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Internal Revenue Service  
**Memorandum**

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to: Global Team Manager  
(LMSB Team 1693)

from: Associate Area Counsel (Detroit)  
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subject: I.R.C. SECTION 41(d)(4)(A): QUALIFIED RESEARCH; ACTIVITIES AFTER THE BEGINNING OF COMMERCIAL PRODUCTION

This field attorney advice memo responds to your request for assistance regarding whether activities at \_\_\_\_\_ assembly plants occur after the beginning of “commercial production” as defined by I.R.C. section 41. This memorandum should not be cited as precedent.

**I. Issues**

- A. Whether the activities identified and associated with \_\_\_\_\_ assembly plants constitute activities “after commercial production” as defined in Internal Revenue Code (“I.R.C.”) section 41(d)(4)(A) and Treasury Regulation section 1.41-4(c)(2).
- B. If any activities identified and associated with \_\_\_\_\_ assembly plants do not constitute activities “after commercial production” as defined in I.R.C. section 41(d)(4)(A) and Treasury Regulation section 1.41-4(c)(2), which expenses at the assembly plant are includable as Qualified Research Expenses for purposes of computing the research credit under IRC section 41, subsections (b)(2) and (b)(3)?

**II. Conclusions**

All activities identified and associated with \_\_\_\_\_ assembly plants constitute activities “after commercial production” as defined in I.R.C. section 41(d)(4)(A) and Treasury Regulation section 1.41-4(c)(2) because both the

manufacturing and product business components meet “the basic functional and economic requirements of the taxpayer for the component’s sale or use.” Consequently, none of \_\_\_\_\_ expenses at the \_\_\_\_\_ assembly plant are Qualified Research Expenses.

### III. Facts

\_\_\_\_\_ development program (“\_\_\_\_\_”) consists of two distinct functions: \_\_\_\_\_ (“\_\_\_\_\_”), which designs both the company’s products and the processes to manufacture those products, and the assembly plants, which build the products. The product design program at \_\_\_\_\_ is responsible for both major \_\_\_\_\_ programs and minor, annual changes. A major \_\_\_\_\_ program is a multi-year, multi-step process that, for major product redesigns or new \_\_\_\_\_, may begin five or more years before an assembly plant produces any \_\_\_\_\_ for sale. For minor changes to existing products, \_\_\_\_\_ employs a smaller division of designers and engineers that focuses on specific \_\_\_\_\_ parts and implements the changes on any of the other \_\_\_\_\_ that the company currently manufactures.

At the same time the company is examining \_\_\_\_\_ design, the manufacturing process division is working on the manufacturing process necessary to build the

\_\_\_\_\_ personnel conduct similar research on \_\_\_\_\_ and \_\_\_\_\_ development. After appropriate \_\_\_\_\_ engineers are satisfied the new or improved \_\_\_\_\_ are ready for production, the \_\_\_\_\_ program moves to the pilot plant, or, for minor changes to existing products, directly to the assembly plant where the \_\_\_\_\_ already is in production.

#### A. Pilot Plant Prototype Builds

During the design phase, \_\_\_\_\_ engineering conducts validation and durability testing on \_\_\_\_\_ subassemblies; for example, \_\_\_\_\_ . In addition, \_\_\_\_\_ conducts computer simulation programs throughout the design phase that simulate real-world durability testing on computer models of the \_\_\_\_\_ . After designers and engineers have completed work on the product’s design, the company builds prototype \_\_\_\_\_ at a \_\_\_\_\_ pilot plant to ensure that all parts fit as planned. These prototype \_\_\_\_\_ are hand-built in a process that takes between \_\_\_\_\_ . Early prototype builds begin with the \_\_\_\_\_ and later include a \_\_\_\_\_ . Later prototypes, although still hand-built, are more complete \_\_\_\_\_, including the \_\_\_\_\_ . \_\_\_\_\_ engineers from company headquarters oversee \_\_\_\_\_ durability, safety, and design validation tests. The company may test thousands of individual parts on a \_\_\_\_\_, and, \_\_\_\_\_, these prototype \_\_\_\_\_ . After the company \_\_\_\_\_ conducts all the durability and quality tests, it certifies the \_\_\_\_\_ for release to the

production plant. All pilot plant prototypes are scrapped after the tests are complete.

### B. Manufacturing Process Implementation

While the designers are finishing their work and the pilot plant is building prototypes, a separate division of engineers is developing the manufacturing process to mass produce the product. These engineers establish specifications for the new equipment the assembly plant will require and solicit bids from vendors. requires prospective vendors to develop a rough concept before submitting a bid in order to determine if they can build the equipment to company standards. The winning vendor must perfect the concept through lab tests and computer modeling, during which the vendor's engineers anticipate a number of potential problems that may occur at the production location and build fixes into the equipment. Because the new equipment is too large to install at the vendor's location for trial and error testing, the vendor builds and troubleshoots the equipment at assembly plant. The equipment vendor, by accepting purchase order, guarantees that the equipment will operate at predetermined specifications, although requires as many as eight trial runs at the plant before it will accept the equipment.

### C. Assembly Plant Builds

After the vendor installs the plant equipment and after certifies the product for release from the pilot plant, the assembly plant conducts several phases of builds before the plant builds " , " the first official production . is not the first sold, though, as the company sells some produced prior to . Nevertheless, takes the position for purposes of claiming the research credit that nearly all activities at the assembly plant qualify as a continuation of the qualified research begun at the Program inception and continue until the first production is certified " ." The certification , described in detail below, is the last phase of the process before are shipped to . It occurs shortly after the assembly plant produces .

Activities at the assembly plant occur in the following phases:

#### 1. *Build ( )*

The build may occur while the vendor is installing and troubleshooting the equipment at the assembly plant, but this phase nonetheless proceeds only after has certified the process for plant release after the vendor's extensive testing and simulation. Its purpose is to evaluate new, revised, and current tooling. The company builds approximately during this phase, which occurs approximately before . The plant ships these to for quality control tests, although personnel sometimes travel to the plant to conduct certification testing. Potential problems in this phase could

involve the failure of the tooling or robotic welder to locate certain parts, and such equipment would require recalibration. Quality control personnel must certify the process before the next phase may begin. All built during this phase are scrapped once the company certifies that the product and process may move to the next phase.

## 2. Build ( )

The purpose of the build is to evaluate part function and fit, design intent, and process capability, and usually it occurs after has accepted the vendor's new and modified plant equipment. The assembly plant builds between approximately before . The company does not sell these ; instead, it ships them to the for tests, although employees sometimes travel to the production plant for these tests. If the personnel do not certify the , the company repeats the process.<sup>1</sup> If the company certifies the , the product and process move to the next phase. The company scraps all built during this phase.

Together, the builds are the first complete trial runs—after the prototype phase for the product and the equipment installation for the manufacturing process—for the company to evaluate the concepts developed over several years at the headquarters engineering labs. Plant personnel build these , and cross-function teams study them to ensure that the process is working as designed and tested in earlier simulations. In addition to the problems identified in the build, for example, the process may reveal that the tooling used to construct the vehicle from its individual parts requires rework because . The company identifies hundreds of these issues and tracks the remedial progress in later plant builds.

## 3. Build ( )

The assembly plant builds between during the build approximately before . The purpose of this phase is to evaluate corrective actions from the build phase. sells most of the that pass certification as , although it retains some for extensive testing. The sold may require parts retrofits, however, if the company develops updated parts in later build phases.

## 4. Build ( )/ Build ( )

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<sup>1</sup> The phases presumably are reserved for additional testing runs should the phase fail to pass certification, although the company did not indicate that any phases usually occur.

The company uses the build phase to determine whether all prior corrective actions related to design or manufacturing process were successful. The assembly plant builds about before , including several current customer orders to ensure that problems will not exist in a variety of combinations offered for sale. These normally are sold as new, but some may require parts retrofits for any parts changed during the build phases.

5.

is the officially announced first production , although the company does not automatically ship it to . Additional certification is required following before ships any to customers, a step the company calls “ certification. The company holds in quarantine all built before

in case engineers discover a problem with the . The assembly plant must then correct the equipment causing the problem and fix any defective . Depending on the complexity of the problems, if any, the certification takes between

#### IV. Legal Analysis

Section 41 of the Internal Revenue Code allows an incremental credit for qualified research activities. “Qualified research,” as defined in the Code and Treasury Regulations, encompasses:

1. Expenditures that may be treated as expenses under I.R.C. section 174;
2. Activities undertaken for the purpose of discovering information that is technological in nature and will be useful to the taxpayer in developing a new or improved business component; and
3. Research in which substantially all activities constitute elements of a process of experimentation.

I.R.C. § 41(d); Treas. Reg. § 1.41-4(a). This three-part test for qualified research applies to each discrete business component—a specific product or process—in which the taxpayer incurs qualified research expenses. has two distinct business components: the it produces, and the manufacturing process it uses to mass produce the .

I.R.C. section 41(d)(4) excludes from the definition of qualified research eight enumerated activities:

1. Activities that take place after commercial production begins;
2. Adaptation of existing business components;
3. Duplication of existing business components;

4. Surveys, studies, or routine testing for quality control;
5. Certain research related to computer software, except to the extent provided in the regulations;
6. Research conducted outside the United States;
7. Research in the social sciences or humanities; and
8. Research funded by another person or entity.

The regulations explain which activities occur after commercial production begins. Activities occur after commercial production begins if the business component is developed to the point where “it is ready for sale or use, or meets the basic functional and economic requirements of the taxpayer for the component’s sale or use.” Treas. Reg. § 1.41-4(c). The regulations at section 1.41-4(c)(2)(ii) specify activities that are deemed to occur after commercial production begins:

1. Preproduction planning for a finished business component;
2. Tooling up for production;
3. Trial production runs;
4. Trouble shooting involving faults in production equipment or products;
5. Accumulating data relating to production processes; and
6. Debugging flaws in a business component.

argues that the are not “ready for commercial sale or use” and the manufacturing process does not “meet the basic functional economic requirements . . . for the component’s sale or use” until after the final certification. But the facts indicate otherwise. Based on the facts presented by , all activities relating to both business components that take place at the assembly plant occur after commercial production has begun because they are the very activities listed in section 1.41-4(c)(2)(ii) or the regulations.

The build is the first assembly activity at the plant after vendors have installed the new or modified equipment. The activities that occur during this phase are specifically addressed in the regulations as those activities deemed to occur after the beginning of commercial production. The very name “ ” illustrates that, by this point in the company’s manufacturing process, the product and process both are developed to the point where they meet the company’s basic functional and economic requirements. In fact, the process (the design of the assembly line) was developed to the point where it met the company’s basic functional requirements even earlier, when the vendor completed its design to specifications and accepted the bid to begin construction at the plant. certifies both business components for plant release after many years of extensive research and testing, and, at this point, the company is ready to commit many of dollars to mass produce the because it is sure that it is physically possible to do so as designed by . The company indicates that certain problems do occur during this phase, but the mere existence of problems does not mean commercial production has not begun. If, for example, a robotic welder cannot properly locate a part, has not represented there

is any uncertainty about how to correct that problem. Because the activities in this phase involve tooling-up for production, trial production runs, and trouble shooting and debugging flaws, it is clear that commercial production began before the business components entered this phase.

During the build, like the build before it, all activities are those deemed to occur after commercial production begins. and manufacturing process development activities are similar to Example 1 in section 1.41-4(c)(10) of the regulations, which illustrates the difference between pre- and post-commercial production activities. In Example 1, X, a tire manufacturer, wants to use a new material in its product, and it must modify its manufacturing process to do so. Because the required manufacturing method is neither commercially available nor readily apparent, X engages in a process of experimentation to discover a useful method. X eventually decides a new belt is necessary and conducts sophisticated tests on several designs to create one that meets its requirements. X then manufactures the belts it needs and installs them in its production process. Example 1 holds that X's experimentation in designing the belt constitutes qualified research, but X's installing and testing the belts occurred after commercial production had begun because the belts at that point met X's functional and economic requirements.

activity at the assembly plant, starting with the build and progressing to the later phases, is more like X's belt installation and troubleshooting in Example 1 than X's development of the belt. All of research took place before it certified the and process for plant release. The assembly plant activity before , though substantial, consists of trial runs and troubleshooting. It is inconceivable that, after many years of research and development, would leave significant items like and manufacturing process design uncertainties to be resolved at the assembly plant a mere before the product's release. In fact, the company represents that a new launch has never been cancelled once it enters the assembly plant.

**V. Conclusion**

Based on all these facts, it is clear that commercial production has begun by the time the \_\_\_\_\_ and manufacturing process business components reach the assembly plant because they meet the company's basic functional and economic requirements—\_\_\_\_\_ already has decided it is possible to mass produce the \_\_\_\_\_. \_\_\_\_\_ is not per se precluded from claiming the research credit for activities that occur after commercial production if it can show that such activities qualify under the section 41(d) three-part test. Treas. Reg. § 1.41-4(c)(10); T.D. 9104, 69 F.R. 22 (Jan. 2, 2004). But the company's claiming activities from the beginning of the development process through \_\_\_\_\_ and \_\_\_\_\_ is erroneous because it ignores the pre- and post-commercial production distinction of sections 41(d)(4) and 1.41-4(c)(2). For these reasons, \_\_\_\_\_ may only claim the research credit for expenses for research activities at the assembly plant if these expenses relate to qualified research independent of research conducted before commercial production began.

Please call \_\_\_\_\_ if you have any further questions.

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