Double face grinding of bearing rings
轴承套圈双端面磨削

Double face grinding or double disc grinding as it is also called is normally the first grinding process of the bearing rings after heat treatment.

双端面磨削或双盘磨削同时也叫轴承套圈热处理后的首道工序磨削。

If we look at tolerances on the finished bearing, the demands on the tolerances that are generated in the double face grinding is not so close.

从成品轴承公差要求的角度来看，所磨削套圈双端面的精度要求并不严。

The most important reason for improving the tolerances from the double face grinding (width, variation of width and especially flatness) is that the surfaces generated in the double face grinding process are references for all the following operations. The first and most important prerequisite to achieve precision in a machining process is to have references with high precision. The double face ground surfaces are the reference for the grove-, track-, flange- etc grinding. The face of the ring is as important as the driving plate to achieve a good grove or track grinding of the ring.

对于所磨削套圈双端面的公差要求（宽度尺寸，宽度变动量，尤其是平面度）的最主要原因是因为套圈双端面是所有后序工序的基准面。在加工工序中，为达到高精度要求其首要且最重要的前提条件是能有一个高精度的基准面。套圈双端面磨削后的表面将作为：沟道、滚道、档边等磨削工序的基准面。为了达到高精度的套圈沟道或滚道磨削要求，套圈端面的重要性与磁极一样。

The biggest difference between double face grinding compared to external and internal grinding is that instead of the periphery, the face of the grinding wheel is used for the metal removal. This implies a difference in two major conditions for the grinding process. The contact area between workpiece and grinding wheel is larger and this must be considered in the selection of grinding wheel.

双端面磨削与内表面和外表面磨削的最大不同之处是其采用的是砂轮端面切削而不是砂轮外缘切削，这也就意味着这两种磨加工工序的主要条件不同。工件与砂轮之间的接触面很大，因此在选择砂轮时需考虑到这一点。

Another important difference is that the cutting conditions are not constant over the whole face of the grinding wheel. This must be considered when choosing the grinding method.

另一重要不同之处就是整个端面所接受的砂轮切削条件不恒定，此点在选择磨削方案时需作出考虑。

Double face grinding is normally the first operation after heat treatment. This implies that the ring has only black areas and this has to be considered when making the tooling. The tooling is not allowed to cause axial forces on the ring as this has a negative influence on the flatness.

双端面磨削一般是热处理后的首道加工工序。这也就意味着此时的整个套圈都是黑皮状态，此点在制做工装时需作出考虑。为使平面度不受到不良影响，套圈不能受到工装所施加任何的轴向力。

In the bearing industry we normally talk about three basic double face grinding methods, straight through feed, rotary through feed and plunge grinding. The highest production is normally connected with straight through feed grinding and the highest quality is normally connected with plunge grinding.

在轴承行业中我们通常会讨论到三种双端面磨削方案，通过式，转盘通过式和切入式。通常通过式的磨削效率最高，而切入式则通常磨削精度最高。

We will focus on the plunge grinding as this method has the potential to achieve the best quality of the ground ring.

由于切入式磨削方案是达到成品套圈最高精的潜力，因此我们所关注的是切入式磨削。

As the cutting condition vary so much over the face of the grinding wheel it is necessary to have a safe rotation of the ring during grinding.

由于砂轮端面各点给出的切削条件相差很大，因此磨削期间保证套圈的稳定旋转是非常有必要的。

Depending on the size of the ring two different methods can be used to assure a safe rotation of the ring during grinding.

根据套圈的大小不同，可采用两种方案确保套圈在磨削期间稳定旋转。
Also two different double face grinders for different ring sizes with safe rotation of the ring will be presented.

同时，针对不同尺寸套圈的稳定旋转可采用两台不同的双端面磨床。