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**United States Producer Price Index for Commercial and
Industrial Machinery and Equipment Repair and Maintenance
NAICS 811310**

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Introduction

The U.S. Bureau of Labor Statistics currently publishes a Producer Price Index (PPI) for the 2012 North American Industry Classification System (NAICS) industry 811310, Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance. This is the only index that the U.S. publishes in sub-sector 811, Repair and Maintenance. This paper discusses the development of this index.

1. Definition of the service being priced

The primary output of this industry is the repair and/or maintenance of commercial and industrial machinery and equipment. Repair involves performing operations to restore machinery and equipment to working condition, while maintenance involves performing procedures to ensure machinery and equipment remains in working condition and is properly maintained. Maintenance can involve cleaning, washing, and sanitation performed on industrial machinery or equipment used in food and beverage production. Inspecting and testing when performed in conjunction with repair or maintenance services are also considered primary to this industry. Inspection and testing of commercial and industrial machinery and equipment without repair services is classified in NAICS 541380, Testing Laboratories. In addition, repairs, which are covered by a manufacturer's warranty, performed by "warranty centers" are in scope of this industry. Turnover from the sale of parts used in repair or maintenance services is also considered primary to this industry.

Establishments in this industry primarily repair and maintain machinery or equipment that is owned by the buyer of the repair or maintenance service. This is distinct from resale activities that may also be performed by establishments in this industry. Resale activities include repairing owned parts, equipment, or machinery with the intention to subsequently sell to a third party. These resale activities plus any wholesale or retail sale of purchased parts not used for maintenance or repair are considered secondary output for firms in this industry.

2. Pricing unit of measure

The unit of measure for most service items is the repair or maintenance job. Repair or maintenance services vary with each piece of machinery or equipment repaired or maintained. The services rendered for each repair or maintenance job are adjusted based on buyer specifications and technical requirements. Since many repair and maintenance transactions are unique and not repeated, the U.S. uses model pricing for this industry. With this strategy, the U.S. collects the price of a unique service item with fixed components in the initial data collection period. In subsequent months, survey respondents are asked to estimate the values they would charge for each component based on their knowledge of the cost factors and market conditions currently affecting the service. The values of the fixed component estimates are then summed or totaled to obtain an estimated net price¹. Please see Section 7 for a description of the components used in calculating estimated net transaction prices.

Establishments in this industry may also offer recurring scheduled transactions under contracted terms. These are known as preventative maintenance contracts and consist of routine services performed for an agreed amount of time. The unit of measure for these transactions is per month or per year depending on the terms of the contract.

¹ The "estimated net price" is the estimated price of the selected repair or maintenance service including the value of the components and any applicable surcharges or discounts.

3. Market size

The following table provides size statistics for the Commercial and Industrial Machinery and Equipment Repair and Maintenance industry based on the 2007 Economic Census:

2007 NAICS Code	Meaning of 2007 NAICS code	Number of establishments	Turnover (\$1,000)
811310	Commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance	22,749	\$25,961,742

Source: U.S. Census Bureau, 2007 Economic Census (2012 Economic Census data is not yet available)

According to the 2007 Economic Census, this industry represents 18.9 percent of sub-sector 811, Repair and Maintenance.

4. Standard classification structure

2012 NAICS

The 2012 NAICS sub-sector 811, Repair and Maintenance classifies repair and maintenance services by the type of machinery and equipment. NAICS does not include separate classifications for services provided to businesses and those provided to households because many establishments serve both.

The NAICS 811 sub-sector structure is as follows:

2012 NAICS Group Code	NAICS title
8111	Automotive Repair and Maintenance
8112	Electronic and Precision Equipment Repair and Maintenance
8113	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance
8114	Personal and Household Goods Repair and Maintenance

NAICS 811310, Commercial and Industrial Machinery and Equipment Repair and Maintenance, comprises establishments primarily engaged in the repair and maintenance of commercial and industrial machinery and equipment. Establishments in this industry may either sharpen/install commercial and industrial machinery blades and saws or provide welding (e.g., automotive or general) repair services. They also maintain and/or repair agricultural and other heavy and industrial machinery and equipment (e.g., forklifts and other materials handling equipment, machine tools, commercial refrigeration equipment, construction equipment, and mining machinery).

Comparison to ISIC Rev.4

The following table illustrates the comparison between the NAICS 811310 and the International Standard Industrial Classification of All Economic Activities, Revision 4 (ISIC Rev.4) repair and maintenance activities:

2012 NAICS Code	2012 NAICS Title	ISIC Rev.4 Code	ISIC Rev.4 Title	Portion of ISIC included in NAICS 811310
811310	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	3311	Repair of fabricated metal products	Repair of all fabricated metal products except central heating boilers or power boilers and fire arms or ordinance.
		3312	Repair of machinery	Repair of all machinery except fabricated metal products, pulse generators, electrical equipment, shopping carts, trailers, other equipment, such as fishing nets, fertilizer bags, plastics and rubber products, non-metallic mineral products, commercial timing mechanisms, repair of trailers, and cleaning of industrial machinery.
		3313	Repair of electronic and optical equipment	Repair of pulse generators.
		3314	Repair of electrical equipment	Repair of all electrical equipment.
		3315	Repair of transport equipment, except motor vehicles	Repair of shopping carts.
		3319	Repair of other equipment	Repair of miscellaneous commercial and industrial equipment, such as fishing nets, fertilizer bags, plastics and rubber products, non-metallic mineral products, parking meters, and commercial timing mechanisms.
		4520	Maintenance and repair of motor vehicles	Repair of truck trailer refrigeration equipment.
		8129	Other building and industrial cleaning activities	Industrial machinery cleaning services.

Source: <http://www.census.gov/eos/www/naics/concordances/concordances.html>

North American Product Classification System

The following table lists the services provided by NAICS industry group, 8113, Commercial and Industrial Machinery and Equipment Repair and Maintenance, as defined by the North American Product Classification System (NAPCS). The services listed are those for which there is trilateral agreement between the United States, Canada, and Mexico:

NAPCS Code for 8113	Title
1.0	Maintenance and repair and related services for commercial and industrial machinery and equipment
1.1	Maintenance and repair services for agricultural, construction, mining, and oil and gas field machinery and equipment
1.1.1	Maintenance and repair services for agricultural machinery and equipment*
1.1.2	Maintenance and repair services for construction machinery and equipment*
1.1.3	Maintenance and repair services for mining and oil and gas field machinery and equipment*
1.2	Maintenance and repair services for commercial and service industry machinery and equipment
1.3	Maintenance and repair services for manufacturing and metalworking machinery and equipment
1.4	Maintenance and repair services for other commercial and industrial machinery and equipment
1.4.1	Maintenance and repair services for commercial refrigeration equipment
1.4.9	Maintenance and repair services for other industrial and commercial machinery and equipment, nec.
1.5	Cleaning services for commercial and industrial machinery and equipment

* indicates U.S. product only

The NAPCS product lines describe machinery and equipment that are most commonly repaired and maintained by this industry. All other commercial and industrial machinery and equipment that is repaired or maintained are classified in NAPCS 1.4.9. Cleaning services associated with maintenance activities are included in NAPCS 1.5.

Comparison to CPC Ver. 2

The machinery and equipment repaired or maintained by establishments in NAICS 811310 are similar to those classified in Central Product Classification (CPC) Version 2, subclass 87156, Maintenance and repair services of commercial and industrial machinery. Portions of CPC subclass 87152 Maintenance and repair services of electrical machinery and apparatus n.e.c. are also classified as primary to NAICS 811310.

Comparisons between NAPCS and CPC are not straightforward, since the CPC classes and subclasses for maintenance and repair services are organized based on the type of machinery that is repaired, while the NAPCS structure for these services is organized based on the industry where the repaired product is used. For example, the repair of pumps and compressors is classified in CPC 87156 in all cases. In the NAPCS structure, however, repair of pumps and compressors for use in the oil and gas industry would be classified in NAPCS code 1.1, while the repair of pumps and compressors used in manufacturing would be classified in NAPCS code 1.3.

5. Evaluation of standard vs. definition and market conditions

The U.S. does not currently publish any detailed product line price indexes for maintenance and repair services.

Currently, the U.S. Economic Census provides product line turnover data by kind of business, with published data for firms primarily engaged in welding repair and for firms primarily engaged in non-welding commercial and industrial machinery and equipment repair.

6. National accounts concepts

The national accounts are handled in the U.S. by the Bureau of Economic Analysis (BEA) at the U.S. Department of Commerce. In the U.S. commercial and industrial machinery repair and maintenance activities are considered intermediate services only and as a result are not included in the estimates of real final demand. Automotive and household goods repair and maintenance are included in final demand as part of the personal consumption expenditures account. The CPIs for these areas are used to prepare estimates of real output.

7. Pricing methodology

Virtually all repair and/or maintenance services provided in this industry are customized. Because PPI methods require that inputs used to produce services remain constant, it is problematic to reprice a repair and maintenance service in which inputs are altered as buyers' specifications and technical requirements change. As a solution, the U.S. employs a model pricing strategy, in which respondents estimate the prices they would charge if they were to perform specified repair or maintenance services in each pricing

period. The service used as the basis for the model may either be a hypothetical, typical service or one that was actually transacted during the initiation period.

The model prices collected by the U.S. PPI also incorporate aspects of the component pricing method, as the fees are derived based on the following three components:

1. labor charges for each worker involved with the repair service,
2. charged prices for each of the parts used per unit,
3. any surcharges or discounts.

The labor component is the hourly rate multiplied by the number of hours billed. Labor charges for inspecting and testing are included here and are usually billed at the same hourly rate as the repair or maintenance work. Overtime hours worked is also included in the labor component. The hourly rate generally differs based on the level of skill required for a specific job.

Parts include most materials used in the repair or maintenance process. Both finished parts and those requiring additional processing (e.g., sheet metal cut to size for refrigeration units or copper wire used to make coils for electrical motors/ generators) are billed under parts.

Other materials (e.g., oil used to lubricate parts of a hydraulic mechanism or cleaning solution used in sanitation of food processing machinery) used in the repair or maintenance process are considered surcharges. When the repair is performed at the customer's location, "field call" fees and fuel costs that are associated with these field calls are commonly recorded as surcharges.

Field calls and fuel surcharges may be measured as a flat rate or a per mile rate. Other surcharges include environmental or disposal fees, and special equipment fees. Examples of discounts found in this industry include those offered to high volume buyers. The prices that warranty centers charge manufacturers also include substantial discounts.

Model pricing is not used for preventative maintenance contracts. Under these contracts, the type of machinery or equipment to be repaired or maintained is negotiated by the establishment and the buyer. The inputs and other terms of the contract typically remain constant for the duration of the contract. Therefore, only price changes in the monthly or yearly payment amounts are captured in the index.

Preventative maintenance contract payments typically combine the values of the labor, parts, and surcharges components into a single price. The monthly or annual payment is negotiated by the establishment and the buyer. Both parties consider the cost factors and market conditions affecting the service when negotiating the price of the service.

Long-term maintenance contracts, generally defined as those with durations of greater than two years, may sometimes include escalator clauses in which service during the first years of the contract is discounted. For example, a three-year maintenance contract may be priced at \$100 per month for Year 1, \$150 per month for Year 2, and then \$300 per month for Year 3. Since this is a single negotiated transaction, the price increases from \$100 to \$150 to \$300 reflect the manner in which the contract is structured and not necessarily inflationary changes from year to year. To ensure that only real price changes are shown for these transactions, the U.S. collects a price that represents a summation of all the years of the contract each pricing period. In the example above, in Year 3 the U.S would collect a price of \$300 (Year 3 price) + \$150 (Year 2 price) + \$100 (Year 1 price) = \$550. In Year 4, a new three year maintenance contract may be signed for the same set of maintenance services with prices of \$125 for

Year 4, \$175 for Year 5, and \$325 for Year 6. In Year 4, the collected price would represent the price charged for the current year and the two prior years. In this example, the price in this period would be \$125 (Year 4 price) + \$300 (Year 3 price) + \$150 (Year 2 price) = \$575. The change from \$550 to \$575 would be reflected in the price index.

Year	Monthly Rate
Year 1	\$100
Year 2	\$150
Year 3	\$300
Calculated Summed Rate for Year 3	
	\$550

Year	Monthly Rate
Year 2 (old contract)	\$150
Year 3 (old contract)	\$300
Year 4 (new contract)	\$125
Calculated Summed Rate for Year 4	
	\$575

8. Quality Adjustment

If it is no longer possible to reprice the selected hypothetical repair or maintenance service item, then a new service will be selected. Cost data and previous prices for new services are usually available from respondents so the overlap method is used frequently. When previous pricing information is not available, the items are not compared and the changes in prices are not shown in the index. Substitutions are required for repair and maintenance services in the following cases:

- (1) when the model of a machine is replaced with a new one causing the actual maintenance or repair service to change,
- (2) when an establishment ceases to perform the specific maintenance or repair service selected or,

- (3) when an establishment ceases to perform components of a specific maintenance or repair service.

9. Evaluation of comparability with turnover/output measures

Every five years, the U.S. Census Bureau calculates and publishes a large amount of turnover data for the Commercial and Industrial Machinery and Equipment Repair and Maintenance industry in the Economic Census.

Currently, the U.S. PPI only publishes corresponding data for this industry at the six-digit NAICS level.

10. Summary

The U.S. PPI has limited coverage of the Repair and Maintenance sub-sector. The single industry index that the U.S. publishes for Commercial and Industrial Machinery and Equipment Repair and Maintenance makes up almost 19% of the sub-sector.

Classification comparisons between this NAICS industry and the ISIC structure are not straightforward as this industry contains repair services that are included within all of the Classes within ISIC group 331, Repair of fabricated metal products, machinery, and equipment,

The U.S. PPI primarily uses model pricing for transactions in the Commercial and Industrial Machinery and Equipment Repair and Maintenance industry because repair services are typically unique and non-recurring. The model pricing strategy also incorporates aspects of the component pricing method since prices are often composed of labor and parts charges.

Model pricing is not used for maintenance contracts. Monthly or annual payments are priced for contracts that are renegotiated every one or two years. For long term maintenance contracts, those with durations greater than two years, the U.S. PPI collects a price that represents a summation of all the years of the contract each pricing period. This is done to accurately reflect price changes that occur when discounts are negotiated during specific periods within the life of the contract.