

## SEMI-AUTOMATIC EQUIPMENT FOR MANUFACTURE OF POLYURETHANE DRESSINGS WITH ADHESIVE BORDERS USED IN WOUND TREATMENT

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**Abstract:** Present technologies for current medical devices are one of the most innovative industries in the world. These devices improve and daily saves thousands of lives. Continuously innovations in medical devices manufacturing technologies have as result lowering of their prices and improved quality and efficiency of medical care. This study presents original equipment used in the manufacture of medical devices in the current context of diversification and specialization of medical devices.

**Keywords:** Sterile polyurethane dressings, absorbent PAD, wound treatment in moisture environment

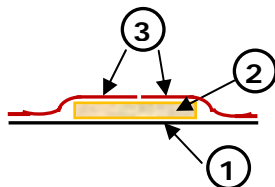
### 1. INTRODUCTION

The existing wounds are presented in different shapes and evolution stages, which led to increasing demands on the European and global market of manufacturing new products for the treatment and healing of wounds, especially in wound treatment in moist environment. This type of treatment plays a vital role in the care and treatment of ulcers, because it has several features including: ulcers protection against external germs and infection, providing a clean environment for treatment and filling the backlash of the wound. Among the successfully used products are included *sterile polyurethane dressings with adhesive borders*.

### 2. PRODUCT PRESENTATION

Polyurethane dressing with adhesive borders is composed of cellular polyurethane central applied on a support of polyurethane film coated with hypoallergenic acrylic adhesive. The contact surface of the dressing to the wound is covered with protective silicone paper, which facilitates its use.

The dressing is made of a cellular polyurethane absorbent PAD with a thickness of 3 mm, centrally positioned on a polyurethane film backing coated with hypoallergenic acrylic adhesive (*Figure 1*).



**Figure 1**

1. Adhesive polyurethane film
2. PAD of cellular polyurethane
3. Protective foils made of silicone paper

Polyurethane adhesive dressing is and individually packed in sterile envelope and has the following features:

- creates an ideal moist healing environment;
- offers an effective protection against infection;
- is easy to apply and comfortable for the skin;
- is flexible due to the adhesive, adapts perfectly to anatomical shapes, even in areas difficult to approach, do not adhere to the wound.

Polyurethane adhesive dressing is indicated for the local treatment of exudative wounds, minor burns, ulcers, bedsores.

Use of polyurethane dressing has several significant advantages including: is an antibacterial barrier, exudates absorption is vertical, do not adhere to the wound, have a good retention, are very economical and are very comfortable for the patient by being very flexible and adhesive.

Polyurethane dressings are available on the international market are non-adhesive and adhesive dressings with different shapes (heel, elbow, sacrum, cavity, rectangular, etc.) and different sizes (5 x 5 cm, 10 x 10 cm, 10 x 20 cm, 12,5 x 12,5 cm, 15 x 15 cm, 15 x 20 cm, 20 x 20 cm, etc) .

### 3. EQUIPMENT AND MAIN UNITS

Figure 2 shows an original semiautomatic equipment use for manufacturer of cellular polyurethane dressing with adhesive borders.

This equipment includes the following parts:

A. The recover system of the protection paper made of a gear motor, paper voltage control system, drive roller and limit switch type ELECTROZEP.

B. Cutting system of the protection paper made of ripping device, paper voltage control system, drive roller and gear motor (*Figure 3*).

C. The transfer system of the PAD on polyurethane film is made of a mechanical-vacumatic manipulator, sliding rail, the vacumatic hook of the PAD limit switch type Camozzi (Figure 4).

D. The feeding system of polyurethane film is made of tension control system of polyurethane film, drive roller and gear motor (Figure 5).

E. The shape cutting system is made of pneumatic cushions, cutting dies, motherboard and mobile sliding plate (Figure 6).

F. Equipment control system (Figure 7).

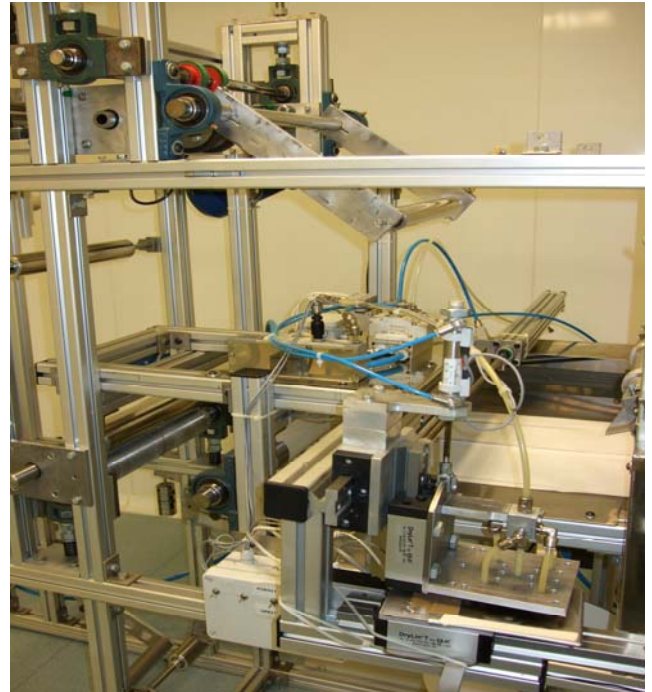


Figure 4



Figure 2

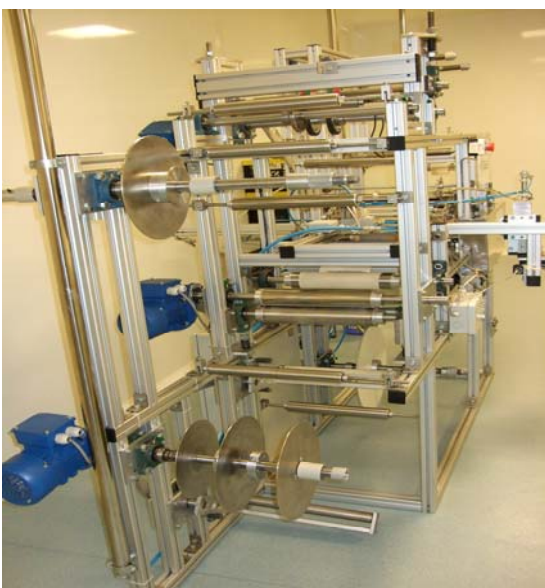


Figure 3

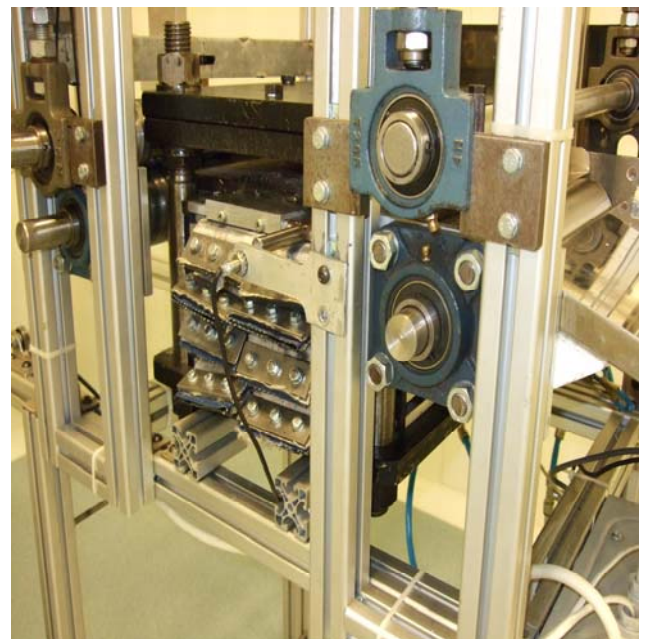


Figure 5

#### 4. PRESENTATION OF PNEUMATIC EQUIPMENT ACTION

Equipment working pressure is 10 bars and is assured by a VARIO compressor manufactured by company ALUP KOMPRESOREN.

All the other pneumatic working devices (cylinders, valves, etc.) are manufactured by the company FESTO.

The sensors used for limit switch during operation are type ELECTROZEP.



Figure 6



Figure 7

## 5. PRESENTATION OF EQUIPMENT OPERATING

The equipment is fed with a roll of polyurethane film and a roll of protection silicone paper (Figure 2). Polyurethane film is detached from the protection paper, which is then recovered using roll-back system.

The programmable automatic type LENZE allow the advance of polyurethane film in the application area of the PAD with the help of a vacuumic manipulator.

The silicon protection paper is cut by the ripping device system and then applied to the dressing.

The next step is positioning the dressing in the cutting area, where with the help of pneumatic cushions is cut to wanted size and shape, after which it is stored for individual packaging.

## 6. PRESENTATION OF THE MAIN FEATURES OF EQUIPMENT

The equipment is very flexible, built in a modular design with aluminum profiles, universal subsets, electrical or electronically.

By changing the mold it can ensure a wide assortment of products with very different sizes.

The estimated cost of the equipment is 20,000 Euro, compared with the existing equipments on international market that have prices higher than 100,000 Euro.

Equipment productivity is high about 400-800 pieces/hour.

## 7. CONCLUSIONS

- The equipment is designed and functional and endures the universality of anatomical shape required on the medical devices market, ensuring very high dimensions accuracy to micrometer level.
- The ratio between equipment cost and added value of the medical devices provides costs amortization in a very short period.
- Time for adjustment and change of the manufacture range is very short (about 20 minutes) this ensures an efficient use of working time.

## 8. ACKNOWLEDGMENTS

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