

기계적 측정방법을 통한 루스 파우다 퍼프에서의 중요 요소 연구

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(2005년 2월 28일 접수, 2005년 3월 4일 채택)

A Study on the Important Features about Loose Powder Puff through New Mechanical Test Methods

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(Received February 28, 2005; Accepted March 4, 2005)

요약 화장품 특히 메이크업 화장품에 영향을 미치는 요소는 화장품에 들어가는 성분 자체뿐 만 아니라 화장성분을 전달하여 주는 메이크업 도구의 영향도 지대하다. 그러나 대부분의 경우 이러한 측정은 대부분 평가자의 감성에 의존하고 있다. 이러한 감성적 데이터는 객관적이지 못하기에 다른 제품에 적용하기에 부적절하며 또한 어떠한 요소가 화장품의 품질에 영향을 미치는지 파악하기도 어렵다. 이에 화장품의 품질에 영향을 미치는 요소를 알아보기 위해 객관적인 측정방법을 마련하고자 한다. 여기에서는 루스 파우다는 고정하고 새로운 루스 파우다 퍼프를 만들어 측정하였다. 이를 통해 화장용 메이크업 도구 특히 퍼프에 있어서 기계적 측정을 통한 물성평가가 어느 정도 가능함을 발견할 수 있었다.

Abstract: The important elements influencing on the quality of make-up cosmetics are not only the ingredients themselves but also the cosmetic tool that delivers the ingredients. But sensory analysis by a has been used on a number of occasion. Therefore it is not reliable to apply the data to other products and not easy to identify the elements influencing the qualities of cosmetics. So we intend to understand the elements influencing the quality of cosmetics and prepare the foundation by introducing objective measurement method. In this study, we fix the loose powder and make new loose powder puff. So we can accomplish objective measurement.

Keywords: *cosmetic puff, evenness, loose powder, make up*

1. Introduction

The loose powder that deliver the pomposity and offer vital skin and catch the surplus sebum is lied in the last step of cosmetic make-up. There are brush and puff as the tool of cosmetics. We have mainly used the puff as the tool of loose powder. We can classify kinds of puff in more detail. There are the puffs using pile fiber and the flocking puffs using the flocking technique. Besides, There is some kinds of puff, sponge puff [1], rubber [1,3] puff. But because it

is uncommon puff, we can exclude in the discussion.

Moreover, pile fiber puff is classified with natural fiber puff and synthetic fiber puff. The representatives of natural fiber puff is the cotton puff and that of synthetic fiber puff is polyester fiber, nylon fiber, acryl fiber. Sometimes we can use together with cotton fiber and synthetic fiber.

In this study, we did the experiment that use the only polyester fiber puff in considering of the consumer preferring smooth and elastic puff. Figure 1. shows that customer's preference in loose powder puff.

Above all with investigating the favor of consumer and panel, we can understand that the essence features

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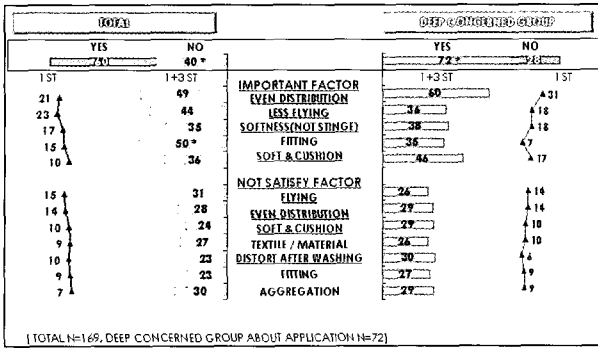


Figure 1. Results of research about customer's preference about loose powder puff.

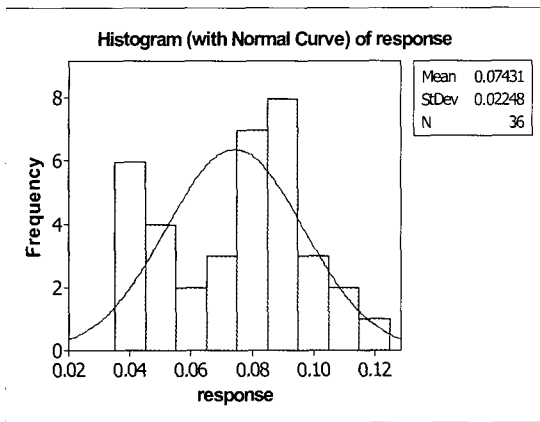


Figure 2. Average amount of transferred powder from container.

of the powder puff are the spreading uniformity (evenness of powder) and powder blowing-off (flying of powder). But as the test of human sense like cosmetic product's one, Test methods about puff are not set officially *in vitro* methods. So we would make mechanical test method which is similar to the condition when consumer use loose powder with puff.

2. Methods

2.1. The First Test Method Set Up (Impact Tester-Flying of Powder)

It was confirmed that the factor which was similarly obtained from an impact machine by calculating driven amount when some panel use a puff for establishing the similar factor with powder. The Figure 2 shows that average amount of powder which is transferred from powder container to puff when panel use loose powder. It is about 0.074 g. We also find out separated amount

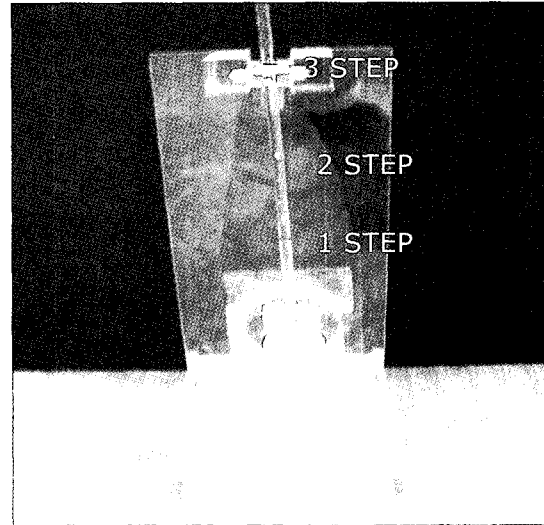


Figure 3. Invented test machine to measure flying (Impact tester).

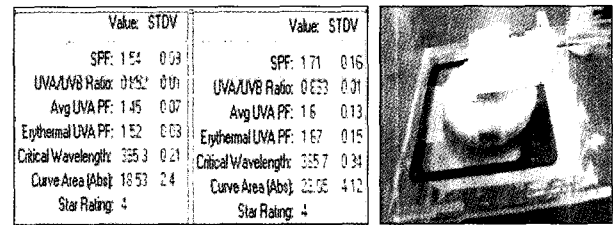


Figure 4. Measured data of SPF 290 and used tester (used) to measure the evenness.

from puff holding loose powder (0.074 g). On the base of upper result, we can fix the position (3 step) of impact tester where it has discrimination and where it is similar to panel usage. Finally, we could invent impact tester (Figure 3) and we could have amount of flying (powder blowing off), when we measure weight of an artificial leather, a puff and an initial powder by upper method.

2.2. Second Test Method Set Up (Even Apply Test Method)

We could devise the evenness test method by adopting the SPF tester (SPF 290 made by the optometrics corporation). The SPF tester has a ability to find out standard deviation (STDV) of values as well as SPF values. So we adopt the STDV method to determine or measure evenness of application when puff is used. In this study, we set the two detect point to know the STDV. The one is located in the middle of puff and the other is located in the edge of puff. As

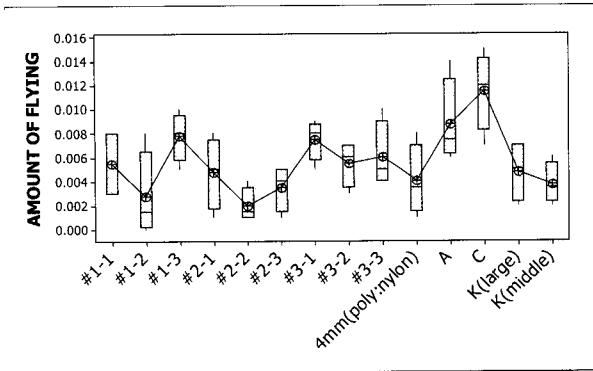


Figure 5. The level of flying according to puff.

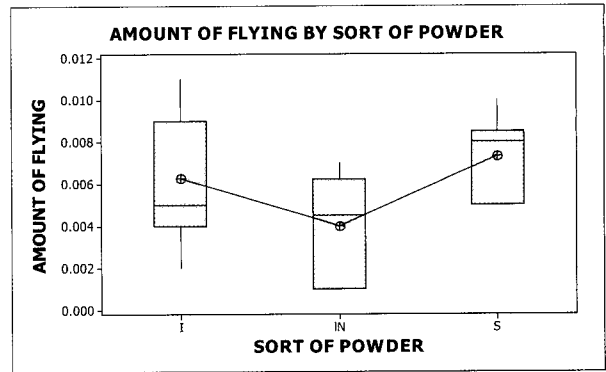


Figure 7. The level of flying according to powder used.

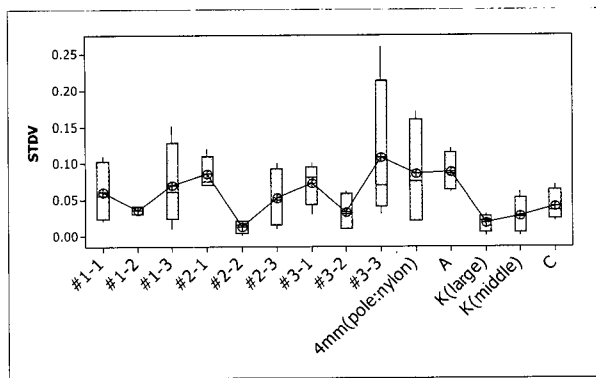


Figure 6. The level of evenness according to puff.

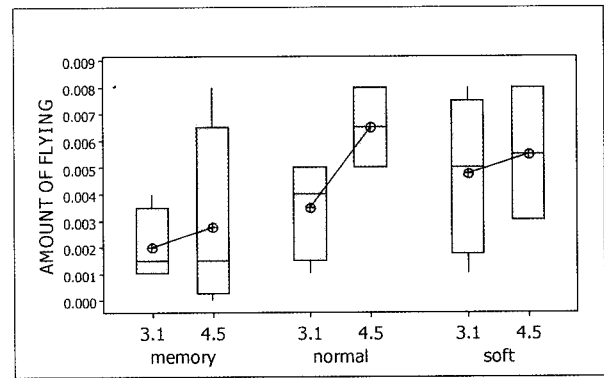


Figure 8. The level of flying according to sponge and length of pile.

you know it. The higher value is, the worse evenness is. Figure 4 show that measure date of SPF 290 and how to use impact tester.

2.3. Gage R&R (Repeatability and Reproducibility)

We need to inspect the degree of reliability to adopt the upper instrument (impact test and STDV). For the purpose of reliability, we do the Gage R&R about the instrument. Normally if the value of Gage R&R is below 10%, the instrument has very good reliability. If the value of Gage R&R is between 10 and 30%, the instrument is adoptable considering cost and so forth. But if value is over 30%, the instrument is not acceptable as a gage.

2.4. Drawing Potential X and Vital X

It is passed through that we put in order the elements influencing the spreading uniformity and powder blowing-off and drive the potential element through benchmarking fish born diagram and multi-voting, and drive a core factor by using hypothesis verification and

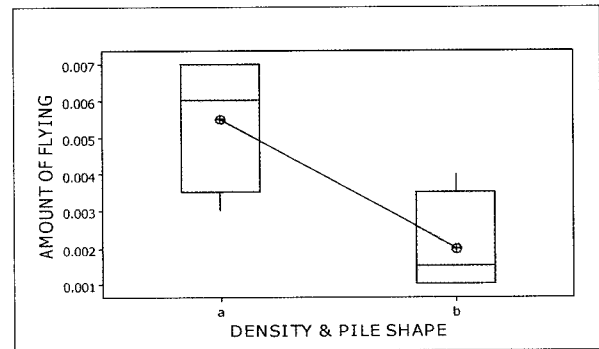


Figure 9. The level of flying according to density and shape of pile.

make appropriate puff.

3. Results and Discussion

3.1. Measuring the Flying of Powder and Evenness According to Puff.

We have known that puff #2-1 is low level. We can

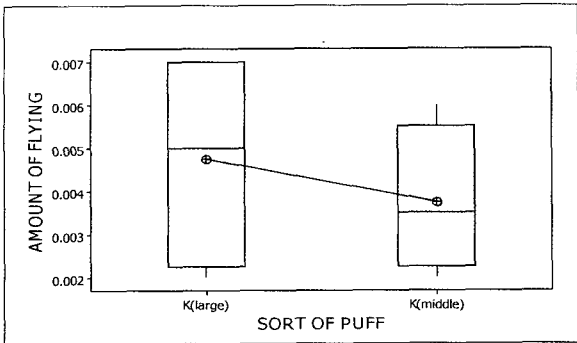


Figure 10. The level of flying according of puff.

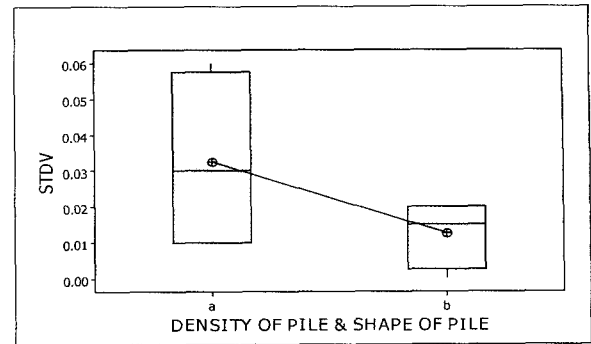


Figure 14. The level of evenness according to density and shape of pile.

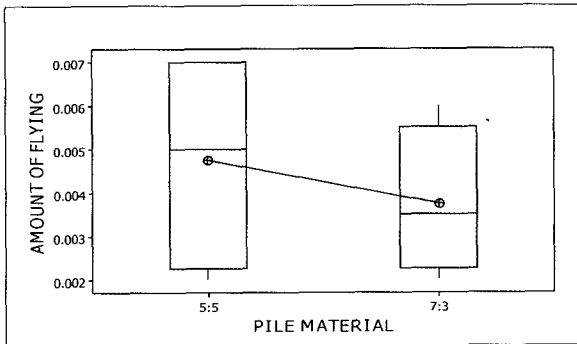


Figure 11. The level of flying according to pile material.

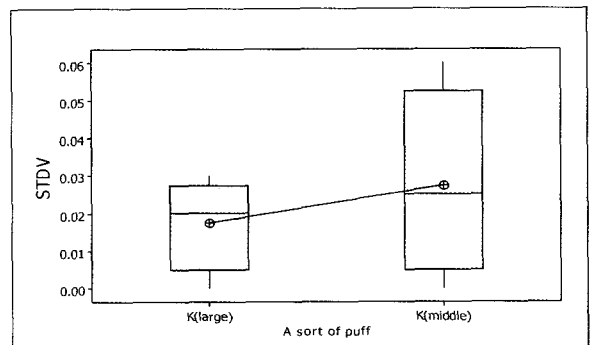


Figure 15. The level of evenness according to puff.

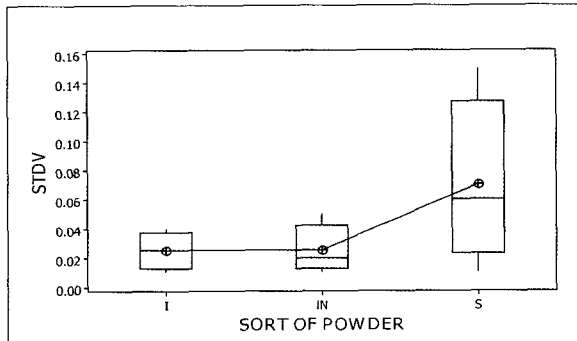


Figure 12. The level of evenness according to powder.

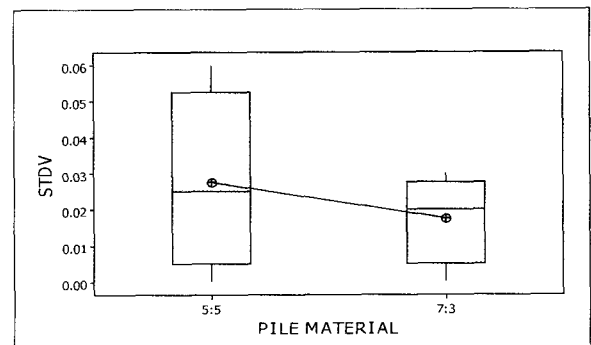


Figure 16. The level of evenness according to pile material.

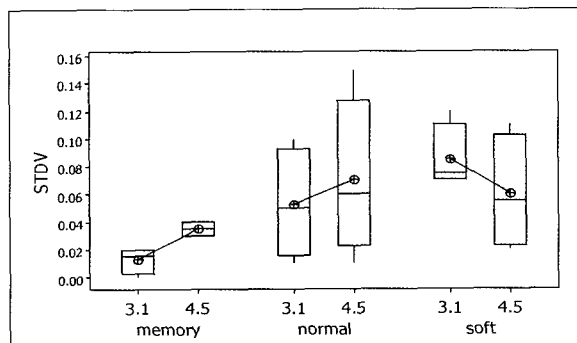


Figure 13. The level of evenness according to sponge and length of pile.

see the puff's level about flying of powder and evenness with the instrument mentioned. As the Figure 5 and Figure 6 show it, therefore we could recognize flying and evenness level of each puff.

3.2. Set the Hypotheses and Proof.

We set up the hypotheses through bench marking, fish-born diagram and multi-voting. To test the hypotheses, we made different types of powder puffs ac-

ording to the below hypotheses. We confirmed the hypotheses by the statistical tool (ANOVA) and we set hypotheses about possible potential-X.

According the results (Figure 7 ~ 16), we find that there are some differences, depending on powder type, sponge type, length of pile and shape & density of pile in flying of powder. But there are no difference, depending on size of puff and material of pile in flying of powder.

In evenness of powder application, we can also see that there are some difference, depending on powder type, sponge [1,2] type, shape & density of pile but there are no difference, depending on size of puff, material of pile.

From the basis of above results, we can establish the vital-X's and find that what is better concoction in powder puff. On closer telling the concoction, it is better choice that 3.1 mm pile length, memory type sponge, straight figure and low density of pile when we consider the price and limitation of materials.

The two test methods to measure flying of powder and evenness of application (puff) are considered as acceptable level, when we consider the cost and so forth. But we think that impact tester to see flying of powder is need to improve degree of confidence. From the basis of above vital-X result, we made sample puff (3.1 mm pile length, A type sponge, straight shape and low density of pile) and measured the puff with two test methods (impact tester and STDV test method-SPF 290 (the optometrics corporation)).

We could improve the flying of powder by 23% and evenness of application by 61% comparing with #2-1 puff.

4. Conclusion

In our study we could find that the methods of improving loose powder's quality is improving the cosmetic puff as well as making better formulation. If we improve the cosmetic puff by combining pile's features (pile length, density, shape, and so forth) with puff-pad (sponge), we could also improve the quality of loose powder like powdering (flying of powder), even distribution of powder. By means of setting up the new test methods for cosmetic puff, we can easily estimate and predict the qualities of loose powder and cosmetic powder puff.

In conclusion, we can improve the loose powder quality by 23% in powdering and also raise up evenness of application by 61% without changing of powder formulation. But because we can't match the results with sense results tested by human panel, it leaves something to be desired.

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