowledge of facts, and those facts related to his proffered area of testimony—the benefits conferred on TSA by use of the carts and trays methodology.

Plaintiff also relies on a TSA slide presentation produced by its Arizona’s senior leadership. In it, Ms. Sulynn Shepherd, a TSA Safety and Occupational Health Specialist in Arizona, explains why Phoenix Sky Harbor Airport was implementing a new system for managing trays and carts at security screening checkpoint and how the new system would work. PX 1554 at 00:34-00:40 (TSA slide presentation titled “Phoenix Sky Harbor Hand Truck with Mini Pallet,” dated April 16, 2018). Ms. Shepherd states:

The change is going to be the process and the vehicle in which bins are replenished to the passenger divestment area. The question may be asked ‘why are we changing this process?’ Currently, TSA is infringing on a utility patent. We will institute a new process that assures we will no longer infringe on that patent. Phoenix senior leadership volunteered to lead the field to help break the infringement.

PX 1554 at 00:25-00:51.

In other words, the reason Phoenix Sky Harbor began using the moveable pallet cart was concern about infringing the ‘460 patent. We count it highly unlikely that a “once a day” use would trigger a wholesale change of operation. Mr. Sears’ testimony that he was not able to identify even one instance of an airport that did not use the patented method is a strong indication that the method was used universally. The statement was made in the context of Mr. Sears’ testimony as a TSA representative that TSA

continued to use the '460 method after the conclusion of the pilot program. Likewise, Mr. Thaxton's testimony suggests that, at least in his experience, there was wide-spread infringement of plaintiff's patented method.

4. Expert Testimony

At trial, plaintiff called Dr. Jacobson to opine on the extent of TSA's unauthorized use of the '460 patent. Dr. Jacobson works in the Department of Statistics at the University of Illinois as a professor of computer science and industrial engineering. He began work on aviation security issues in 1995, advising the FAA on aviation security through 2016. The court accepted him as an expert in the operation of security screening checkpoints. Based on TSA Checkpoint Design Guides, the parties' stipulations of infringement, and the deposition testimony of Mr. Mason, he concluded that, "there is widespread universal infringement of the '460 patented method by the TSA." Tr. 964:9-11. He also found that the '460 patent is:

practiced by the Transportation Security Administration, and by practicing this method, passengers . . . benefit from this because ultimately every decision that the TSA makes at a checkpoint is designed to enhance the safety, security and efficiency of the operation . . . So ultimately what I found is that there was tremendous benefit to practicing the method in safety, security, as well as efficiency.

Tr. 987:14-24.

At trial, in response to a question about the existence of "any evidence that TSA has not practiced the method of claim 1 of the '460 patent at any time from January 1, 2008 through the present," he replied, "I found no evidence to refute that belief." Tr. 1070:5-8. As it relates to the asserted dependent claims, "which are claims 2, 3, 4, 6, 7, 8, 9, 12, 13, 11 14, and 15, did you form any opinions as to the extent of TSA's infringement of the asserted dependent claims of the '460 patent?" Dr. Jacobson replied that, "these are once again supported by the design guides and there is no evidence to suggest that they would not be practiced." Tr. 1070:10-18.

At trial, Dr. Jacobson was also asked about his understanding of the parties' executed stipulation regarding proof of liability under 28 U.S.C. §1498. As it relates to the parties' November 2012 stipulation, Dr. Jacobson testified:

As I reviewed the '460 patent, as I said before, I was trying to establish infringement and the extent of the infringement, and what this informed me is that when the TSA chose to practice the '460 method, that was a decision that they had to make, and they committed to that decision ultimately by putting it in the security -- in the design guides. In these design guides, it provides an optimized security checkpoint . . . but by adding the stipulation in, the agreement is that a continuous basis means once the commitment is made, it is applied uniformly, continuously and universally to the airports which are designated here as stated[, relating to 10 airports.]

Tr. 1029:3-15.

Dr. Jacobson was asked if he was “aware that at some point in time the court expanded the inquiry of the present case [from 10 airports] to other Cat X and Cat I airports” and if he had “look[ed] for any evidence to see whether TSA follows different procedures at the 10 airports that are the subject of PX 811, the stipulation, and the other Cat X and Cat I airports.” Tr. 1029:19-21; 1029:24-1030:2. He replied, “[t]here is perfect consistency based on the design,” indicating that TSA’s CDGs provided support to infer that the same infringement which occurred at the 10 airports listed in the stipulation was occurring at other Cat X and Cat I airports. Tr. 1030:3-4. Dr. Jacobson concluded that, based on Checkpoint Design Guides, there is no reason why the infringement that TSA admitted to at 10 Cat X airports should not also apply to the other Cat X and Cat I airports.

Overall, Dr. Jacobson found that, based on the evidence provided in the design guides, Mr. Mason’s testimony, and the parties’ stipulations, TSA’s infringement of claim 1 of the '460 patent is “widespread and universal based on all the information and documentation that I had available to me.” Tr. 1070:2-4.

Rather than countering Dr. Jacobson’s testimony with expert testimony of its own, defendant objects to Dr. Jacobson’s testimony on the basis of his qualifications concerning the design guides:

The only support for its contention besides the guides themselves is the testimony from Dr. Jacobson who has never worked for TSA and had never seen a Design Guide before this litigation.

Def.’s Post-Trial Br. at 9-10.

As we explained above, Dr. Jacobson has extensive experience with airport security and we view him as competent to interpret the design guides and apply them to the method of the patent. In addition, while his testimony is in some respects merely a recitation of the three items of proof addressed above, we find his testimony persuasive in terms of whether any other methods than the patented one has been used during the relevant period at TSA-controlled airports.

5. Summary of Plaintiff's Proof of the Extent of Infringement

We find that plaintiff has carried its burden of proving that, with certain exceptions we lay out below, its patent was universally used as the default method for all lanes at all Cat X and Cat I airports. While this finding is warranted based on the stipulations, CDG Guidelines, admissions, and expert testimony, it is particularly appropriate in light of the virtually impossible task plaintiff had of quantifying use. Unlike plaintiff, defendant had the advantage of virtually unrestricted access to TSA lanes and was the party best able to preserve the relevant metrics. This was particularly the case after plaintiff put TSA on notice as early as 2005 of its claims of infringement. In retrospect, defendant's resistance and ultimately inability to comprehensively and in detail provide responses to plaintiff's discovery requests may have been understandable due to the complexity and cost involved. As we will see below, defendant itself undertook a small-scale effort at determining usage of the patented method, and, in our judgment failed, in part because the study was limited to a brief period of time and a limited number of airports. Even though we reject, below, the methods employed in the survey, it serves to illustrate as well that plaintiff would never have been able to offer proof of past usage comparable to the detail of Mr. Tarakemeh's data.

It is worth clarifying, in view of one of defendant's arguments with respect to damages, that we find defendant infringed the method of the patent. It did not use the tables, trays and carts which plaintiff offered at no cost as part of its unsuccessful solicitation. Although it could have obtained them for free if it had contracted with plaintiff, TSA purchased those itself while infringing the patent.

In sum, we find that plaintiff has carried its burden of proving that its patented method became the default means used by TSA for screening passengers at security checkpoints at all Cat X and Cat I airports. It becomes defendant's obligation to prove that use was not universal.

D. Potential Exceptions to Use of the Patented Method

Defendant made little attempt to challenge plaintiff's evidence as to comprehensive widespread use of the '460 patent. Instead it argues that plaintiff's evidence camouflages non-use as use by indiscriminately treating all passenger throughput as if it were use of the patent. Defendant contends that proof of use requires distinguishing between the movement of passengers through a checkpoint and their belongings to determine whether a given passenger is exclusively utilizing trays for divestiture and whether those trays return to their point of origin. Only if a passenger exclusively divests his or her items onto trays obtained from the proximate end, as defined by defendant, and then that tray of items is scanned without interruption, and the passenger reassembles his or her belongings and places the tray onto a cart that returns to the point of origin is that viewed by defendant as evidence of infringement. Any break in this chain, for example if a passenger obtains a tray from another lane, or places an item directly on the scanning belt, or if a TSA screener removes a tray for closer inspection, or if a cart is returned to another lane, would, according to defendant, mean the patent is not being used.

In order to establish these examples of non-use, defendant offered the testimony of Mr. Tarakemeh, who has been an operations research analyst at SAIC since 2014. Mr. Tarakemeh was engaged to conduct a study of what he viewed as use, or not, of the patent at airport checkpoints. During the study, Mr. Tarakemeh visited 36 airports in 2018 and 2019 for the purpose of determining the extent to which all the steps of the '460 patent were actually used. As we explain in more detail below, Mr. Tarakemeh was not merely counting the number of passengers going through a checkpoint. Instead, he broke the various elements of the movement of passengers and their belongings into a number of events mimicking the steps of the patent. If a passenger used three trays, for example, he kept track of the number of trays and items going into the trays. He also attempted to trace the source and destination of trays and bin carts. For example, he observed that carts sometimes were shared between adjacent lanes and that sometimes trays were removed for additional screening. He viewed each of these events as potential "attrition points" because, in his view, they broke the chain of use of the patented method. He employed a team of surveyors to monitor and quantify all these events.

He concluded that the patented method was actually used by less than 20% of passengers in normal lanes, and less than 1% of the time in lanes designated as "PreCheck lanes." From this, defendant concludes that the court cannot accept universal comprehensive infringement as an established

fact. In addition, even if the court finds the government liable for infringement, defendant argues that the Tarakemeh study demonstrates that plaintiff's preferred damages metric—passengers—is inappropriate.

1. Mr. Tarakemeh's Airport Study

Mr. Tarakemeh has a bachelor's degree in systems engineering and a master's degree in operations research.¹⁶ He has worked on a TSA contract since beginning his work at SAIC in 2014. Mr. Tarakemeh tests procedures and equipment used at airport security checkpoints and baggage areas to ensure that they meet safety requirements. He testified as an expert in operations research analysis and the use of the tray and cart method in security checkpoints. Dr. Barnett, another of defendant's experts, then used Mr. Tarakemeh's raw data from the 36 sampled airports for the eight-month period and extrapolated an overall usage rate for the additional Category X and Category I airports and for previous years.

Mr. Tarakemeh identified four phases in a passenger's progress through a security screening checkpoint ("SSCP"): 1) the divest phase, where passengers are able to place their items in trays or directly on the scanner belt; 2) the scanner phase, from which trays can be diverted for additional screening; 3) the recompose phase, where passengers retrieve their items and dispose of trays; and 4) the cart phase, at which bin carts are recirculated to the beginning of a lane.

Essential to Mr. Tarakemeh's analysis is the assumption that the patent calls for a "closed loop" in the circulation of trays and carts, i.e., staying within a single lane. If either trays or carts, or both, cycle through a different lane, then the patent was not being used.

At the divest phase, non-use could occur in a number of ways. If a passenger did not use a tray at all, that became a "zero" use. If, as was sometimes the case, TSA placed a bin cart between two lanes so that trays could be retrieved from two directions (something Mr. Tarakemeh referred to as a "bin island"), that also constituted zero use at the divest phase.

¹⁶ On December 23, 2019, plaintiff filed a motion *in limine* to exclude Mr. Tarakemeh's opinions. ECF No. 433. On February 20, 2020, we denied plaintiff's motion. We did not reach plaintiff's substantive criticisms, as none of plaintiff's contentions would disqualify him from testifying. The objections went to the weight afforded his opinions and the sufficiency of the data, but not his qualifications.

Similarly, if there was one tray cart per lane, but the cart was placed more than five feet away from the proximate end of the divesting table, he viewed that as non-use. As he explained it, if a passenger had to take a “pivot step” to retrieve a tray, that meant the tray was not at the “proximate end” of the lane, as contemplated by his view of the patent. Because Mr. Tarakemeh also tracked the number of items divested, if a passenger simply placed an item on the conveyer belt without using a tray, that became an instance of non-use, although he expressed that as a percentage for that phase, reflecting the total number of items divested.

At the scanner phase, SAIC data collectors tracked whether trays or items were removed from the scanner belt by TSA inspectors and taken to a separate secondary screening. Even if the item or tray was returned to the belt for retrieval by the passenger, Mr. Tarakemeh’s data collectors were instructed to treat that as an instance of non-use of the patent. In his view, this was an additional step that broke the link in patent infringement.

At the recompose phase, if a passenger picked up a tray and went into an overflow area to recompose, but the tray did not end up in the cart at the distal end of that same lane, that was counted as non-use. In other words, the tray was not returned to the cart at the distal end to be returned to the proximate end. He also applied the same five foot “pivot step” inquiry at the distal end.

Finally, at the cart phase, Mr. Tarakemeh tracked whether TSOs returned carts to the proximate end of the same lane. If the second cart was returned to the proximate end of a different lane through a crisscross movement, that was counted as non-use because the patent envisioned a closed loop within one lane.

Mr. Tarakemeh defined the overall observed usage rate as the ratio of the total number of trays observed moving in accordance with the ‘460 method to the total number of items scanned by the scanner machine. Table V-1 presents the overall observed usage rate broken down by lane type.

Table V-1: Overall observed method usage rate

Lane Type	@ Divest	@ Scanner	@ Recompose	@ Cart	Overall observed method usage rate
Mixed	38.4%	96.2%	73.3%	70.8%	19.2%
Pre-Check	2.9%	97.0%	35.8%	20.1%	0.2%

DX 1683 at 5.

The overall observed usage rate above is obtained by multiplying the usage rates observed at the four phases. At mixed lanes (a standard checkpoint lane) the overall observed rate was 19.2 percent. At Pre-Check lanes, the rate was 0.2 percent. As the court understands his analysis, in the results for “mixed” lanes above, one could not assume a minimum of 38.4% infringement based solely on the divest phase results, because using a tray at the divest phase in a way that infringed the patent might end up with the same tray, for example, being sent to the wrong lane, resulting in non-infringement.

The most basic critique plaintiff lodges against the Tarakemeh study is that it is designed to capture the steps of the patent used by a single passenger, and it is not, as it should be, focused on TSA’s creation of security lanes which are set up with the purpose of using the steps of the patent. In other words, TSA has established a security screening process which, in normal operation, continually violates the patent, even if a particular passenger does not, for example, make use of trays. Everyone who passes through a security check point benefits from increased efficiency, and therefore focusing on a complicated means of isolating specific instances of non-use of trays is pointless. According to plaintiff, simply operating the lane itself, irrespective of how any one passenger chooses to use trays, constitutes the infringement.

Defendant replies that the ‘460 patent relates to a system for the movement of items, not people: “a tray and a system that can be used . . . to provide efficient movement of loose items . . . from a starting point to an ending point.” JX 1 at col. 5 ls 27-30. Because the patent mentions items, defendant argues, items are the proper metric of infringement.

This disagreement illustrates why the court asked for additional briefing on how the parties expect the court to use the Tarakemeh study. After briefing, it became apparent that defendant did indeed seek to call into question plaintiff’s assertion of comprehensive infringement, but defendant’s alternative, and in some respects more important point, was that Mr. Tarakemeh’s work shows why plaintiff’s royalty calculations, which rely on passenger volume, are artificially inflated. In other words, even if the court has reservations about the precision of the Tarakemeh study, defendant argues that Mr. Tarakemeh was correct to shift the court’s focus to screening items, and not people. We will reserve for the discussion below the resolution of how to use his study, assuming it is otherwise relevant and reliable.

Plaintiff has three other objections to the study which are of a type: they all amount to contentions that Mr. Tarakemeh has misconstrued the patent by adding steps in some way. The first concerns the exclusion of instances of passengers taking a “pivot step” in either picking up a tray or disposing of a tray. Collectors were told to estimate when the bin carts were positioned more than five feet away from the divesting table or more than five feet away from the end of the recomposing table. Plaintiff contends that not only is the term “pivot step” not found in the ‘460 patent or the court’s claim construction, but that the term lacked precision; there was no way for data collectors objectively to assess whether a passenger took a “pivot step.”

For reasons set out in the discussion below, we agree with plaintiff that the limitation of not making a “pivot step” is not present in the patent, hence this deduction point is invalid. Even if it were, we think the metric is too subjective to be taken into account.

Plaintiff also argues that exclusion of lanes making use of bin islands was improper. Here, however, we agree with defendant’s assumption that this forms a relevant inquiry. As Mr. Tarakemeh’s study revealed, there were occasions during his eight-month study in which lanes shared bin carts. As we explain below, whether at the proximate or distal end of a lane, use of such bin islands constitutes a different method than the one covered by the ‘460 patent because the trays circulate across lanes. While plaintiff points out that there is no evidence that bin islands were in use before 2018, that merely factors into how the court will calculate damages. We note, however, that defendant gave us no readily measurable way to extract instances of bin island use or crossovers.¹⁷

The third attrition point to which plaintiff objects is that related to secondary screening. Mr. Tarakemeh’s data gatherers were instructed to record instances of trays being removed for secondary screening as non-use at the scanning phase, unless they saw the tray returned to the recompose table. Mr. Tarakemeh instructed his observers to count those instances of secondary screening as non-use, which resulted in approximately 3% non-infringement at that point. While Mr. Tarakemeh testified that he attempted to account for trays that returned to the lane after being pulled for secondary screening, he also testified that trays were not tracked from start to finish. We are unpersuaded by this methodology because, without knowing whether a tray departed the lane, the trackers would not know whether the method

¹⁷ While at the distal end it appears that the only reductions relate to cross-over or bin islands, the same is not true at the proximate end.

was practiced as it regards a particular tray, even assuming that was a relevant metric to count infringement.

Plaintiff's remaining critiques concern the mathematics of the study. For example, plaintiff argues that items being tracked at the four phases are different from each other, leading to an incoherence when the results are combined. At phase one, two, and three, the study tracks trays and items. At phase four, only carts and trays are tracked. Plaintiff also argues that the SAIC study artificially amplifies the instances of non-use because a passenger's use of single tray can result in multiple instances of non-use. If a bin cart was located six feet away from either the distal or proximate end of a screening lane, each tray could be an instance of non-use at the divesting and recompose phase. If the passenger put a knapsack on the conveyor belt in addition to the tray, that became another partial non-use at the divesting phase. If a tray was removed for additional screening, that became an instance of non-use during the scanner phase. Tracking individual non-uses thus creates the potential that a single passenger can account for multiple instances of non-infringement.

Disagreement between the parties' experts as to whether the SAIC calculations are a meaningful way to measure use of the patented method generated a lively debate. If we understand Dr. Barnett's explanation correctly, these phenomena do not skew the results because the calculations are done independently for each phase. The results for any one phase, based on thousands of data points, are accurate and meaningful, in his view. Plaintiff's expert, Dr. Jacobson claims that, because of the study's faulty design, it cannot be corrected, and thus it is completely unreliable. The court also had its own concerns, which we believe were not satisfactorily explained by Dr. Barnett as to the multiplier effect of "zero" usage at any given phase.

In the final analysis, however, we believe it is unnecessary to attempt to harmonize the expert's views on the reliability of measuring non-infringement in the way that Mr. Tarakemeh and Dr. Barnett attempted. Once we remove those asserted instances of non-infringement that Mr. Tarakemeh improperly applied, the results as a whole are compromised. We recognize, however, that the use of bin islands or tray cart crossovers is some evidence that plaintiff's method was not utilized at all times at all screening points.

What is also true is that Dr. Barnett's data was gathered from 36 airports representing only 60 percent of air traffic and extrapolated to the remaining airports. More important, he extrapolated from an eight-month period from 2018 to 2019 backward across a thirteen-year period, assuming

the same conditions. That is particularly problematic given the recent introduction of bin islands.

2. TSA PreCheck Lanes

A related but separate instance of non-infringement which defendant offers concerns the use of PreCheck lanes. Beginning in 2011, TSA began offering expedited screening lanes at some airports. The purpose of PreCheck is to expedite the screening process for passengers who have successfully completed TSA's background investigation.¹⁸ TSA PreCheck lanes allow passengers to "experience a smoother screening process—no need to remove shoes, belts . . . laptops, or light jackets" versus TSA's standard security screening lanes which require removing coats, shoes, laptops, and other items before proceeding through security.¹⁹ Instead, personal items may be placed directly on the scanning belt, without a tray, as is the case in the instance of not removing a laptop from its carrying case or passengers keeping their shoes and jackets on. In other words, when passengers use TSA PreCheck lanes, they do not divest as many items into trays on the scanning belt as they would in standard security lanes.

Defendant argues that PreCheck lanes do not infringe the '460 method. Defendant reasons that passengers in a PreCheck lane do not need to use a tray for their belongings because passengers are required to remove fewer garments and are able to leave items in carrying cases. As a result, fewer items pass through the scanning device in trays as taught by the claims of the '460 patent. It relies on the Tarakemeh study to quantify the extent of infringement at PreCheck lanes. By "use," Mr. Tarakemeh means that a given passenger places all divested items on a tray that cycles through the security lane. If a passenger placed any items directly on the belt, even though using a tray for some items, he treated that as non-use. From this he concludes that the method is used less than 1% of the time in PreCheck lanes.

Plaintiff takes the position that, even though passengers often may not use trays in PreCheck lanes, the relevant fact is that TSA has set up all lanes, including those employing PreCheck, to use the patented method. It is not the passenger that violates the patent; it is TSA that infringes by positioning carts at both ends of the scanning devices and using them to recycle trays.

¹⁸ TSA's website concerning TSA PreCheck, <https://www.tsa.gov/precheck> (last visited Aug. 3, 2021).

¹⁹ *Id.*

As we discuss below, we agree with plaintiff that the relevant fact is that the lane is set up and operated in a way that infringes the patent. The fact that few passengers make use of trays we view as relevant not to infringement but to calculation of a royalty.

3. Automatic Screening Lanes

It is undisputed that in 2016, TSA implemented, on a limited basis, a completely new means of returning trays called “Automated Screening Lanes” or “ASLs.” These involve lanes in which carts are not used at all, and trays are automatically returned on a conveyor belt. They involve oversized trays which are labeled for tracking purposes within the scanner. There is no question that they do not employ the ‘460 method. Atlanta is the only airport with ASLs in every lane. Plaintiff’s damages expert estimates that over 100,000,000 passengers have been screened using such lanes and that implementing ASLs universally would cost hundreds of millions of dollars.

E. Findings Related to Damages

Plaintiff argues for use of a running royalty based on passenger throughput. Plaintiff’s evidence that 7,660,935,659 passengers went through screening lanes at Cat I and Cat X airports between 2008 and 2018 is unrebutted.

Another relevant factor in calculating damages is the extent to which plaintiff granted an implied license to TSA to use its patent at certain airports covering specific periods of time. In the discussion section below, we consider the parties’ competing evidence and argument concerning the scope of that implied license.

Also discussed below, defendant argues that, assuming liability, damages should be determined based on a lump sum royalty. The key factor it relies on in advocating for a lump sum is its allegation that there existed an acceptable, non-infringing alternative to plaintiff’s patented method at the time the parties would have conducted a hypothetical negotiation—the one-cart method or moveable pallet cart system (MPC) adopted in Arizona. The availability of such a non-infringing alternative would have limited the amount that TSA was willing to pay at the hypothetical negotiating table.

Mr. Thaxton, a seventeen-year TSA veteran and a Deputy FSD, designed the MPC system and implemented it in Phoenix Skyharbor Airport in 2018 as a way to avoid using plaintiff’s patent. TSA first started using the MPC system in March 2018. Instead of using two movable tray carts that

function both to store and move trays, the MPC used a modified tray to become a “mini-pallet”²⁰ that functions as a “base unit” in which other trays are nested and stored. A single two-wheeled dolly is then used to pick up the mini-pallet and accumulated trays from the distal end of the screening lane and move them to the proximate end. The mini-pallet does not have wheels. While it can be picked up or slid, as a practical matter, it is not designed to move independently of the dolly. The dolly, in effect, serves a purpose not unlike the plaintiff’s tray carts, although the MPC uses only one dolly per security screening lane. In contrast, the patent requires two carts.

Mr. Thaxton testified that in 2018 he assembled the various elements of the MPC from local hardware stores. He explained that the “Dolly Pal” component is currently a “stock item” that is “off-the-shelf,” Tr. 2167:16-17; although he also testified that it was not commercially available in 2005. “I don’t think they produced it until 2010.” Tr. 2168:15-16. Mr. Thaxton testified that it took him only a short time to assemble the one cart system. As he said, “it was kind of a no-brainer.” Tr. 591:5-6.

Defendant’s damages expert, Mr. McGavock, testified that he was able to determine what was commercially available in 2005 to put together the MPC system.²¹ He opined that, although the “Dolly Pal” component currently used in the one-cart method was not on sale until 2010, all of the components—the trays, the dollies, and mini-pallets—were either commercially available or there were similar components, including custom pallets, that were on the market at the time of the hypothetical negotiation.

Mr. McGavock went on to determine what it would have cost in 2005 to implement the MPC at all Category X and Category I airports. He concluded it would have cost between \$5,922,399 and \$9,917,101.²²

²⁰ Sometime after 2010, instead of using a tray to create a mini-pallet, Mr. Thaxton located a commercially available Dolly Pal and bolted a tray onto it to form the base unit. Mr. Thaxton testified the Dolly Pal was not available until 2010.

²¹ He testified that he used “the Wayback machine to look at the internet as it existed in 2005” to find ads selling the various components of what he considered to be the moveable pallet cart. Tr. 2896:23-24.

²² Plaintiff’s experts calculate a much higher number due to their assertion that the inefficiencies of the MPC would dictate hiring many more security officers.

Defendant later uses this calculus to ground its numbers to limit plaintiff's damages.

The MPC was used at nine commercial airports in Arizona and in some lanes at the Denver Airport.²³ Mr. Thaxton testified that he evaluated metrics such as throughput and personnel usage before and after the MPC was implemented and concluded that the metrics were the same as when using the '460 method.

Plaintiff's expert, Tim Hollifield, was a checkpoint team manager involved in the testing of SecurityPoint's system during the SafeSkies study. Mr. Hollifield identified several inadequacies of the MPC that would, in his view, have rendered the MPC system unacceptable for widespread use by TSA in 2005:

The goal for TSA was to calm the checkpoint down, and an aluminum hand truck going through a metal detector caused significant distractions. When you push that through, they're going to stop the lane, you're going to create distractions for the screening process, and also you're going to increase anxiety for passengers.

Tr. 1726:12-18.

Mr. Arroyo also noted that the MPC requires TSOs to ask their colleagues for assistance when returning the MPC through the disabled passenger gate. Mr. McGavock admitted that MPCs caused damage to gates and access gate panels, which required TSO time to repair, and negatively impacted TSOs by taking them away from performing security-related functions. According to Mr. McGavock, MPCs have a thin, protruding nose plate which posed a risk of strikes to passengers. In contrast, the '460 patent showed no ankle strikes when the method was tested. Additionally, SecurityPoint's carts could hold up to 60 bins per cart, whereas the MPC system could only hold 28 bins per cart, resulting in 1.28 more minutes per hour spent on returning bins.

We have no reason to question Mr. Thaxton's testimony concerning the availability in 2018 of the component parts from which he assembled the proto-type MPC, or for that matter, Mr. McGavock's evidence that similar

²³ Mr. Thaxton testified, "[the MPC] went to the nine airports, commercial airports, in Arizona." Tr. 589:4-5; Mr. Ambrefe also testified that he saw the MPC in use in Denver.

components were available in 2005. What the court finds more telling, however, is the fact that the one cart system was not developed in the sixteen years following 9/11. We find speculative and counterfactual Mr. McGavock's testimony that, in the hypothetical negotiation, the size of the patent holder's demand for compensation would have prompted TSA to implement the MPC system in 2005. The best evidence of what TSA would have done is what it did—adopt plaintiff's patented method on a massive scale, despite the asserted availability of a “no brainer,” low-cost alternative.

Mr. Arroyo explained that several alternatives were introduced by TSA between 2001 and 2006 in an effort to expedite screening. In addition, Mr. Malackowski testified that experiments were undertaken at various airports, all of which failed (such as a bin runner system, side slide, and mechanical conveyor belt). As he explained, “for an extended period of time, the government was continually looking for alternative solutions . . . and the [MPC system] was not . . . identified for [13 years].” Tr. 1925:7-11. At the validity trial, Mr. Arroyo also testified that, prior to adopting plaintiff's method, TSA thought the introduction of carts, including a dolly cart, would be a hazard and decrease efficiency. Validity Trial Tr. 1593-94. Moreover, as we discussed above, Ms. Gloria Bender was hired from 2003 to 2005 to develop a solution to remedy efficiency problems at SSCPs, but never suggested a cart-and-tray management system as claimed in the '460 patent or use of a dolly and pallet system. We find that the MPC was not an available and acceptable method at the time of the hypothetical negotiation.

DISCUSSION

I. Infringement

We found above that plaintiff put on sufficient evidence to confirm universal and continuous infringement of its patent at all Cat X and Cat I airports. The only potential exceptions we reserved from our examination of the Tarakameh study were with respect to TSA's use of bin islands, crisscrossing carts, and PreCheck and ASL lanes. We turn then to the import of the Tarakameh study.

A. The Parties' Opposing Conclusions on Mr. Tarakameh's Study

We agree with plaintiff that the Tarakameh study is fundamentally flawed and that his overall conclusions are irrelevant. The reason is that he improperly assumed that TSA infringed only if a particular passenger actually divested items onto at least one tray taken from a tray cart which

was no more than five feet away from the proximate end of a screening lane and if there was no secondary screening.

We disagree with this operating assumption. We hold that TSA infringed the patent when it operated screening lanes which, in their normal operation, invited passengers to take a tray from a first tray cart at the proximate end of a particular screening lane and then, after scanning, to then return that tray to a second tray cart at the distal end of the same lane, after which the second tray cart was returned, with trays, to the proximate end of the same lane by TSA. That was clearly established to be the routine process by which TSA screened passengers. Once TSA opened up a lane for use employing these steps, the infringement was continuous, and it was infringement by TSA, not the passenger. We view it as legally immaterial whether a particular passenger declined the use of a tray, or placed items directly on the scanning belt. Therefore, recording how many trays a passenger took, how many items were divested into trays, or how many items were placed on the scanning belt directly was a useless exercise. It demonstrated nothing about whether the patent was being infringed.

We recognize, however, that Mr. Tarakemeh also recorded some other “attrition points,” which, as we suggested above and we discuss below, we do find relevant. What we reject, however, is his overall conclusion that there was no more than 19.2% infringement in normal lanes and less than 1% infringement in PreCheck lanes. This conclusion can be ignored because the study was not designed to capture infringement. And it can be ignored without reliance on the enfilade of more detailed criticism from plaintiff’s experts. We turn now to the particular attrition points he identified.

1. Pivot Step

Mr. Tarakemeh excluded from the infringement tally instances in which passengers took a “pivot step” of five feet or more, either in picking up or disposing of a tray. We need not address plaintiff’s criticisms directed at the imprecision and subjectivity of this metric. The term “pivot step” is not present in the patent. It is Mr. Tarakemeh’s interpretation of the patent, and it is one that is not justified by the court’s claim construction. Claim one, step one of the ‘460 patent requires positioning a first tray cart containing trays at the proximate end of a scanning device through which objects may be passed, wherein said scanning device comprises a proximate end and a distal end.

In our construction of the terms “proximate” and “distal” we held that proximate meant “proximal or nearest to; referring to the end of the scanning

device where an object enters the device.” *SecurityPoint Holdings, Inc. v. United States*, 111 Fed. Cl. 1, 9 (2013). We described distal end as “farthest from; referring to the end of the scanning device where an object exits the device.” *Id.* We gave no further specificity to location or distance from the scanning device. In fact, we specifically rejected defendant’s efforts to add more precision to location:

Defendant views its definition of an “end” to be a precise point as compared to a more general area at the extent or boundary of something. We do not share defendant’s understanding of its construction; it implies a level of precision that we find generally lacking in the 460 patent. The patent describes a method for cycling trays through a scanning device at a security check point. It is not dependent upon a great deal of precision in the location of the instrumentalities involved. Perhaps if “proximate end” and “distal end” were used to describe the actual physical entry and exit point of the screening device itself, defendant’s understanding would be natural. Here, however, the claims use the terms to describe the location of tray carts external to the device. As it is, “proximate end” means “proximal or nearest to; referring to the end of the scanning device where an object enters the device.” “Distal end” means “farthest from; referring to the end of the scanning device where an object exits the device.” Nothing further is implied by those definitions.

Id. at 8-9.

A tray cart six feet away from the screening belt therefore literally infringes. Even if it did not, however, this is precisely the type of additional limitation which would trigger the court’s ruling that, if Mr. Tarakemeh’s presentation relied on a new limitation, and one inconsistent with the court’s prior claim construction, plaintiff would be able to resuscitate its argument of infringement under the doctrine of equivalents. In that event, the testimony of Dr. Jacobson is clear that positioning a first tray cart containing trays six feet away from the proximate end of a scanning device amounted to performing the same function in the same way to produce the same result. The same would be true of trays at the distal end.

2. Secondary Screening

Similarly, plaintiff objects to Mr. Tarakemeh’s secondary screening as a point of attrition. Secondary screening occurs when a tray is selected

for additional screening and taken away from the general area of the scanning device. Apparently the reason for treating this as an attrition point is not that this amounted to an additional step, but because Mr. Tarakemeh assumed that, unless it was clear that a tray returned to the re-vesting table, it must have gone to a different lane, thus triggering concerns about “criss-cross” movement between lanes. He testified that his observers attempted to account for trays that returned to the lane after being pulled for secondary screening, but he also testified that trays were not tracked from start to finish. Under these circumstances we are unwilling to assume that secondary screening should be treated as non-infringement.

3. Bin Islands and Tray Crossovers

Finally, plaintiff argues that the exclusion of lanes making use of bin islands and tray crossovers was improper. Here, however, we agree with defendant’s assumption that the existence of bin islands and instances of the crisscross scenario, in which bins from the distal end of one lane are returned to the proximate end of another lane, are relevant because these constitute non-use of the patent.

As an initial matter, we find that making exceptions for bin islands and instances of tray cart crisscross does not trigger the doctrine of equivalents. These are not new claim constructions; rather, the existence of bin islands or the crisscross scenario were merely observations of where tray carts were situated and how they moved at the airports Mr. Tarakemeh surveyed. As we observed above, there were occasions during Tarakemeh’s eight-month study in which lanes shared bin carts, and we concluded that use of such bin islands constitutes a different method than the one covered by the ‘460 patent because the trays circulate across lanes rather than in a closed-loop fashion as contemplated by the patent. Mr. Tarakemeh was applying the court’s construction of the patent. We further note, however, that defendant gave us no readily measurable way to extract instances of bin island use or crossovers. In fact, concerning the quantum of damages, the government concedes that it does not rely on Mr. Tarakemeh’s study. Rather, defendant uses the study to illustrate what it views as plaintiff’s unreasonable eight cent per-passenger royalty.

Concerning the issue of bin islands and tray cart crossovers, those instances thus do provide some evidence that the ‘460 patent was not used at all times, at all lanes, at all airports. According to Mr. Tarakemeh’s data, at the cart phase, reported in Table V-1 above, use of plaintiff’s method was 70.8%. Non-use due to bin island and tray cart crisscross instances would be 29.2 %, assuming all non-use at the cart phase related to whether or not a cart

was returned from the distal end to the proximate end of the same lane. This number cannot be directly applied to the infringement calculus, however. The study was only conducted at 36 airports over an eight-month period from 2018 to 2019. There is no evidence that bin islands were in use before 2018. Accordingly, non-use as it relates to bin island and crossover instances, will be considered for the limited purpose of determining a royalty rate.

In sum, Mr. Tarakemeh's study does not rebut plaintiff's claim concerning TSA's universal infringement of the '460 method. We agree with plaintiff that inferring that the '460 patent was rarely used at all in Cat X and Cat I airports from 2005 to 2018 based solely on a survey conducted from 2018 and 2019 at 36 airports is unreasonable due to the lack of historical data and questionable mathematical calculations, and more importantly, because the survey was not designed to capture use of the patent. We conclude that TSA made the patented method the default at all Cat X and Cat I airports, with the exception of those using the MPC and ASL systems. Moreover, because the government has not indicated how the SAIC study should be applied to the damages calculation other than to argue that the study shows the unreasonableness of plaintiff's damages calculation, we find that the study does not convey meaningful data related to damages, with the exception of the finding that there was some use of bin islands and tray cart crossovers.

II. Damages

A. A Running Royalty Versus a Lump Sum Payment

Having found liability, plaintiff is entitled to recover "reasonable and entire compensation" for the government's acquisition of a compulsory non-exclusive patent license. 28 U.S.C. § 1498(a). Both parties agree that damages should be determined by constructing a hypothetical negotiation between a willing licensor and licensee using factors spelled out in *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *modified and aff'd*, 446 F.2d 295 (2d Cir. 1971); *see also Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1544 (Fed. Cir. 1995) (en banc) (citing *Hanson v. Alpine Valley Ski Area, Inc.*, 718 F.2d 1075, 1078 (Fed. Cir. 1983)). Plaintiff bears the burden of proof.

One means of measuring compensation, particularly when profits are not a relevant measure, is to require the defendant to pay a running royalty for a license as well as damages for its delay in paying the royalty. *See Standard Mfg. Co. v. United States*, 42 Fed. Cl. 748, 758 (1999), *abrogated in other respects by Uniloc USA, Inc. v. Microsoft Corp.*, 632 F.3d 1292 (Fed.

Cir. 2011); *see also Wright v. United States*, 53 Fed. Cl. 466, 469 (2002). An alternative calculus involves a lump sum payment. *See Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1326 (Fed. Cir. 2009).

Plaintiff advocates for a running royalty, which it argues should consist of \$0.08 per-passenger going back to at least 2008.²⁴ That would lead to damages of \$618,505,375 million.²⁵ Plaintiff claims that, “This amount is inclusive of delay damages, but it will need to be trued up as of the date of judgment to reflect additional passenger throughput and additional delay damages.” Pl.’s Post-Trial Br. at 65.

Defendant asks the court to adopt a lump sum royalty, which it contends should be no more than a maximum of \$12,637,499, an amount representing the cost to implement the MPC system at all airports.²⁶

The most basic issue to resolve, therefore, is whether to adopt a running royalty rate as opposed to a lump sum. There are generic considerations involved. For example, as defendant points out, for both contracting parties, the lump-sum license generally avoids ongoing administrative burdens of monitoring usage of the invention. Plaintiff counters that the lump sum royalty runs the risk of an unanticipated windfall to either party due to unforeseen circumstances or miscalculation of the patent’s value or anticipated use. A per-passenger royalty would have provided both parties with the flexibility of ending the arrangement.

²⁴ Although the parties agree to an earlier date of first infringement, plaintiff’s damages calculations begin in 2008.

²⁵ Plaintiff’s expert, Mr. Malackowski, testified that “\$618 million . . . takes into account deductions for the implied license at about 21 percent, deductions for ASLs and a 10-year bond delay payment rate.” Tr. 1948:25-1949:3.

²⁶ Mr. McGavock’s opines that the cost of implementing the MPC method at all Category X and Category I airports would be between \$5,922,399 and \$9,917,101, plus delay damages. His figure for the total reasonable and entire compensation was \$12,637,499. Mr. Malackowski criticized that figure for not including increased labor hours that would have been necessary had TSA used the MPC instead of the ‘460 method nationwide.

Mr. Malackowski testified that the remaining term of the license, approximately 17 years, also would motivate the parties to agree to a running royalty versus a lump sum. He reasoned that, since the hypothetical negotiation would have taken place in 2005, the parties to the negotiation would need to assess what might happen over the next 17 years to account for future innovation. Because of the length of the remaining term, we agree that TSA would have been motivated not to lock itself into a lump sum, in the hope that it could minimize future payments by engineering a way around the patented method. Instead, we believe that TSA would have been motivated to try to reach agreement on a de minimis running royalty as a way to avoid a large lump sum that might turn out to have been unnecessary.

Plaintiff also argues that a running royalty based on passenger throughput would have logically suggested itself to hypothetical negotiators. First, because, as Mr. Malackowski testified, “the passenger is essentially the engine of commerce that results in the benefits of the ‘460 Patent.” Tr. 1819:16-18. In addition, as Dr. Jacobson testified, one of the primary benefits of the patented method is reduced passenger wait time. No other metric for use with a royalty was offered by defendant and none appears to the court. Personal belongings do not flow through the screening points unless they are directly associated with a passenger, and the use of trays and carts would, in any event, be considerably more difficult to track. The most relevant and simplest metric—passengers—was also readily available. TSA already tracks passenger throughput in order to measure performance of its operations, and it already charges usage fees on a per-passenger basis for enhanced security. In addition, SecurityPoint’s business model was already based on passenger throughput.

Defendant offers a number of particularized reasons why the parties to the hypothetical negotiation would have agreed to a lump-sum royalty, versus a running royalty, and why, if a running royalty had been adopted, it would not be based on passenger throughput. It argues that it is not feasible to track precise usage of the patented method, that usage of the claimed method is sporadic, and that plaintiff’s concentration on passenger throughput overestimates usage of the claimed method and encompasses instances of infringement and non-infringement. We find none of the arguments persuasive.

The simple answer to these critiques we have already explained. The reason the government contends it would be difficult to apply a running royalty is that it accepts Mr. Tarakemeh’s flawed view of how to measure use of the patent. TSA, however, infringes by the way in which it sets up and operates lanes. The assumed complexity disappears when it becomes

obvious that it is unnecessary to track trays, individual items divested, and carts. For the same reason, there was no “sporadic use.” The only thing which made it appear sporadic was Mr. Tarakemeh’s focus on items, trays and divestments.

Defendant’s strongest argument in favor of a lump sum amount is that there was available an acceptable, non-infringing alternative that would have given TSA great leverage in the hypothetical 2005 negotiations, namely the MPC. The Federal Circuit has recognized that non-infringing alternatives will necessarily limit the amount a party would be willing to pay to use the patented technology at the hypothetical negotiation. *AstraZeneca AB v. Apotex Corp.*, 782 F.3d 1324, 1334 (Fed. Cir. 2015) (“There is little incentive . . . for the infringer to take a license rather than side-step the patent with a simple change in its technology.”); *Riles v. Shell Expl. & Prod. Co.*, 298 F.3d 1302, 1312 (Fed. Cir. 2002) (“The economic relationship between the patented method and non-infringing alternative methods, of necessity, would limit the hypothetical negotiation.”). The question, therefore, is whether the MPC system infringes the patent, was an acceptable alternative, and was available.

1. Does the MPC Infringe the ‘460 Patent?

The ‘460 method cycles trays through a checkpoint using two carts. In contrast, the MPC uses only one cart. The addition of the second cart was critical to the patentability of the method. It is thus a decisive difference. Defendant alleges that SecurityPoint ignores the requirement that a “tray cart” be an actual cart. Instead, defendant claims that plaintiff relies on conclusory statements of Mr. Arroyo and Dr. Jacobson, that a “tray cart” does not require wheels.

We are unpersuaded by the creative argument from plaintiff’s experts that one, or even two mini-pallets at either end of the checkpoint are theoretically movable and thus constitute the two carts required. Clearly the mini-pallets are platforms intended to receive trays and are then moved with the dolly. While there may have been some sighting of agents sliding pallets on Velcro skids across the floor, that is not a meaningful equivalent to two moveable tray carts.

2. Were MPCs an Acceptable Alternative?

To be deemed acceptable, the alleged non-infringing substitute must not “possess characteristics significantly different from the patented product.” *Kaufman Co. v. Lantech, Inc.*, 926 F.2d 1136, 1142 (Fed. Cir.

1991). Mr. Thaxton testified that he evaluated certain metrics such as throughput and personnel usage before and after the MPC was implemented and that the throughput metrics were the same as when using the '460 method. Defendant also argues that the acceptability of the method is proved by the fact that it was used in nine commercial airports in Arizona and for a period in some lanes at Denver International Airport.²⁷

Plaintiff notes that use of the MPCs did not begin until 2018, long after the theoretical 2005 negotiations. In addition, it argues that the MPC system was severely deficient when compared to the '460 method, thus rendering it unacceptable as an alternative. Plaintiff's expert, Mr. Hollifield, was a checkpoint team manager involved in the testing of SecurityPoint's system during the SafeSkies study. He saw the benefits of the '460 patent firsthand when it was first tested and identified certain ways in which the MPC system would have been less desirable, including triggering metal detectors and causing increasing stoppages.

Mr. Arroyo explained that the MPC requires TSOs to ask their colleagues for assistance when returning the dolly through the ADA gate, which, according to Mr. McGavock, occasionally resulted in damage to ADA gates and access gate panels. The MPC dolly carts have a thin, protruding nose plate which posed a risk of strikes to passengers. The '460 method cart could hold up to 60 bins per cart, whereas the MPC system could only hold 28 bins per pallet. Mr. Arroyo also testified that the MPC system required significant energy to operate, and it is less stable, because it operated with the two wheels versus the '460's four-wheeled tray cart.

As defendant points out, however, an alternative need not provide the same level of benefits or quality if the relevant consumer would have accepted it. *See Brunswick Corp. v. United States*, 36 Fed. Cl. 204, 217 (1996). In this respect although we agree with the government that the asserted deficiencies of the MPC smack of exaggeration, we believe that, if given a choice, TSA would have preferred to use the patented method, so long as it came with no legal liabilities. The patented method was more efficient and less likely to cause minor damage or injury. The latter half of the inquiry—whether the relevant consumer would have accepted the alternative—is much more telling. We agree with plaintiff that the strongest evidence that the MPC was not an acceptable alternative was that TSA used

²⁷ The parties offer competing evidence regarding whether MPCs continue to be used at the Denver airport today. It is unnecessary to resolve that dispute, however, because our holding that the alternative method was neither acceptable nor available is unconcerned with where it is used today.

the MPC only at Arizona airports and some lanes at Denver International Airport, and it did not begin doing so until 2018, when it became apparent that there was a serious patent infringement problem. In short, development of the MPC itself smacks of contrivance because it was implemented, not in response to a felt physical need, but to minimize damages from patent infringement after many years of unauthorized use.

It is also telling that, despite the pendency of this lawsuit since 2011, and the concerted efforts of TSA to design around the patented method, plaintiff's method has been adopted wholesale around the country. Contrast that with the spotty use of the MPC and the very late development of ASLs. We conclude that the MPC was not sufficiently attractive to dissuade TSA negotiators from considering paying for a more attractive alternative. In addition, for the reasons explained below, we are persuaded that it was not available in 2005, albeit for some of the same reasons that it was not an attractive alternative.

3. Was the MPC Method Available?

Defendant argues that even if the one-cart method was not used until March 2018, that does not mean it was unavailable in 2005. Defendant contends that an alternative does not need to be actually in use to be "available" to the hypothetical licensee so long as the licensee possessed "all of the necessary equipment, know-how, and experience" at the time of the hypothetical negotiation. *Micro Chem., Inc. v. Lextron, Inc.*, 318 F.3d 1119, 1123 (Fed. Cir. 2003) (quoting *Grain Processing Corp. v. Am. Maize-Products Co.*, 185 F.3d 1341, 1354 (Fed. Cir. 1999)). Rather a hypothetical licensee would look to alternatives that were "in the wings." *Zygo Corp. v. Wyko Corp.*, 79 F.3d 1563, 1571–72 (Fed. Cir. 1996) (discussing reasonable royalty).

Mr. Thaxton testified that he obtained the materials he used to create a fixed receptacle for trays, as well as a dolly, from commercially available sources in 2018. When he first attempted to design around the '460 patent, he managed to come up with the one-cart method in a relatively short period of time. To create a fixed base for holding trays at both ends of the screening lane, he modified a single tray and labeled it to discourage passengers from trying to pick it up. He later switched to a premanufactured "Dolly Pal," which he conceded was not available in 2005. Mr. McGavock confirmed, however, that all of the components or component substitutes, such as customized pallets, were available at the time of the hypothetical negotiation.

We conclude that the constituent components or their equivalents were probably commercially available in 2005, and it would take minimal engineering skills to build from a tray or tray platform an elevated pallet to hold trays. Mr. Thaxton or someone else from TSA probably could have cobbled together in 2005 the same or similar pieces of equipment into an MPC.

This does not amount to proof of availability, however. TSA expert Gloria Bender testified at the validity trial that her company was engaged by TSA at several airports to improve checkpoint efficiency but was unable to develop a satisfactory solution to the problems solved by the methods claimed in the '460 patent. She, along with TSA expert, Robert Cammarato, also testified that even though it was their responsibility to solve efficiency problems in SSCPs and establish standard operating procedures for TSA screeners from 2003 to 2005, they never suggested a cart-and-tray management system as claimed in the '460 patent.

Mr. Arroyo also explained that several alternatives were explored by TSA between 2001 and 2006 at various airports, such as a bin runner system, side slide, and mechanical conveyor belt, all of which failed. Mr. Malackowski added that “for an extended period of time, the government was continually looking for alternative solutions . . . and the [MPC system] was not one of them that was identified for that first decade plus.”²⁸ Tr. 1925:7-11. And, as noted earlier, we have Mr. Arroyo’s 2015 testimony that the use of carts was considered counterintuitive at checkpoints at the time when the hypothetical negotiation would have taken place. This further suggests to us that TSA would not have come up with the MPC method back in 2005.

Two things are clear. First, what was not available was a commercially offered method or “system” of a pallet and dolly for moving trays, nor did TSA have an internally developed system that was waiting in the wings. *See State Industries, Inc. v. Mor-Flo Industries, Inc.*, 883 F.2d 1573, 1579 (Fed. Cir. 1989). There was not available a single product that performed like the tray and cart system.

More importantly, however, the know-how, experience, and motivation necessary to assemble the parts into the combined tray holder and

²⁸ Mr. Malackowski explained: “And so there is no basis to believe that sitting down in 2005, the negotiators would have thought of, developed, the movable pallet cart. It was not obvious at the time, just as the simple elegant invention of SecurityPoint was not obvious at that time.” Tr. 1925:12-16.

dolly system was also clearly missing at the time of the hypothetical negotiation. *Cf. Grain Processing*, 185 F.3d at 1354. If it had been present, it would not have taken thirteen years and repeated, targeted, and TSA-financed efforts by engineers to come up with a solution to a problem that was obviously not a “no brainer.” We find that the one-cart method or MPC would not have occurred to the hypothetical negotiators and was therefore not available to influence the negotiations.

This is not to say that the apparent simplicity of plaintiff’s method would not have occurred to the government. As Mr. Malacowski observed, in the event TSA developed a new technology (such as automated screening lanes), TSA could have stopped paying royalties on passengers passing through lanes that used the new technology. This offered TSA an incentive to use a minimal running royalty to buy time to develop an alternative.

Plaintiff has established that the parties would have elected to use a running royalty, and not a lump sum payment. Defendant has not proved that the MPC was an available, acceptable alternative. What follows is consideration of the amount of that royalty.

B. Other Factors Influencing the Negotiation

Reasonable royalty damages are determined based on what the parties would have agreed to in a hypothetical negotiation just prior to the date of first infringement. In this case, that would be September 2005. The Federal Circuit has held that the hypothetical negotiations model produces the result “more of the character of a forced settlement where neither party gets all it would wish.” *Rite-Hite Corp.*, 56 F.3d at 1556.

In analyzing the hypothetical negotiation, the court applies the factors from *Georgia-Pacific*, which provides a “list of evidentiary facts relevant, in general, to the determination of the amount of a reasonable royalty for a patent license.” *Ga.-Pac. Corp.*, 318 F. Supp. at 1120 (outlining the factors relevant to the determination of a reasonable royalty). The parties are not required to address all the factors because “there is no formula by which these factors can be rated precisely in the order of their relative importance or by which their economic significance can be automatically transduced into their pecuniary equivalent.” *Id.* at 1120–21. Thus, in the court’s construction of the hypothetical negotiation, some “factors may be of minimal or no relevance to a particular case and other factors may have to be molded by the Court to fit the facts of the case at hand.” *Proctor & Gamble Co. v. Paragon Trade Brands, Inc.*, 989 F. Supp. 547, 607 (D. Del. 2001). The court is not “constrained” by the *Georgia-Pacific* factors and need not consider factors

that are “inapposite or inconclusive.” *Brunswick Corp.*, 36 Fed. Cl. at 212 (citing *Ga.-Pac. Corp.*, 318 F. Supp. at 1120).

Although there are fifteen *Georgia-Pacific* factors, the only ones either or both parties discussed are the following:

- (1) The current, established royalty rates under the patent at issue.
- (2) The royalty rates for comparable technology.
- (7) The duration of patent and license terms.
- (8) The profitability and commercial success of the invention.
- (9) The utility and advantages of the invention over prior art.
- (10) The nature, character, and benefits of use.
- (11) The extent and value of infringing use.
- (13) The portion of realizable profits creditable to the invention alone.
- (14) Expert testimony on royalty rates.
- (15) The totality of other intangibles impacting a hypothetical negotiation between a willing licensor and licensee.

In considering how these factors should influence the hypothetical negotiation, the court may consider facts that post-date the time of the negotiation. *Sinclair Refining Co. v. Jenkins Petroleum Process Co.*, 289 U.S. 689, 698 (1933). The Supreme Court termed these facts “the book of wisdom” and cautioned that courts should not ignore them. *Id.* These relieve some of the artificiality inherent in the exercise by tethering what is otherwise a pure hypothetical to reality.

In considering these factors, we are mindful that the benefits claimed must be attributable to the patented method, which is to say that we must be able to differentiate between the specific improvement of the claimed method and other non-patented features that may otherwise also contributed to the benefits ascribed to the patent. *FastShip, LLC v. United States*, 131 Fed. Cl. 592, 625 (2017), *aff’d as modified*, 892 F.3d 1298 (Fed. Cir. 2018) (“Damages are apportioned based on the ‘smallest salable patent-practicing

unit' within the infringing article, meaning those features within the scope of the claimed invention.”) (citing *LaserDynamics, Inc. v. Quanta Computer, Inc.*, 694 F.3d 51, 67 (Fed. Cir. 2012)). While this is less of a concern here because we are confronted with a method patent rather than an improvement to a complicated piece of existing technology, it is nevertheless the case that some of the enthusiasm expressed about the '460 method was attributable to non-patented changes to screening lanes. That caution is particularly applicable to *Georgia Pacific* factors 10 and 13.

1. Factors 1 and 2: Established Royalty and Comparable License Rates

The place to begin is any evidence of what the licensor agreed to in the real world. The *Georgia Pacific* court captured this inquiry in its first two, related, factors. The first is “[t]he royalties received by the patentee for the licensing of the patent in suit, proving or tending to prove an established royalty.” *Ga.-Pac. Corp.*, 318 F. Supp. at 1120. The second is “[t]he rates paid by the licensee for the use of other patents comparable to the patent in suit.” *Id.* “This factor examines whether the licenses relied on by the patentee in proving damages are sufficiently comparable to the hypothetical license at issue in suit.” *Lucent Techs., Inc.*, 580 F.3d at 1325.

Here, the only reference offered is plaintiff’s agreement with the Adason Group to settle SecurityPoint’s infringement suit. Defendant objects, arguing that the Adason agreement is not analogous because it was neither a license agreement nor was it a commercial transaction in the normal sense. Although not perfectly analogous, we find that the Adason agreement provides a starting point.

As mentioned earlier, Adason responded to TSA’s Bin Advertising Program solicitation and was successful in participating in that program at five airports in 2007. After SecurityPoint sued Adason,²⁹ the parties entered into a settlement in September 2007, whereby Adason agreed to pay SecurityPoint \$650,000, and agreed to market SecurityPoint’s system for advertising as, in essence, a broker for plaintiff. That plan was not ultimately followed, however, because Adason went out of business. It paid roughly half of the settlement amount before going under. Although there was no running royalty adopted for future use, Mr. Hosfield calculated what he believed was an equivalent royalty rate of \$0.063 per-passenger by dividing

²⁹ The suit was not limited to patent infringement. Plaintiff alleged five counts, including false advertising and violations of the Lanham Act.

Adason's total settlement of \$650,000 by the 10.3 million passengers screened at those five airports during the period of the Adason agreement.³⁰

According to plaintiff, during a hypothetical negotiation (using the "book of wisdom" to account for the Adason negotiations fourteen months later), the parties would have taken into account the \$0.063 per-passenger royalty rate of the Adason agreement because it is the only comparable license. Plaintiff reasons that TSA would have agreed to pay more than Adason paid because TSA received more benefits from the '460 patent than Adason. Adason was a private advertising company which only benefitted from placing ads on the trays, and not from improved security, increased passenger throughput, reduced TSO injuries, and reduced staffing. Moreover, Adason was in financial distress, and could not have paid more than \$0.063 per passenger. Plaintiff thus argues that Adason's royalty rate should be a floor.

Defendant, on the other hand, believes the Adason example to be inapposite because it was not a running royalty license, was entered into to end litigation that included claims other than patent infringement, was between competitors in the market—unlike TSA and SecurityPoint—and set the terms for a future business relationship. The government also believes Mr. Malackowski's reverse engineering of the rate to be flawed because it did not take into account any infringement that Adason undertook prior to 2007.

We disagree with the government's complete rejection of the relevance of the Adason payment. Adason, like TSA, infringed the '460 patent. Both would have been incentivized to enter into negotiations to deal with assertions of infringement. The fact that Adason was only able to pay \$300,000 before declaring bankruptcy, we view as not undercutting the legitimacy of the use of the \$650,000 figure, which, barring evidence of deceit (none was offered), represents the result of arms-length negotiations.

Moreover, any higher royalty would have jeopardized Adason's solvency. This factor would have put a downward pressure on a settlement figure. As Mr. Hosfield testified:

³⁰ The Adason agreement was not just a payment for past infringement. The parties agreed to an ongoing business relationship. While the terms of that deal became irrelevant due to Adason's insolvency, the intent to enter a mutually beneficial arrangement for the future lends credence to plaintiff's position that it would have pushed for a running royalty.

What they agreed to pay and, in fact . . . as I recall, what they told SecurityPoint was *this is what we can pay; anything above that would force us into bankruptcy*. So that's the amount that they agreed to. What that tells us . . . is that if Adason's financial condition were better, SecurityPoint might not have agreed to such a low number; however, that's the agreement they made, and that's what they agreed to accept, and that's what I determined.

Tr. 1657:3-13. (emphasis added).

Mr. Malackowski agreed with Mr. Hosfield's assessment:

I believe the Adason agreement is lower than an agreement with the TSA, all else being equal, because, *first, there's the financial duress* that we've talked about that drove it down, but second, Adason was receiving no benefit to this invention except the ability to sell advertising, which is valuable, but the TSA receives significantly greater benefits related to the passenger throughput and all of the labor savings and reduced injuries and other economics that exceed anything that Adason would have ever been able to achieve.

Tr. 1854:8-18. (emphasis added).

We reject as well, however, plaintiff's argument that the Adason figure becomes a floor. While an equivalent royalty rate can be derived from a lump sum payment, nevertheless, the parties used a lump sum payment and not a running royalty. We agree with the government that the dynamics of a decision to foreclose future use of a patent and close out litigation is different than opening the door to ongoing payments over potentially a 17-year period. Constructing an artificial equivalent royalty under those circumstances strikes us as camouflaging the independent incentives to end the infringement and the litigation. We do not know what the parties would have agreed to by way of a running royalty and we do not know whether releasing non-patent infringement claims had any financial weight for Adason. We also cannot ignore the fact that Adason had been infringing for the purpose of making money. Plaintiff's demand would have sought to capture some of those advertising receipts, something of no interest to TSA.

In sum, as the only evidence of anything that looks like a payment for infringement, the Adason settlement is certainly relevant. However, we

decline to treat the constructed royalty as a floor. We use it as a factor in constructing the appropriate royalty.

2. Factor 7: Patent Duration/License Term

The duration of the hypothetical license is also relevant to the parties' bargaining positions. This is the seventh *Georgia-Pacific* factor. 318 F. Supp. at 1120. The term of the license is assumed to be the remaining life of the patent. Plaintiff's expert, Mr. Malackowski recognized that this factor operates in the government's favor:

Once we determine that it's going to be a running royalty, because it's such a long period of time, the TSA is going to push hard to say that we have to make it very reasonable, . . . lower rather than higher. And so I give them the benefit of the doubt [Y]es, I believe the term of the license -- in particular, 18 years -- matched to this industry and the uncertainty of future innovation would result in a running royalty to account for anything like ASLs, and it would teach away from a lump sum.

Tr. 1868:11-1869:8.

We agree that the long remaining life of the patent would push the negotiation toward a running royalty, and a lower one. TSA would have opted for a running royalty in the hope of a coming up with an alternative method in the future, but concern that, if it was unsuccessful, it would end up paying a royalty for all 17 years remaining on the patent would give it a strong incentive to agree to only a small royalty.

3. Factor 8: Profitability, Commercial Success, and Popularity

The eighth *Georgia-Pacific* factor is “[t]he established profitability of the product made under the patent, its commercial success; and its current popularity.” 318 F. Supp. at 1120. The focus here is on the success of the patented methodology from the patent holder's perspective. On the one hand, there is no question that SecurityPoint developed a successful business model for turning access to security lanes into advertising revenue. It is also true, on the other, that it obtained that access by offering, not just a method to improve efficiency and safety at screening lanes, but free equipment. From 2008 through 2017, it realized a total of \$45.93 million in ad revenue from more than 40 airports throughout the United States. TSA's imposition of a requirement that airport operators sign an MOU indemnifying TSA for

possible patent violations, along with its opening up to plaintiff's competitors the opportunity to offer the same system, put substantial constraints on plaintiff's ability to capitalize on its method.

Insofar as this factor can be separated from the parties' relevant bargaining positions, we agree with the government that this factor is neutral in calculating a royalty. TSA is not an advertising broker. The success of plaintiff's endeavors to date is not tied strictly to the patent's method. Further, the hypothetical running royalty is not an effort to calculate profits lost to plaintiff.³¹ The fact that plaintiff could have made even more money with unfettered access to airports is irrelevant to what the parties would have negotiated for use of the method only, which would not necessarily have resulted in ad revenues to plaintiff and which required TSA to furnish its own equipment. We find plaintiff's business success not directly relevant to the circumstances assumed in a hypothetical negotiation.

4. Factors 9 and 10: Advantages of the Invention and the Nature, Commercialization, and Benefits of the Claimed Invention

The next two interrelated inquiries consider the benefits provided by the patent, especially over what was known in the field prior to the invention, and "the character of the commercial embodiment of it as owned and produced by the licensor." *Ga.-Pac. Corp.*, 318 F. Supp. at 1120. These are the ninth and tenth *Georgia Pacific* factors, which are often considered in tandem.

Plaintiff offers four areas of benefit to the government provided by its method: 1) enhanced security; 2) passenger time savings; 3) reduced TSO injuries; and 4) that the patent enabled TSA to employ fewer TSOs. The common denominator in asserted benefits 1, 2, and 4 is that the patented method involves less clutter and is more efficient in terms of cart movement and accelerated passenger throughput, an assertion we accept as proved. This efficiency also meant less effort expended on moving trays, resulting in fewer repetitive stress injuries for TSOs.

³¹ Taxpayers can only scratch their heads over TSA's unwillingness to take up plaintiff's offer in 2005 to furnish, not only the patented method, but trays and carts at no cost. Plaintiff could have implemented its model and the government would not have to pay damages for infringement.

Defendant, on the other hand, asserts that factors 9 and 10, are less relevant to a § 1498 inquiry because consideration of the alleged benefits of the patent are disfavored, citing *Dow Chemical Co.*, which held that “[t]he proper measure [of damages] is what the [patent] owner has lost, not what the taker has gained. *Dow Chem. Co. United States*, 226 F.3d 1334, 1348 (Fed. Cir. 2000) (alterations in original). This appears to be based on a concern that § 1498 actions amount to an uncompensated Fifth Amendment taking, in which the value of what is taken is relevant, not the benefit to the government. While we appreciate that as a theoretical constraint, we do not view *Dow* as a bar to evaluating the motivations to the government in a theoretical negotiation, so long as the benefits are not speculative.

The benefits offered by the invention are thus relevant to the hypothetical negotiation, but only in so far as they are established improvements over TSA’s prior modes of managing trays and carts. The focus here is on TSA’s incentives to pay to be able to use the patent because of the benefits it obtained. We must therefore apportion the benefits between those provided by the patent’s method and any that were the result of non-patented elements or other unrelated events. In the context of an invention that is a smaller part that is then used in a larger system, as in *FastShip, LLC v. United States*, 131 Fed. Cl. 592 (2017), *aff’d as modified*, 892 F.3d 1298 (Fed. Cir. 2018), “[d]amages are apportioned based on the ‘smallest salable patent-practicing unit’ within the infringing article, meaning those features within the scope of the claimed invention.” *Id.* at 625 (citing *LaserDynamics, Inc. v. Quanta Computer, Inc.*, 694 F.3d 51, 67 (Fed. Cir. 2012)); *see also Ericsson, Inc. v. D-Link Sys., Inc.*, 773 F.3d 1201, 1226 (Fed. Cir. 2014) (“[T]he governing rule is that the ultimate combination of royalty base and royalty rate must reflect the value attributable to the infringing features of the product, and no more.”).

Here, however, we are looking at a method patent which offers a novel but complete and integrated set of steps. Each step is necessary. The fact that none of the equipment used was novel should not detract from the novelty of the method as a whole. We are aware of the need for apportionment—the same consideration comes up in dealing with factor 13—but we view it as having limited application here, except with respect to scrutinizing the benefits highlighted by plaintiff.

a. Enhanced Security

There is no question that airport and passenger security is TSA’s mission. Nor is there any question that the ‘460 patent relates to this mission

by increasing efficiency at checkpoints.³² Mr. Hosfield testified that the patented method “reduce[s] the distractions caused by the need for screening officers to perform job duties amidst the stress and strain of congested and disorganized checkpoints.” Tr. 1298:16-19. This sentiment was echoed publicly by TSA spokesperson Nico Melendez, who said that the ‘460 methods “allows us to do our jobs more effectively and provide more security.” PX 1125 (Washington Post Article on ads being tested in LAX airport security trays). This is accomplished primarily, as explained by Mr. Hosfield, by reducing the time spent by TSOs returning trays to the non-sterile side of SSCPs. Thus, the TSOs can spend more time on security-related tasks.

In addition, Dr. Jacobson testified that improving throughput at security checkpoints, something discussed in more detail below, reduces passenger wait times, resulting in shorter queues and smaller crowds on the non-sterile side of the airport check-in area. He explained that crowding at checkpoints creates security risks. This was supported by testimony of TSA Administrator Peter Neffenger at a Senate Committee on Homeland Security and Governmental Affairs hearing. Mr. Neffenger stated that delays at airport security screening checkpoints are “unacceptable, primarily because the convergence of large crowds in public spaces can create a security risk TSA has worked diligently to address passenger volume growth, and the delays . . . at checkpoints.” PX 539 at 24 (Malackowski report) (quoting “Written testimony of TSA Administrator Peter Neffenger for a Senate Committee on Homeland Security and Governmental Affairs hearing titled ‘Frustrated Travelers: Rethinking TSA Operations to Improve Passenger Screening and Address Threats to Aviation’,” *U.S. Department of Homeland Security*, June 7, 2016.).

We are persuaded that the patented method contributed substantially to improved security. How much, however, is a consideration we reserve until dealing with defendant’s contention that plaintiff failed to apportion damages to distinguish improvements tied to the ‘460 patent versus non-patented features.

³² The USPTO, in its determination to make special, stated that the ‘460 Patent “directly contributes to the countering of terrorism.” PX 9 at 1 (PTO Decision on plaintiff’s Petition to Make Special the ‘460 Patent).

b. Passenger Time Savings

Several TSA documents state that passenger experience and wait times are important to TSA. TSA's staffing model is "designed to calculate the necessary level of TSOs to ensure security and minimize wait times." PX 1175 at 5 (GAO Aviation Security: TSA's Staffing Allocation Model, GAO-07-299). The CDGs, moreover, state that SSCPs should be optimized to "increas[e] throughput" and "improv[e] passenger customer service." *E.g.*, PX 1371 at 8 (TSA 2014 CDG).

Reducing wait times was a priority for TSA, as Mr. Arroyo attested, having witnessed the disorganized checkpoint lines prior to the '460's implementation:

It got so chaotic -- I can speak for Newark personally because I witnessed it and experienced it and received many of the complaints -- where the queueing lines were so backed up that they congested the concession stands, the entire operation. The lines were and people with their carry-on items were blocking the escalators that ramped up to the point where escalators had an emergency stop because people were -- there was no place to go, and they were falling on each other. So it was a really chaotic situation that we had to address immediately.

Tr. 693:17-694:2.

Much of plaintiff's proof of the efficiencies gained by its method comes from TSA's description of the success of the test run at LAX. Mr. Melendez, a TSA spokesperson, attributed, at least in-part, a 90-second reduction in passenger wait times at LAX during the test period to the '460 patent, resulting in a 16% reduction in wait times. PX 1123 ("Ad Pitches Target Captive Audience," by Jeff Thomas, Mercury News, January 10, 2007). A September 5, 2006 letter from Lawrence Fetters, FSD at LAX, concluded that the patented method "helped streamline the screening process and increase throughput." PX 754 at 1 (Lawrence Fetters' letter to Lydia Kennard, dated September 5, 2006). According to Ronald Shields, former Program Analyst for TSA, the patented method also helped streamline the screening process and increase throughput. PX 1209 at 187 (Shields Dep.).

In order to capture these time savings and express their value in dollars, plaintiff offered the testimony of Dr. Jacobson. He put together an elaborate presentation, heavily dependent on the 90-second savings figure from the LAX test. He melded that with figures obtained from a 2013 report

of The National Academies of Science, Engineering, and Medicine, a third-party, government-supported source, which attempted to calculate the value to passengers of wait times in different areas at airports. That report concluded that passengers valued check-in and security time at \$32/hour (\$37.20/hour for business travelers and \$28.45/hour for leisure travelers). PX 1239 at 7 (Passenger Value of Time Vol. 1, Transportation Research Board of the National Academies of Science, Engineering, and Medicine). Applying those hourly figures to the 90-second savings touted from the LAX pilot program results in a calculus of that savings' value.

Recognizing that the 90-second figure was from one airport and reflected heightened savings due to the holiday period, Dr. Jacobson attempted to come up with comparable figures for other airports at other times. He proposed a range of \$0.10 to \$0.50 per passenger. It is unnecessary to examine his methodology in detail. We agree with defendant that the exercise creates a false sense of accuracy.

We have fundamental concerns about the constituent elements of Dr. Jacobson's calculus. First, the 90-second figure is drawn from one airport and represents a brief period of time. Even Dr. Jacobson conceded that, because the testing was done at the peak 2005 Thanksgiving season, he had to make an adjustment to the figures, but his 10 to 50 cent per passenger range appears more like a guess than the product of considered analysis. In addition, we agree with defendant that a dose of skepticism about TSA's reaction is warranted in view of the predictable enthusiasm that would be associated with receipt of free equipment.

In fact, Mr. Melendez qualified his statement concerning the "90-second" reduction:

The longest checkpoint wait times for last holiday season dropped by 90 seconds to seven minutes from a year earlier, said spokesman Nico Melendez, though he acknowledged *any number of variables could have cut the time.*

PX 1126 at 1 (News article from TampaBay.com) (emphasis added). The reference to "any number of variables" probably refers to other efficiencies employed at SSCPs around that time, including ergonomically correct equipment and a \$15 million dollar remodel of the LAX checkpoints. *See* PX 84 at 2 (TSA Information Bulletin) ("The new checkpoint configurations at LAX have resulted in significantly longer divestiture and re-composure space for the traveling public. Furthermore, divesting tables are installed to

x-ray height . . . These improvements have had a positive impact on reducing wait times at LAX.”).

As defendant’s expert, Mr. McGavock, correctly observed, “longer divestiture and recomposure space and x-ray height tables are not elements of the SecureTray® System that are covered by the claims of the patent-in-suit.” DX 1664 ¶ 157 (McGavock Report). Even plaintiff’s expert Mr. Malackowski acknowledged that the “SecureTray® System” provided to LAX included custom-fitted, stainless steel “ergonomically designed divestiture and recomposing tables” which improved efficiencies at the checkpoint. PX 538 at 10; *see also* PX 159 at 27 (TSA’s 2009 CDG) (“Implementation of these tables will increase sequencing efficiency through the checkpoint.”). Mr. Arroyo also conceded that improvements to divesting tables was expected to increase checkpoint throughput.

Defendant also points out that some of the lane configurations at LAX changed during this time to use one scanner for two lanes. This had the effect of minimizing wasted passenger wait time. Mr. Thaxton memorialized these efforts in a spring 2006 report. DX 1778 (Trip report from a visit to Los Angeles in 2006). He testified that the optimization changes “drove down some of the wait time conditions.”³³ Tr. 2123:20.

In short, the 90-second savings figure, which serves as the backbone of Jacobson’s monetary calculus, is highly problematic. It does not account for the non-patented changes at LAX and elsewhere. In addition, we view the report of The National Academies of Science, Engineering, and Medicine with respect to how passengers value their time in checkout lanes as inherently subjective. Further, Dr. Jacobson’s reliance on those numbers assumes a one-to-one correspondence between how passengers value their time and how TSA would have valued time savings. While TSA has every incentive to keep passengers happy, we decline to simply apply these numbers as if they had objective weight.

We have no doubt that TSA’s use of the patent triggered an important consequence—reduced passenger wait times and increased throughput—which had an associated advantage in improving security. We also believe that TSA would have been willing to pay to achieve increased security, efficiency, and happier passengers. We are not, however, persuaded by Dr.

³³ Similar efficiency results were achieved in Dallas (DFW) in 2005 unrelated to the patent. *See* DX 1543 at 17 (Tiger Team 2005 Security Checkpoints Report).

Jacobson's per-passenger time saving model that this phenomenon should be valued at \$0.10 to \$0.50 per passenger.

c. Reduced TSO Injuries

Before implementing the claimed methods of the '460 patent, the standard practice of moving bins was hand-carrying and lifting by TSOs. In 2003, TSA had the highest injury and illness rate among federal agencies at 19.4%, while the average injury and illness rate for all federal workers was 5.5%. PX 1218 (AP article, March 3, 2004). That TSA recognized the correlation between hand-carrying bins and TSO injuries is apparent from the 2006 Design Guide, which states: "Lifting and carrying of bins by TSOs is known to be a significant injury risk and should be eliminated if possible." PX 1193 at 16. A February 2007 GAO Report on TSA Staffing Models states that "TSO injuries were a significant drain [on TSA] workforce." PX 1175 at 56. Mr. Malackowski also opined that lack of standardization added to injury levels.

In response to on-the-job injuries, TSA stated that it no longer endorsed hand-carrying of bins by TSOs:

Bin carts are similar to a hand cart or dolly to transport a large number of bins without requiring excessive lifting or carrying by a TSA agent . . . In the past, bin cart transport by TSOs was a primary cause of on-the-job injuries. Hand-carrying of bins is no longer endorsed by TSA.

PX 1172 at 26 (TSA 2009 CDG). The '460 system, by eliminating the hand carrying of trays, would have had a beneficial impact on reducing TSO injuries. This is confirmed by a TSA press release, which reported that injury rates were reduced by 90% following implementation of the '460 method during the pilot program at LAX. PX 84 at 2. A June 12, 2007 TSA e-mail provided similar support: "Since LAX has optimized the checkpoints including the transition to using the bin carts, we have reduced our [workers' compensation claims] by at least 65%." PX 1191 at 1.

Mr. Hosfield analyzed data related to fewer TSO injuries in order to calculate a per-passenger cost savings to TSA. He concluded that TSA avoided 6,855 lost time events through use of the '460 patent from 2008 through 2018. After subtracting Air Marshal injury cases, he also came up with an average workers' compensation cost per TSA injury for each year. Using those numbers, he calculated a per passenger savings attributed to reduced injuries. He concludes that the cost savings from fewer TSO injuries

from the '460 method results in another positive economic indicator of \$0.007 per passenger.

Mr. McGavock, defendant's expert, conceded Mr. Hosfield's overall point, agreeing that injury reduction is a solid economic indicator: "I think the injury rate statistic is probably the most solid in terms of the difference between hand carrying and the two-cart method in terms of quantifying [a royalty]." Tr. 3081:10-13. He went on, however, to criticize Mr. Hosfield's numbers. Mr. McGavock testified that, "what I tried to do is apportion using actual data and empirical data before and after use of the patented method to apportion down to bin-related injuries, which would be closer to the value associated with the patented invention." Tr. 2984:24-2985:3. He determined that, when the injury reduction value is corrected to specifically analyze bin-related injuries as opposed to any type of injury at checkpoints, the value would be reduced from \$0.007 per passenger to \$0.001:

I did the same type of math that Mr. Hosfield did to determine a but-for lost time cases, subtract actual time cases, to get what the implied savings were in terms of reduced injuries. So it's interesting, when you look at just bin-related injuries, there's a 58 percent adjustment, but bin injuries are only a small percent of total checkpoint injuries, whereas [Hosfield] just applied this whole percent to total checkpoint injuries. So that's a long way of saying what I tried to do is *apportion* using actual data and empirical data . . ."

Tr. 2985:15-25 (emphasis added). In other words, Mr. McGavock did a similar calculus but limited his inputs to those injuries attributed to bins, which would have been the injuries most likely to have been reduced by the use of plaintiff's method. We find that reduced injuries is a relevant factor in determining a royalty, as both parties acknowledge, although we find defendant's argument as to the valuation of that factor more persuasive.

d. Reduction in TSO Staffing

SecurityPoint contends that TSA was able to hire fewer TSOs after it implemented the '460 patent. Mr. Hosfield was the expert responsible for calculating these savings. He relied on the following inputs: the number of hours worked annually by TSOs, the average cost per hour to maintain a TSO, and total passenger throughput. Against these, he applied a percentage reduction in the number of TSO hours which he attributes to use of the patented method.

That percentage, of course, is critical. He derives the number from two reports. The first is the December 2006 TSA Information Bulletin summarizing the SecurityPoint pilot at LAX: “bin return carts reduce the frequency of moving bins from the sterile to non-sterile side by 80%.” PX 84 at 2. Secondary support for this number comes from The Safe Skies study, which showed that there was an 84-90% reduction in tray movements using the ‘460 patent. *See* PX 1149 at 14. It also comes from an internal TSA memorandum which states: “Preliminary results of the pilot indicate favorable results due to the consistent and unlimited equipment supplies for each lane. This includes reduction of time for current screener (manual) bin return . . . [B]in reruns have been reduced drastically.” PX 607 at 2. Mr. Shields also testified that the use of carts allowed TSOs to move more trays at a time, and he agreed that it “reduced drastically” tray reruns and led to a “reduction of time for current screener.” PX 1209 at 60 (Shields Dep.).

The second critical piece in deriving a percentage savings was drawn from the 2005 Cambria study, prepared for TSA, which analyzed the benefits of potentially using an automated conveyor system. As part of that study, it was determined that a TSO stationed at the recompose area of the checkpoint (an “exit floater”) spent 34-35% of his time on tray management. PX 1122 at 6. Mr. Hosfield then applied these two percentages—80% fewer TSO movements and 34% of an exit floater’s time—to come up with a 27.2% reduction in TSO hours due to use of the patent. He then converted that into a .41 Full-Time Equivalent (employee) savings per lane, resulting in a total of 532 to 696 TSOs fewer per year for a total cost savings to TSA of \$510,774,633, which converts to a \$0.075 cost savings per passenger.

We agree that the overall point is well taken. There no doubt were far fewer trips back and forth for TSOs, and that had value for TSA in terms of less work pressure and fewer distractions for TSOs and perhaps fewer hires. What we cannot accept at face value are Mr. Hosfield’s numbers. It assumes a frictionless conversion of fewer motions into fewer employees. As Mr. Hosfield conceded, the best evidence of his hypothesis would have been an actual decline in TSOs employed. In that regard, Mr. Hosfield’s export report indicates a reduction in TSOs with job titles related to checkpoint security from 2008 to 2017 but also recognizes that total TSOs employed increased during the period.³⁴

³⁴ He also claimed that, regardless of the actual number of persons employed, TSA reaped the benefit of having more time available to TSOs for security-related functions as a result of the patented method.

In summary, we view factors 9 and 10 as very important to the negotiations. Even after discounting for the effect of other changes that improved efficiency, we are persuaded that the switch from hand carrying trays to the two-cart system significantly improved the flow of passengers through checkpoints. That certainly had the effect of making checkpoints safer by increasing passenger throughput and decluttering. It decreased the number of injuries to TSOs, and it took pressure off both the individual TSO in doing his or her job and on the agency in deciding how many officers to hire and where to place them. We believe TSA was willing to pay for these benefits.

5. Factor 11: Extent of Use of Claimed Invention

The eleventh *Georgia-Pacific* factor is “[t]he extent to which the infringer has made use of the invention; and any evidence probative of the value of that use.” 318 F. Supp. at 1120. While both parties discuss this factor, we find it adds nothing useful to calculation of a royalty rate here. The first component, extent of use, is accommodated by our findings on infringement. This was a contested issue but now it has been resolved. Applying any appropriate royalty based on use will incorporate this factor. The second component, value of that use, was addressed in our discussion of factor 10.

6. Factor 13: Apportionment Between Patented and Unpatented Elements

As cautioned earlier, in valuing damages, plaintiff must be careful to seek only the value provided by the patented elements. *Ga.-Pac. Corp.*, 318 F. Supp. at 1120. To the extent that this consideration is relevant to a government entity, we believe we have taken it into account in assessing factors 9 and 10, by limiting benefits to those traceable to the patent.³⁵ There is value in the screening lane attributable to equipment not unique to the patent, such as tables and scanners. It is also true that trays were used before the patented method. Each of those items pre-existed the patented method, although they are utilized in the patented method. But we do not believe it to be appropriate to use them to discount the improvements unique to plaintiff’s patent. The proper comparison is between screening lanes which do not use the patented method and those which do. Our earlier comparison

³⁵ We also note that this consideration is most apt in a lost profits case, a remedy not sought here.

isolates the benefit of the patented method by asking what value was added by the insight of using two carts to cycle trays through a screening lane.³⁶

7. Factor 14: Expert Opinions

The thirteenth *Georgia-Pacific* factor is “[t]he opinion testimony of qualified experts.” 318 F. Supp. at 1120. As the parties note, this factor is subsumed in the court’s consideration of other factors. It does not warrant separate treatment.

8. Factor 15: Bargaining Position of Parties at Hypothetical Negotiation

Finally, in constructing the hypothetical negotiation scenario, the court should consider the relative strengths of the parties’ bargaining positions. “The fifteenth factor sets forth the ‘willing buyer/willing seller’ hypothetical negotiation through which the other fourteen factors are to be considered.” *Proctor & Gamble Corp.*, 989 F. Supp. at 613.

Mr. Malackowski concluded that SecurityPoint would have the upper hand due to the benefits provided to TSA: TSO cost savings, passenger time savings, and the high cost of employing alternatives to the ‘460 method. Plaintiff also points to its history with Adason as an example of success in asserting its intellectual property rights. We agree that these facts generally support plaintiff’s bargaining position. There is no question that TSA faced a serious problem, and plaintiff’s invention provided a solution. We know that it struggled to avoid using the method and failed until at least 2018. And even then, the government only uses the alternative MPC method at a handful of airports. Further, the Adason settlement suggests that the method had real commercial value.

Nevertheless, TSA was plaintiff’s only customer for its patented method, as opposed to advertising space. This gave significant leverage, in our view, to TSA in the hypothetical negotiations. For all practical purposes, SecurityPoint operated at the sufferance of TSA because TSA has a monopoly on access to security lanes. In pursuing its business model, plaintiff could not access advertising revenues unless it could get cooperation from the government, as became apparent when TSA adopted the MOU

³⁶ This is in distinction to the exercise we engaged in earlier scrutinizing the data plaintiff’s experts relied on in calculating time savings per passenger. That data was clouded by features unrelated to the patented method, such as improved equipment and use of one scanner for two lanes.

directed at obtaining indemnification assurances from airport operators. The MOU illustrates both that TSA had strong concerns that it was violating the patent and that it wanted access to the patent, but it also illustrates how fragile was plaintiff's ability to exploit its patent.

The compensation we award does not assume that plaintiff would benefit from advertising access—compensation has to be measured simply in terms of what the parties would agree to in giving TSA access to plaintiff's patent. Nevertheless, because plaintiff had the most to lose in failed negotiations, we believe the parties' unique relationship favors the government. Although we have to assume the parties wanted to reach a compromise, we recognize that TSA wanted, but did not absolutely need plaintiff's patent; whereas plaintiff only had TSA as a potential customer.

C. The Royalty Rate

All of the above considered, we find a reasonable royalty rate of two cents per passenger to be appropriate. We believe the parties would have found themselves in something like the following positions in 2005. Plaintiff owned a very useful method for significantly improving passenger throughput at security lanes, which TSA recognized would solve a long-standing efficiency problem and improve security in the process. TSA badly wanted to use the method, but was unwilling to pay for it, hoping either that the patent would turn out to be invalid, or could be designed around.

Plaintiff badly wanted to exploit its patent, but without access to security lanes, the patent was basically useless. The parties thus had every incentive to reach an agreement, but one which recognized the length of the term of the patent. Unlike a commercial license agreement, whereby both parties hope to profit, TSA would not have been able to recoup any of the royalty on the backend.³⁷ Although TSA wanted to use the patent and would have been willing to pay a running royalty, we believe that the specter of paying a royalty for a very high number of passengers over a very long period would have made it only willing to consider a running royalty if it were relatively small.

³⁷ We do not agree with plaintiff's position that TSA would have, in essence, passed the buck to airline passengers viz-a-viz air travel safety fees tacked on to airfare. There was no evidence introduced nor legal argument made that these funds were available to TSA outside of the normal appropriation process controlled by Congress.

Plaintiff's eight cent figure failed to meaningfully account for the government's non-patent contributions and for the relatively long life that this agreement would have had.³⁸ The Adason agreement provides a starting point, but it does not represent the minimum that plaintiff would have been able to insist on. Adason was faced with the threat of bankruptcy if it did not settle with SecurityPoint. It had no recourse or option other than to pay and enter into a new arrangement with plaintiff going forward. TSA, on the other hand, would not have been threatened, other than by a suit for damages, in the same as was a private party. Further, Adason and SecurityPoint were competitors in the travel advertising space. They were both interested in capturing advertising clients. In the hypothetical negotiation, TSA would have been uninterested in the benefits of advertising. These are reasons to lower the rate derived from the Adason settlement.

We begin with the Adason rate but reduce it to two cents per passenger to account for the differences in the positions of TSA and Adason, TSA's non-patent-attributable contributions, the fact of the long duration and large base involved, and, in addition, in the absence of any better way to measure it, to account for reduction in the base to account for leakage due to use of bin islands, crossovers, and PreCheck lanes. We also believe that two cents per passenger more likely reflects the actual savings to TSA from reduced injuries and reduced manhours, especially given our finding discounting Dr. Jacobson's work quantifying those benefits, and it accounts for the more intangible benefit to TSA's primary mission, aviation security. The rate set, we calculate the base to come up with the license payment before interest.

D. The Base

Between January 1, 2008 and April 30, 2020, 7,660,935,659 passengers passed through Cat X and Cat I airports.³⁹ That forms the base for the royalty, although two deductions are appropriate.

³⁸ Although Mr. Malackowski contends that in calculating the \$0.08 royalty he gave TSA the benefit of its contributions to the security process, such as TSA's TSO training and equipment improvements, we see no apportionment in his per passenger royalty other than his conclusory statement.

³⁹ PX 1202. This number will need to be trued up to reflect the actual TSA passenger throughput as of the date of judgment.

1. ASL Lanes

ASL lanes, or “Automated Screening Lanes,” are lanes in which carts are not used and trays are automatically returned. There is no question that they do not employ the ‘460 patent. Atlanta is the only airport with ASLs in every lane and was the only airport deducted from Mr. Tarakemeh’s and Dr. Barnett’s airport usage study. Plaintiff deducted passengers who passed through ASL lanes from its base, leaving a total of 5,937,271,709 passengers who passed through checkpoints where there were no implied licenses or ASLs (using its figures for implied licenses).

The government did not provide its own numbers on ASL throughput. We thus apply the TSA-generated numbers used by plaintiff in calculating an ASL deduction to the passenger throughput base, which will also have to be adjusted to reflect usage after the date of trial and before judgment.

2. Implied Licenses

We found that TSA held an implied license to use the ‘460 method at certain airports but left the issue of the scope of the license for trial. *SecurityPoint Holdings, Inc. v. United States*, 147 Fed. Cl. 499, 503-04 (2020). Plaintiff requests reconsideration of our prior ruling. It argues that an implied license does not exist at all because SecurityPoint’s placement of its system at airports was done under economic duress because it was forced to choose between negotiating with TSA or losing the opportunity to continue installation of SecurityPoint’s equipment at airports. Mr. Ambrefe testified that, “If I did not sign the document, I would not have been able to continue installation [of equipment].” Tr. 173:2-3.

We previously rejected plaintiff’s argument of economic duress, finding that “Plaintiff offers not a scintilla of evidence that it was in any way coerced to sell advertising in exchange for providing trays and carts.” *SecurityPoint*, 147 Fed. Cl. at 503. A review of the evidence during the infringement and damages trial does not warrant a different outcome. As we previously held, “[i]t was plaintiff, in fact, that approached the government, prior to TSA’s use of the patented method, with an unsolicited proposal to begin supplying its system and materials to the government in exchange for the right to place advertising.” *Id.*

In the alternative, plaintiff argues that, if an implied license does exist, the license should only apply to instances in which SecurityPoint received consideration in the form of advertising revenue. To support its argument, plaintiff cites *Fuji Photo Film Co. v. Int’l Trade Comm’n*, 474 F.3d 1281,

1294 (Fed. Cir. 2007), which held that, “An accused infringer does not acquire an implied license unless it has actually paid full compensation.” Mr. Ambrefe prepared a document that provided the timeframes during which advertising contracts were in place with SecurityPoint, distinguishing instances in which SecurityPoint did not receive consideration. He explained that there were gaps in the chart during which SecurityPoint continued to provide its equipment to airports but it did not have advertising contracts in place. Mr. Malackowski then prepared his calculation:

The deduction for the implied license . . . should occur at any time that SecurityPoint had an agreement with an airport that provided them with compensation for use of the invention . . . So in order to know when SecurityPoint was actually compensated for use of their technology, I requested, through counsel, for Mr. Ambrefe to prepare an analysis or a summary [PX 1415] of the business records showing each and every contract in place for each and every airport.

Tr. 1908:23-1909:9. His 21.2 percent deduction for implied licenses reflects only those periods and airports in which SecurityPoint had active advertising contracts.

In contrast, Mr. McGavock based his implied license deduction of 31 percent on any period during which SecurityPoint had a contract for access with an airport. Defendant argues that this was appropriate because SecurityPoint received the benefit of access to TSA checkpoints and the opportunity to receive revenue, not the revenue itself, by installing its equipment at checkpoints. This is also consistent with plaintiff’s counsel’s statement during the claim construction hearing that “TSA has entered into . . . a memorandum of understanding with about 40 airports where the SecurityPoint system is in place, and again we’re not claiming infringement for any of those situations because it’s under an implied license.” ECF No. 48 at 57:6-11.

We agree with defendant that whether SecurityPoint was able to commercialize its opportunity has no bearing on the existence of the license. The proper approach to determine the scope of the implied license is to count each instance in which SecurityPoint had an agreement with an airport to provide trays and carts to implement its method, not just periods during which SecurityPoint had advertising contracts. By deploying its equipment at TSA screening checkpoints, SecurityPoint gained access, which conferred the benefit of an opportunity to sell advertising in its trays, regardless of whether an advertising contract was in place. Compensation therefore should

be reduced by 31 percent reflecting passenger throughput from 2008 to 2018 at airports affected by the implied license.

E. Damages Calculation

If we were to assess the royalty as of the date of this opinion, it would come to \$103,685,510, derived as follows: 1) a royalty base of 7,660,935,659 passengers at Cat X and I airports from January 1, 2008 to April 30, 2020; 2) less 2,374,890,054 (31%) to account for TSA's implied license; 3) less 101,770,092 (ASL passenger throughput); and 4) applying the per passenger royalty of two cents per passenger:

1) Category X and I Passenger Throughput	Passenger Throughput	7,660,935,659
2) Implied License Deduction	31% Implied License Deduction	31%
Passenger Throughput covered by Implied License		2,374,890,054
Remaining Passenger Throughput After Deduction for Implied License	Remaining PAX (after 31% deduct)	5,286,045,605
3) ASL Passengers	Passenger throughput related to ASL screening lanes that do not practice the patented methods and excludes overlapping passengers already deducted from the implied license	101,770,092
Royalty Base	Calculated as Passenger Throughput Reduced by: 1) Implied License; and 2) ASL Throughput	5,184,275,513
4) Royalty Rate	Royalty Rate	\$0.02

Royalty Rate multiplied by the Royalty Base	Total Damages	\$103,685,510
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This calculation, however, is based on a passenger throughput figure as of April 30, 2020. Plaintiff is correct that this number should be updated through the date of judgment, including appropriate reductions for implied licenses and ASL lanes.⁴⁰ The same is true with respect to the application of interest, set out below. Accordingly, we leave to the parties the correct total judgment.

F. Delay Damages

The parties agree that delay damages should reflect the 10-year Treasury rate. We agree that this is a reasonable instrument, given the length of time of uncompensated infringement. Where the parties disagree is whether to apply over the entire 16-year period the 4.02% rate prevailing in September 2005 when the hypothetical negotiation took place, or whether to apply the rate prevailing when annual royalty payments would have been made.

The overarching principle is to make the patent holder whole. *Gen. Motors Corp. v. Devex Corp.*, 461 U.S. 648, 655-56 (1983). While the “rate of prejudgment interest and whether it should be compounded or un-compounded are matters left largely to the discretion of the court,” *Boeing Co. v. United States*, 86 Fed. Cl. 303, 322 (2009), plaintiff is correct that “[g]enerally, the interest rate should be fixed as of the date of infringement, with interest then being awarded from that date to the date of judgment.” *Id.* (citing *Nickson Indus., Inc. v. Roi Mfg. Co.*, 847 F.2d 795, 800 (Fed. Cir. 1988)). And a fixed rate has been applied in recent decisions of this court. *See Davidson v. United States*, No. 13-942C, 2018 WL 4087269 (Fed. Cl. Aug. 27, 2018); *FastShip, LLC v. United States*, 131 Fed. Cl. 592, 627 (2017).

It is important to note, however, that in *FastShip*, a single award was made; the case did not involve a running royalty. While *Boeing Co.* involved damages based on periodic royalty payments, our reading of the case suggests that the court did not rely on a single fixed interest rate. 86 Fed. Cl. at 322-25. In *Davidson*, while the court did apply a single rate over multiple payments, the court noted that the periodic payments would have been heavily weighted to the front.

⁴⁰ Damages beyond the date of judgment are not available in this litigation.

We agree with defendant that the appropriate approach here is to assess interest at the ten-year rate as it fluctuated annually over the seventeen-year period, on an annually compound basis. We believe this best captures the intent of the Court in *General Motors*:

An award of interest from the time that the royalty payments would have been received merely serves to make the patent owner whole, since his damages consist not only of the value of the royalty payments but also of the forgone use of the money between the time of infringement and the date of the judgment.

General Motors Corp., 461 U.S. at 655–56. Plaintiff was not deprived of the entire amount of principal compensation from January 2008. Rather, it would have received royalty payments on an annual basis. As defendant correctly argues, ignoring this fact makes damages look more like a lump sum approach was taken and would result in overcompensation in light of the fact that interest rates have declined over the intervening 13 years. *Accord Brunswick Corp. v. United States*, 36 Fed. Cl. 204, 218–219 (1996) (The purpose of delay compensation is to “place [plaintiff] in the economic position it would have held had royalties been timely paid and prudently invested to produce return and preserve the principal.”).

CONCLUSION

For the reasons set out above, we conclude that plaintiff has established comprehensive infringement of its patent at all Cat X and Cat I airports beginning in January 2008 and running through the date of entry of judgment, with the exceptions set out. Plaintiff has established entitlement to a running royalty based on \$0.02 per passenger. Delay damages are fixed as set out herein. The precise quantum of damages, including interest, is left to the parties’ calculation.

Pending motions ECF No. 554 and 555 are dealt with in the opinion: we grant plaintiff’s motion to strike (ECF No. 554) portions of Mr. McGavock’s supplemental expert report (DX 1814), and deny plaintiff’s motion for judicial notice (ECF No. 555) as both moot and not warranted. Other pending motions are denied as moot: ECF No. 524, 525, 540-546, 551, and 553.

The parties are directed to consult regarding damages through the date of judgment as directed in this opinion, including the quantum of interest,

and file a joint status report on or before October 1, 2021, informing the court of an agreed-upon amount or their respective positions as to that figure. Entry of judgment will be deferred until that status report.

s/ Eric G. Bruggink
ERIC G. BRUGGINK
Senior Judge