

The Development of a Gasket Exchange System for Kegs

This paper was originally published in the Master Brewers Association of the Americas (MBAA) Technical Quarterly and republished with permission of the MBAA Editorial Committee, to KEGS.COM.LTD.

By Takahiko Okada, S. Ogata, N. Endo, T. Suzuki, K. Shimomura, H. Sawaguchi, H. Izawa and A. Matsuda

Kirin Brewery Company Ltd., Yokohama, Japan.

This poster was originally presented at the MBAA 112th Anniversary Convention, Keystone, Colorado, 1999.

ABSTRACT

Kirin Brewery Co. Ltd. exchanges aging keg gaskets (distinguishable by a change in color) as a measure to prevent troubles during production or in the market. This process requires many operators due to Kirin's decision to use extractor tubes with a safety lug to prevent expulsion during handling. A gasket exchange system was therefore developed that consists of the following four machines:

- 1) Automatic tube extractor (60 KPH): loosens the keg cap, separates the tube from the body and extracts the tube from the keg. Separation and extraction of the tube is carried out using a vibrator system.
- 2) Automatic tube assembler (60 KPH): connects the tube to the body (these parts are inserted into the keg by an operator), and tightens the cap to a specified torque.
- 3) Automatic main seal gasket exchanger (120 tubes/H): removes old gasket and fits the new one.
- 4) Seal rings assembler (380 bodies/H): a manually operated machine that is used to fit gaskets to the body.

This system is operated by two operators per batch, and has an operating capacity of approximately 500 kegs per day. It is presently undergoing trials at the Toride plant. It is planned to introduce this system into Kirin's other plants in the near future.

Keywords: Keg Gaskets, Keg Gasket Exchange System, Keg Seal Gaskets

Takahiko Okada is an engineer in the Research Laboratory for Production Technology, Kirin Brewery Co. Ltd. He graduated from Chiba University in 1991 with a major in Mechanical Engineering, and joined Kirin Brewery Co Ltd. in the same year. He has been engaged in development of labor-saving machines used in the Brewing and Packaging plants.

Email: t-okada@kirin.co.jp

SINTESIS

La Kirin Brewery Co. Ltd. cambia los empaques gastados de los barriles (que se distinguen por el cambio de color) como una medida para prevenir problemas durante la producción o en el mercado. Este proceso requiere muchos operadores debido a la decisión de la Kirin de usar tubos extractores con una aleta de seguridad para prevenir la expulsión durante el manejo. De tal manera se desarrolló un sistema de cambio de empaques que consiste de las cuatro máquinas siguientes:

- 1) Tubo extractor automático (60 KPH): afloja la tapa del barril, separa el tubo del cuerpo y extrae al tubo del barril. La separación y extracción del tubo se llevan cabo usando un sistema de vibración.
- 2) Tubo ensamblador automático (60 KPH): conecta al tubo con el cuerpo (estas partes se insertan al barril por un operador), y aprieta la tapa a un momento de torsión específico.
- 3) Máquina de cambio del empaque sellador principal automática: (120 tubos/H): remueve el empaque antiguo y pone el nuevo.
- 4) Ensamblador de anillos de sellado (380 cuerpos/H): una máquina de operación manual que se usa para meter los empaques en el cuerpo.

Este sistema es operado por dos operadores por remesa, y tiene una capacidad de operación de aproximadamente 500 barriles por día. Ahora esta máquinas esta siendo sometida a pruebas en la planta de Toride. Se está planeando introducir este sistema en otras plantas de la Kirin en un futuro no muy lejano.

INTRODUCTION

At Kirin Brewery Co. Ltd., we periodically exchange, off-line, aging keg gaskets in order to reduce the number of problems during production or in the market.

This gasket-exchanging process requires many operators, since we started to use the extractor tube with a safety lug, to prevent expulsion during handling.

We have therefore developed a gasket exchange system for kegs that consists of four different machines. The machines cost approximately 20 million yen (\$162,600) and have an operating capacity of 500 kegs per day with 2 operators.

EXTRACTION TUBE POLICY AT KIRIN

1) Safety

In the mid 1990's, we started to introduce the extractor tube with a safety lug (Micro Matic Group; Figure 1) and have now completed its installation on most of the kegs in our plants.

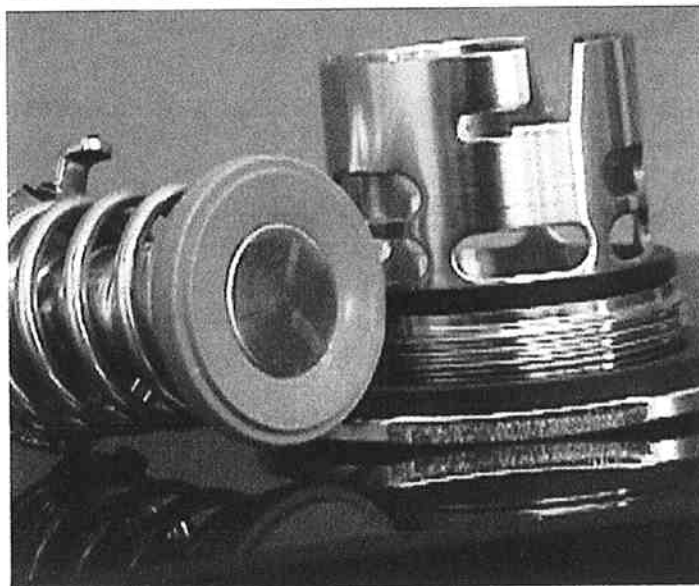
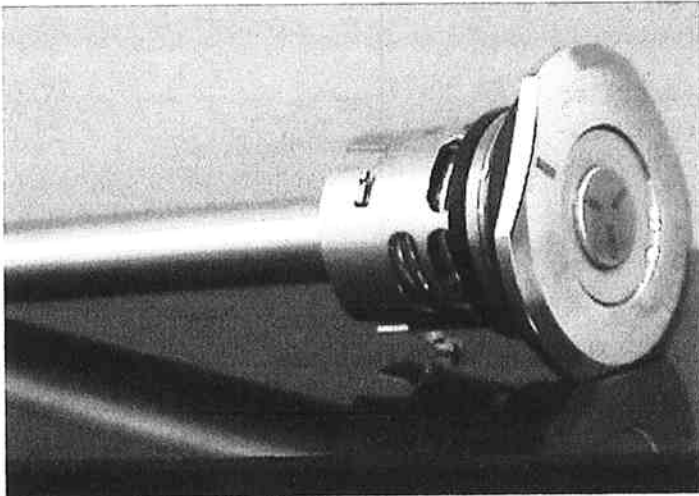


FIGURE 1

Photo of the exterior of the extractor tube

2) Guaranteed Quality

All the gaskets that have reached their specified term of use are replaced with new ones in order to reduce the number of problems in the market. The age of the keg gaskets is distinguished by using a different coloured main seal gasket each year.

NUMBER OF KEGS THAT REQUIRE GASKET EXCHANGE

It is necessary to exchange 500 keg gaskets /day at each brewery. (At Kirin, we have 12 plants and several million kegs are distributed in Japan.)

PREVIOUS METHODS AND PROBLEMS

Our previous manual exchange method using hand tools had the following problems.

1) Large workload

One operator could only deal with 100 kegs/day at most and thus this process required 5 operators in a plant.

2) Hazardous operation

Occasionally the extractor tube without safety features sprang out, sometimes causing injury to the operator

3) Production of faulty goods

We sometimes found that the gaskets were not properly assembled due to human error, especially by unskilled workers.

OBJECTIVES

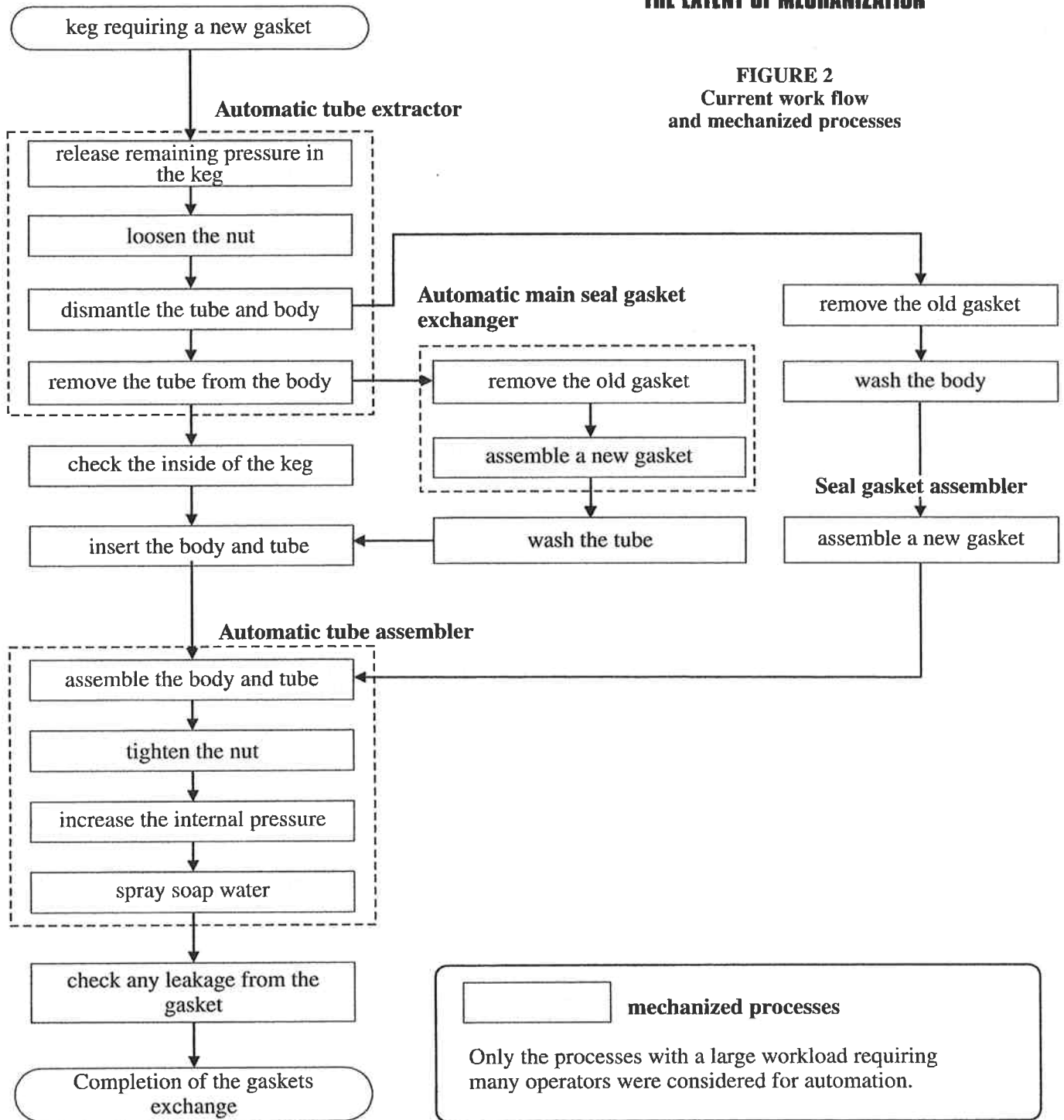
We investigated the partial automation of this exchange process in order to solve these problems. (See Figure 2)

OPERATION CAPACITY

The system should be able to exchange more than 500 keg gaskets a day. The system should require only 2 operators (reducing the labour requirement by 3 operators).

THE EXTENT OF MECHANIZATION

FIGURE 2
Current work flow
and mechanized processes



METHOD

We have developed 4 types of machines with the following operations and basic modes of action. (See figures 3-8).

**1) AUTOMATIC TUBE EXTRACTOR
(80 KPH, W 1.0m x L 2.5m x H 2.2m)**

This automatically loosens the keg cap, separates the tube from the body and pulls out the tube from the keg.

Separation and extraction of the tube is carried out by a simple vibration mechanism.

FIGURE 3 (right)
The exterior of the automatic tube extractor

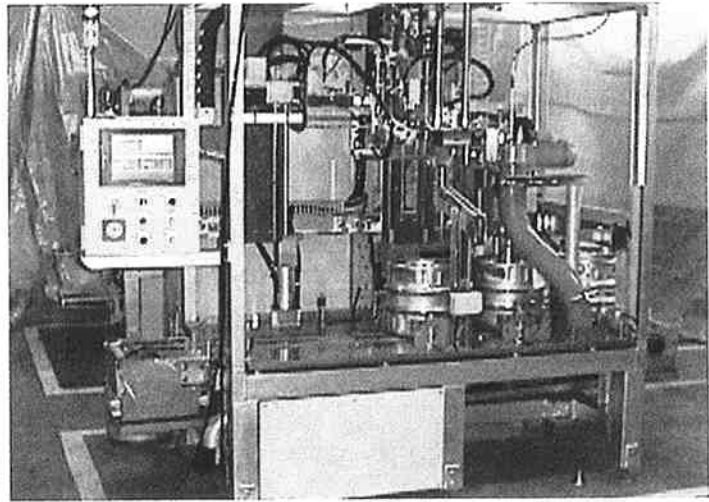
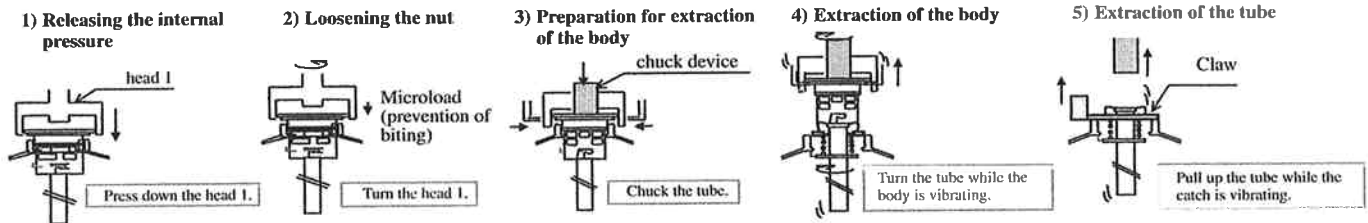


FIGURE 4 (below)
The basic mode of action of the automatic tube extractor



**2) AUTOMATIC TUBE ASSEMBLER
(85 KPH, W 0.9m x L 2.2m x H 1.8m)**

This automatically connects the tube to the body, which has been inserted into the keg by an operator, and tightens the cap to a specified torque.

FIGURE 5 (right)
The exterior of the automatic tube assembler

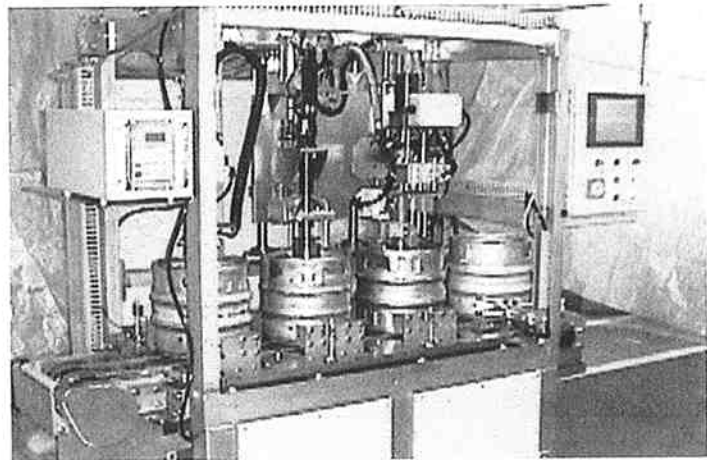


FIGURE 6 (below)
The basic mode of action of the automatic tube assembler

