

**STUDY OF XIAO JUNFENG'S FRONT HANDSPRING TO SOMERSAULT
FORWARD STRETCHED WITH 900 DEGREE TWIST BY BIOMECHANICAL
ANALYSIS**

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It is well known that new and difficult performances occur constantly and stimulate the development of gymnastics. The focuses in performance are the connection and all kinds of somersault and twist technique. Lately, no matter whether in domestic or international competition, the front handspring to somersault with certain difficulty has been used frequently. It is worth mention that from 1993 to 1996 the international rules of gymnastics were changed, increasing the difficulty value of the front somersault. That means that the front somersault gets more points than the back somersault, even for a performance turn of the same degree. The front handspring connecting somersault forward stretched and twist performance is being concentrated on by coaches and athletics. Even some experts considered the front handspring to somersault forward stretched with twist performance as part of the future of free gymnastics. Xiao Junfeng was one of the athletes of the Chinese gymnastic team. He was the first athlete to perform the front handspring to somersault forward with a 900 degree twist. He won the title champion of the world gymnastics championships in 1997. The purpose of this study is to analyze the technique of his performance by biomechanical methods. The subject was Xiao Junfeng (age: 17 years old, Height: 1.60 m, Weight: 50 kg). HUAHANG KS 16-mm camera and TP-301 film analysis systems and a KISTLER 3-dimensional testing force platform were use to collect the data of the front handspring to somersault forward stretched with a 900 degree twist performance. The results for his techniques are shown below:

1. During the handspring phase, Xiao used bending arms to touch the floor. This technique caused him to reduce the radius of turning over and the time of touch and also increasing the angular velocity.
2. During the push phase, by explosive strength, the extension muscle group of shoulder, elbow and ankle work sequentially one by one (the angle at the last contact of push is 80.4 degrees). His space of pushing is big. It is good for connecting somersault. The angle of the body at feet touchdown is 41.81 degrees.
3. At the takeoff of the somersault forward stretched with twist, his technique concentrates on the opening angle of shoulder, explosively stretching leg, the angle of the body at 100 degrees. This technique is reasonable for increasing the angle of takeoff effectively. The angle of CG at take off is 44.5.
4. During the somersault phase, the impulse on side by side is relatively large ($I=28.10N\ s$). It demonstrates that the body leans to the direction to incorporate the performance of the arms. The body turns to the vertical axis to complete the difficult performance.