1. After study of the RFID technology and its potential uses in Harley-Davidson’s supply chain, I will explain the advantages and disadvantages for Harley-Davidson (H-D) to replace its bar codes and scanners technology with RFID.

**Advantages for Harley-Davidson to replace bar codes technology with RFID**

* Unlike a [barcode](http://en.wikipedia.org/wiki/Barcode), the RFID tag does not necessarily need to be within line of sight of the reader, and may be embedded in the tracked object. This allows items to be scanned without moving them, which saves time and resources.
* Also without the need to align the reader within line of sight of the item, inventory can be stored closer together in a smaller volume, making space for more inventory.
* The in-work progress of motorcycle manufacturing can be made faster, easier, and better quality by replacing manual tasks to do time-accounting of the workers, with the automation done by the detection and locating of parts and assemblies by RFID.
* It would be very cost-effective to use inexpensive passive tags (15¢/unit) on boxes and pallets of parts in inventory to trigger resupply upon low stock levels. And the tags are probably already on the packaging from suppliers, so H-D can take advantage of existing, vertical-supply logistics. These tags have a range of 1-12 meters which is good for stationary stock bins of small parts.
* It would also be very cost-effective to use moderately-expensive active tags ($5/unit) on assembled units of parts as they are built on the assembly line. These tags have a range up to 200 meters which is good for detecting the location of assembled units that are moving down the assembly line.
* Comparing production rates of assemblies and the resupply rates of parts, can be simplified by the RFID detection technology, to fine-tune Just-In-Time Manufacturing.
* Quality control can be improved by analyzing defective components to identify the production area, manufacturer date, and shift personnel involved with the defect.
* Active tags would probably reduce pilferage (inventory shrinkage) of expensive unit assembles. Similarly, RFID has been adopted for item-level retail uses, called electronic article surveillance (EAS).
* Other benefits of using RFID include the reduction of labor costs, the simplification of business processes, and the reduction of inventory inaccuracies.[[1]](#endnote-1)
* Logistics and transportation are major areas of implementing RFID technology. H-D ships its motorcycles all over the USA and the world, RFID can help in yard management, shipping, freight and distribution centers.
* RFID tag’s large data capacity allows for uniquely identifying the item among many other items. That lends the capability to track the item as it travels great distances, i.e. from fabrication, through assembly, transportation logistics, to stores and finally to the consumer. That affords the security of the item by accurately track its identification and location history.
* RFID tags can be detected, by the hundreds, simultaneously. Versus barcode which is one item at a time.

**Disadvantages for Harley-Davidson to replace bar codes technology with RFID**

* RFID tags are a complement but not a substitute for UPC or EAN barcodes. Barcodes can be generated and distributed electronically, e.g. via e-mail or mobile phone, for printing or displaying by the recipient.
* The large amount of data stored by RFID requires filtering and categorizing.
* There is a possibility of reader collision. The signal of one reader can interfere with the signal of another reader. Techniques in the technology can avoid this, like TMDE.[[2]](#endnote-2)
* There is a possibility of tag collision. The signal of more than one chip reflects back at the same time and confuses the reader.
* Metallic surfaces have an adverse impact of the range of the RFID tag and some of the assembled units that make up a motorcycle are of only parts made of metal. An RFID may not be detected so easily for these items.

An excellent paper on this subject is “Radio-Frequency Identification (RFID): Harley-Davidson”[[3]](#endnote-3)

2. I have developed a timetable for adoption of RFID technology with specific recommendations on where it should be implemented first. Time delays at each stage of the supply chain will be justified.

* Since I propose the adoption of two RFID systems which work together, I recommend implementing both of them at the same time. That way, the effort to develop the application software to analyze their relationship can proceed immediately. As soon as the system can detect both, parts and assembled units, then automatic resupply can adjust manufacturing for JIT production.

1. Radio-frequency identification - Wikipedia, the free encyclopedia, downloaded from http://en.wikipedia.org/wiki/Radio-frequency\_identification [↑](#endnote-ref-1)
2. Frequently Asked Questions - RFID Journal , downloaded from http://www.rfidjournal.com/site/faqs#Anchor-What-41681 [↑](#endnote-ref-2)
3. Radio-Frequency Identification (RFID): Harley-Davidson, downloaded from http://blog.thomwire.com/2011/09/radio-frequency-identification-rfid.html [↑](#endnote-ref-3)