Spotted

A solid figure is built from 2006 ordinary cubical dice by gluing them together at their faces. What is the smallest number of dots that could be showing on the outside?

Solution: A cubical die has 1 opposite 6, 2 opposite 5, and 3 opposite 4. It follows that an $a \times b \times c$ block can have as few as $8 \cdot 6 + 4(a-2+b-2+c-2) \cdot 3 + (a-2)(b-2)(c-2) \cdot 1$ pips showing. Now $2006 = 2002+4 = 11 \cdot 13 \cdot 14 + 4$, so we have to glue four dice to the surface of an $11 \times 13 \times 14$ block B. We can do this so that we eliminate a 3, two 2's and a 1 from the surface of B while we add a total of four 6's with the additional four dice. This results in a surface count of $1110 - 6 + 24 = 1126$. The alternative, removing 10 dice from a block of size $12 \times 12 \times 14$ results in a larger surface number.