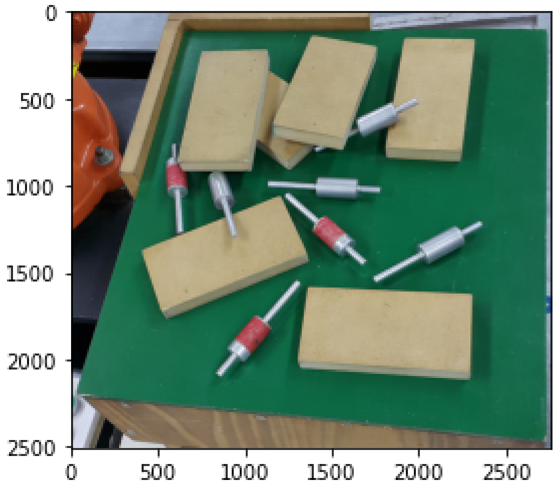
Segmentación

A partir de la imagen de bloques encontrar, mediante alguno de los métodos mencionados o combinación de ellos (inclusive pueden utilizar operaciones morfológicas como las vistas anteriormente) la mejor segmentación de los bloques respecto del resto de las piezas.

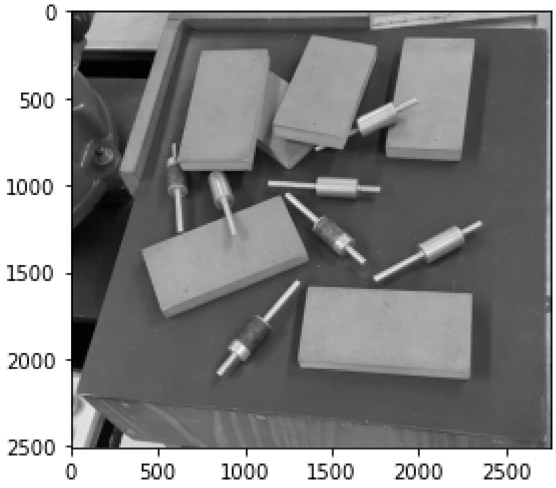
In [1]:
```
%matplotlib inline

import numpy as np
import cv2 as cv
import matplotlib.pyplot as plt
```

In [2]:
```
img = cv.imread('piezas.png')
img = cv.cvtColor(img, cv.COLOR_BGR2RGB)
plt.figure()
plt.imshow(img)
```

Out[2]: <matplotlib.image.AxesImage at 0x7f66590cdb80>



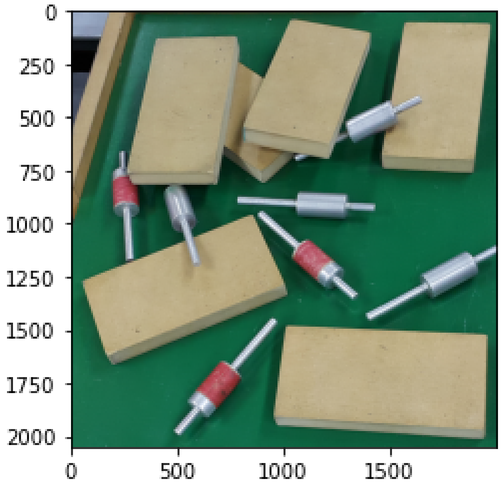
In [3]:
```
grayImg = cv.cvtColor(img, cv.COLOR_BGR2GRAY)
plt.imshow(grayImg, cmap='gray')
plt.show()
```



Recortamos la imágen para obtener solo los bloques y no todo el fondo innecesario

In [4]:
```
cutoutImg = img[100:2150, 350:2350]
plt.imshow(cutoutImg)
```

```
plt.show()
```



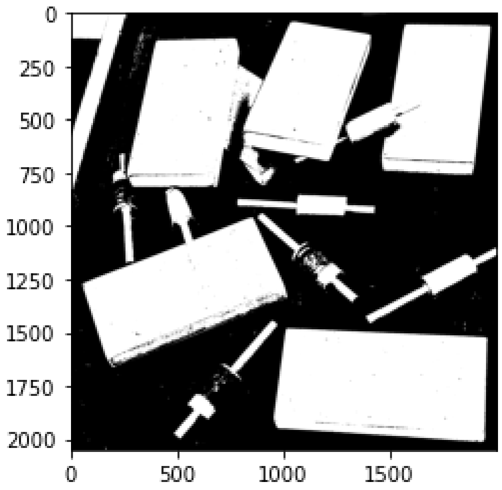
In [ ]:

Watershed

In [5]:

```
gray = cv.cvtColor(cutoutImg,cv.COLOR_BGR2GRAY)
ret, thresh = cv.threshold(gray,0,255,cv.THRESH_BINARY+cv.THRESH_OTSU)
plt.figure()
plt.imshow(thresh,cmap='gray')
```

Out[5]: <matplotlib.image.AxesImage at 0x7f6657f70340>

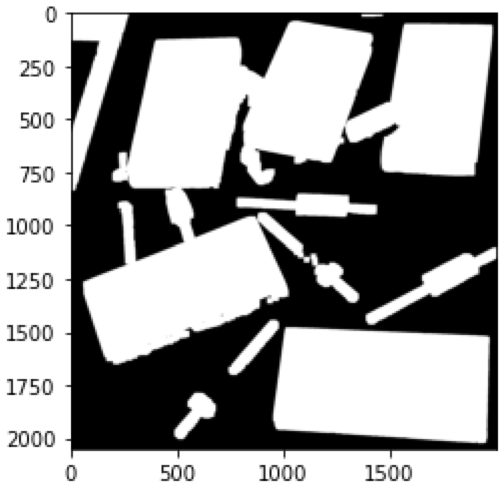


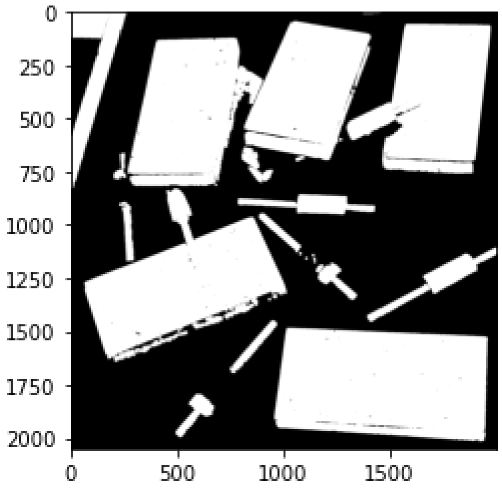
In [6]:

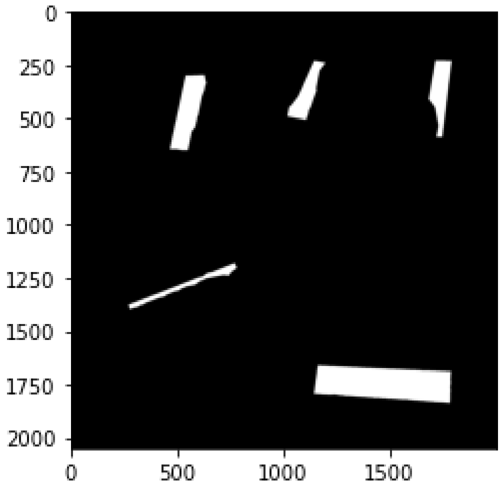
```
kernel = np.ones((6,6),np.uint8)

opening = cv.morphologyEx(thresh,cv.MORPH_OPEN,kernel, iterations = 2)

sure_bg = cv.dilate(opening,kernel,iterations=3)

closing = cv.morphologyEx(opening,cv.MORPH_CLOSE,kernel, iterations = 2)

dist_transform = cv.distanceTransform(closing,cv.DIST_L2,5)
ret, sure_fg = cv.threshold(dist_transform,0.7*dist_transform.max(),255,0)

sure_fg = np.uint8(sure_fg)
unknown = cv.subtract(sure_bg,sure_fg)


fig=plt.figure('Sure BG')
plt.imshow(sure_bg,cmap='gray')
```

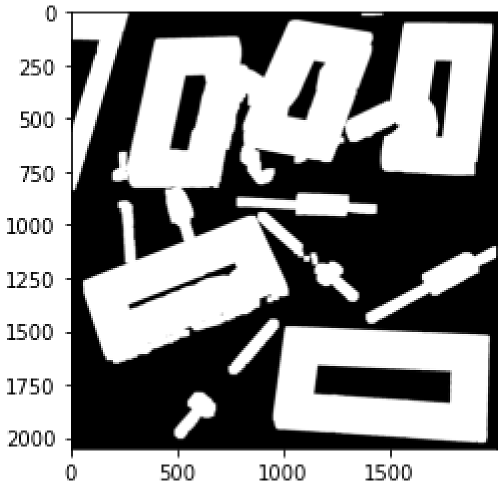
```
fig=plt.figure('Opening')
plt.imshow(opening,cmap='gray')

fig=plt.figure('Sure FG')
plt.imshow(sure_fg,cmap='gray')

fig=plt.figure('Fondo seguro')
plt.imshow(unknown,cmap='gray')
```

Out[6]: <matplotlib.image.AxesImage at 0x7f6657e00280>



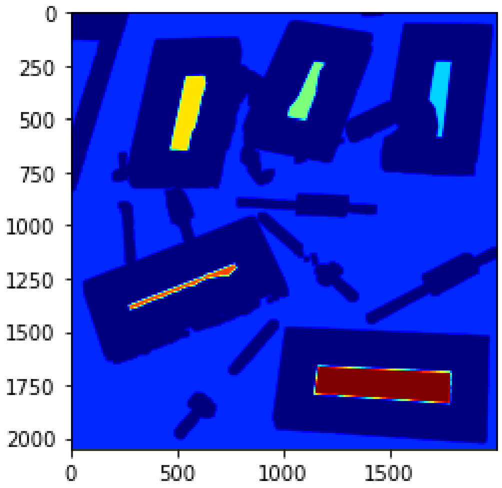






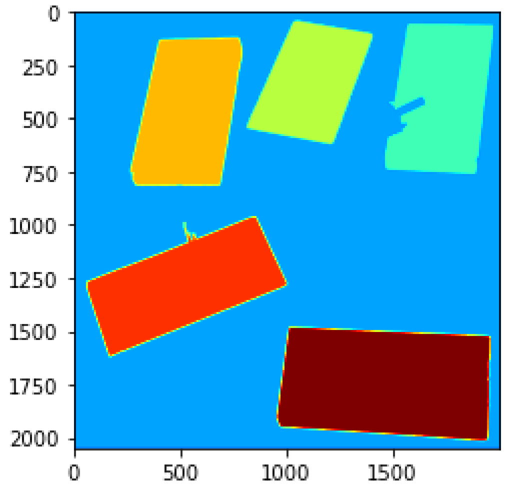
In [7]:
```
ret, markers = cv.connectedComponents(sure_fg)
markers = markers+1
markers[unknown==255] = 0

plt.figure()
plt.imshow(markers,cmap='jet')
```

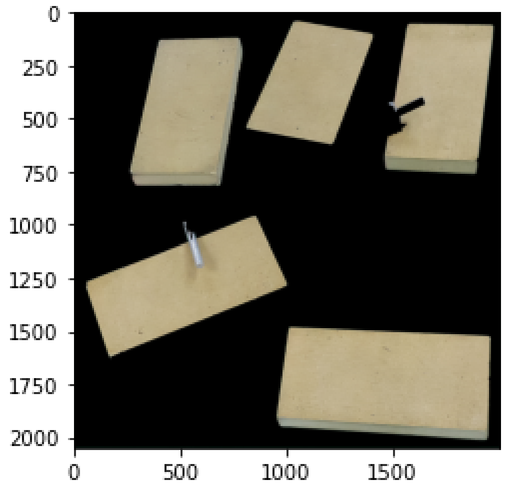
Out[7]: <matplotlib.image.AxesImage at 0x7f6657d418e0>



In [8]:
```
watershed = cutoutImg.copy()
markers = cv.watershed(watershed,markers)
watershed[markers == 1] = [0,0,0]

plt.figure()
plt.imshow(markers,cmap='jet')

plt.figure()
plt.imshow(watershed,cmap='jet')
```

Out[8]: <matplotlib.image.AxesImage at 0x7f6657ce1220>

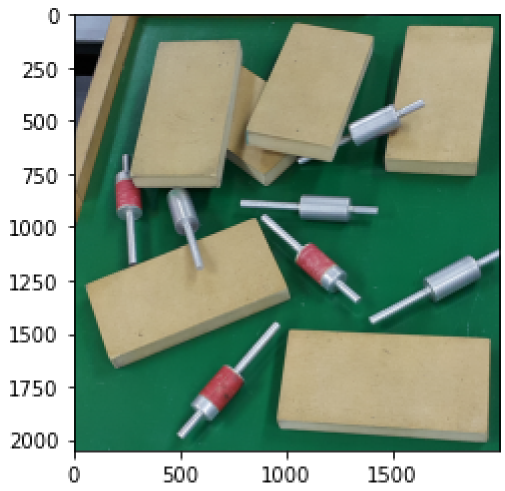




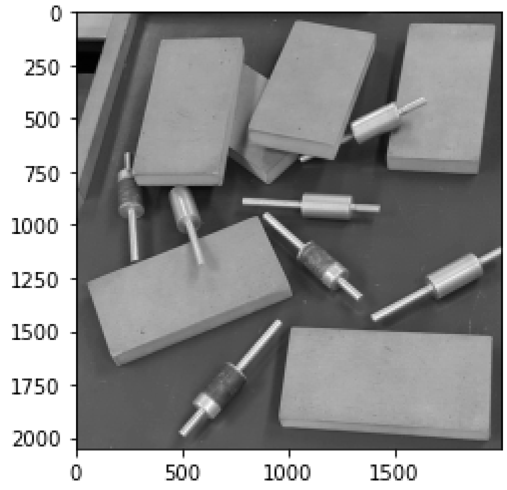
In [ ]:

K Means

In [9]:
```
plt.imshow(cutoutImg)
plt.show()
```

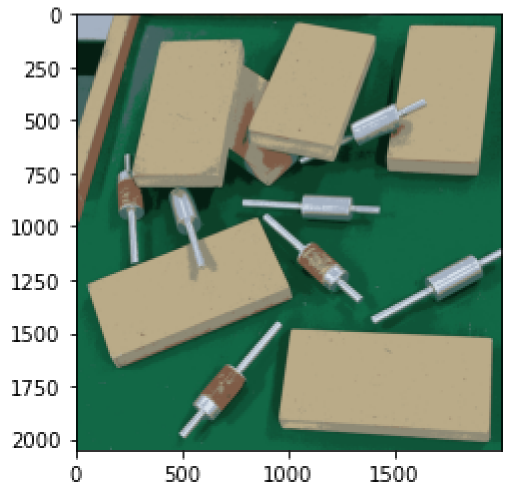


In [10]:
```
grayImg = cv.cvtColor(cutoutImg, cv.COLOR_BGR2GRAY)
plt.imshow(grayImg, cmap='gray')
plt.show()
```

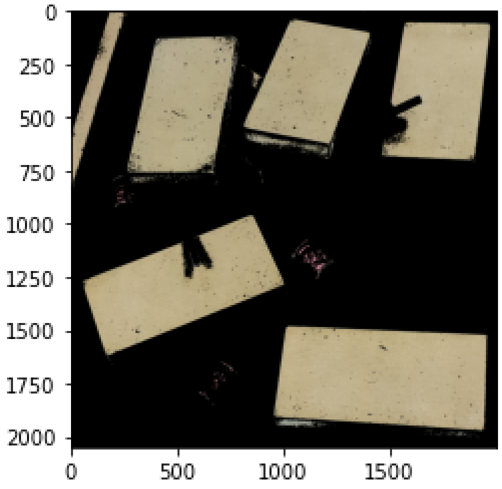


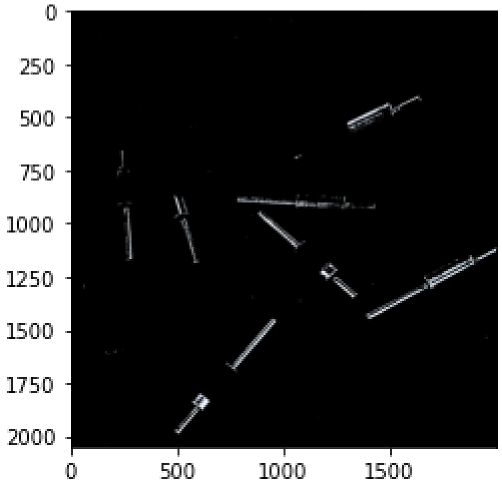
In [11]:
```
Z = cutoutImg.reshape((-1,3))
Z = np.float32(Z)

criteria = (cv.TERM_CRITERIA_EPS + cv.TERM_CRITERIA_MAX_ITER, 50, 0.5)
K = 10

ret,label,center=cv.kmeans(Z,K,None,criteria,10,cv.KMEANS_RANDOM_CENTERS)
```

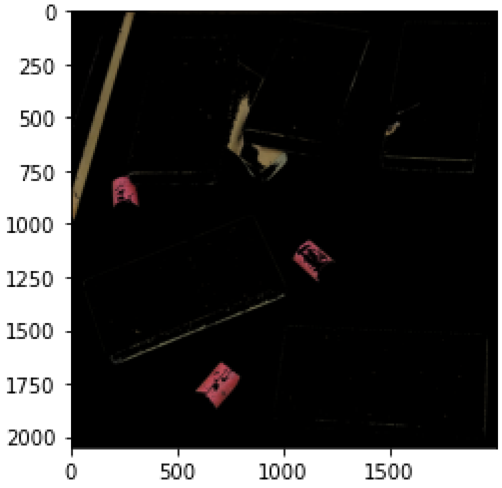
In [12]:
```
center = np.uint8(center)
label = label.flatten()
compact = np.uint8(ret)

img_out = center[label]
img_out = img_out.reshape((cutoutImg.shape))
plt.imshow(img_out)
plt.show()
```

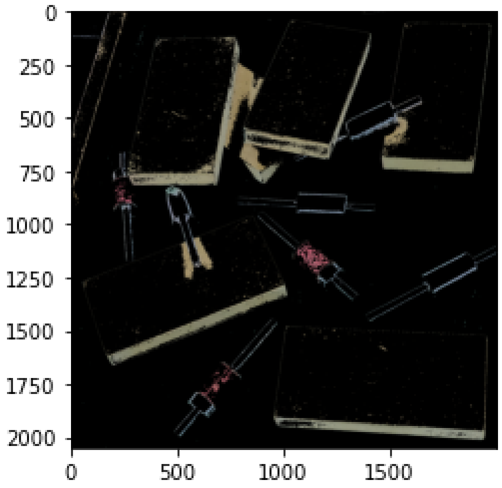


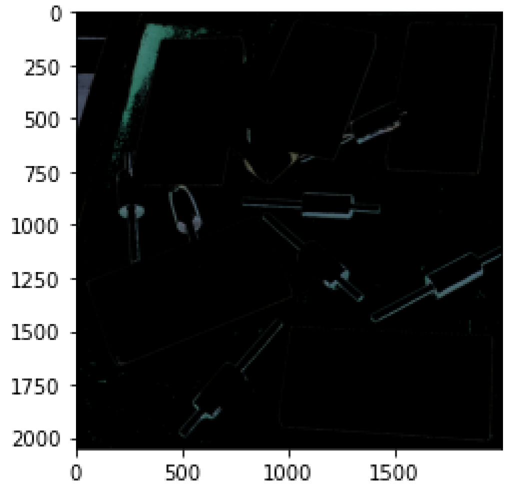
In [13]:
```
copy = cutoutImg.copy()
copy = copy.reshape((-1, 3))
for cluster in range(1,11):
    clusterCopy = copy.copy()
    clusterCopy[label != cluster] = [0, 0, 0]
    clusterCopy = clusterCopy.reshape(cutoutImg.shape)
    plt.imshow(clusterCopy)
    plt.show()
```

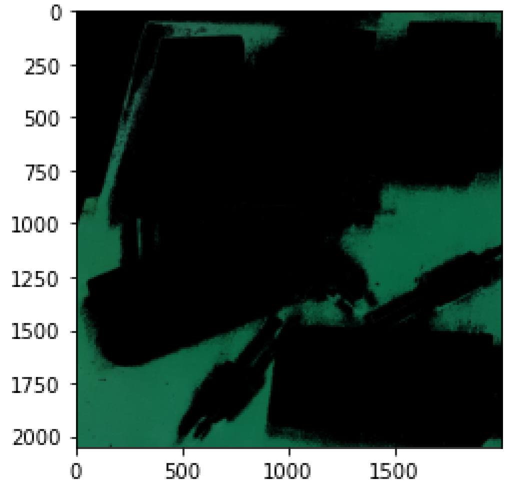


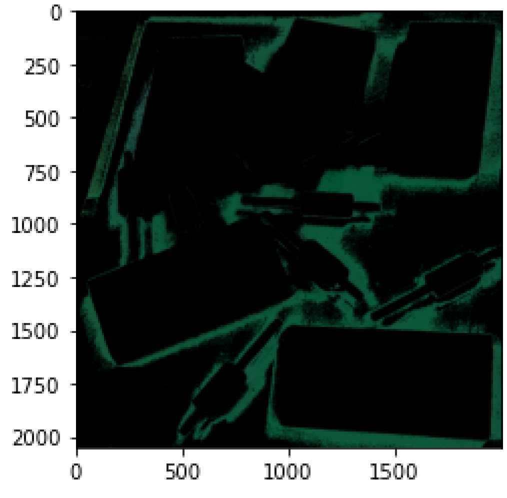


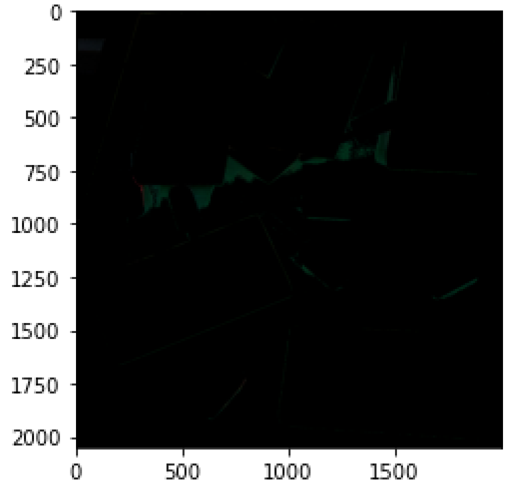


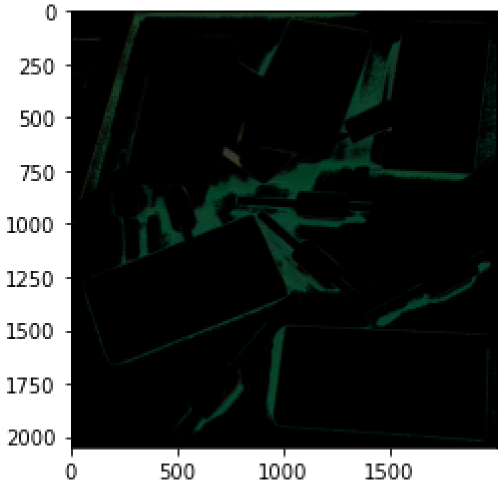


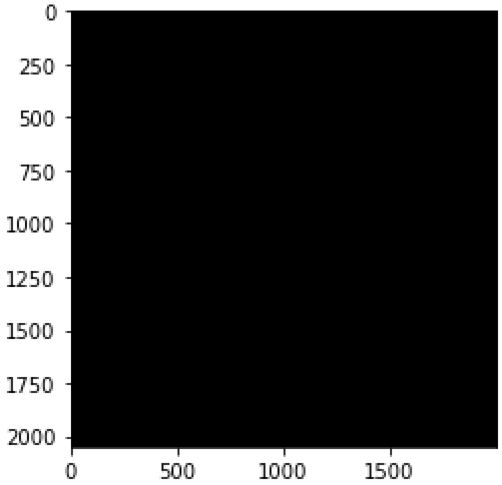

0
250
500
750
1000
1250
1500
1750
2000
0
500
1000
1500


0
250
500
750
1000
1250
1500
1750
2000
0
500
1000
1500

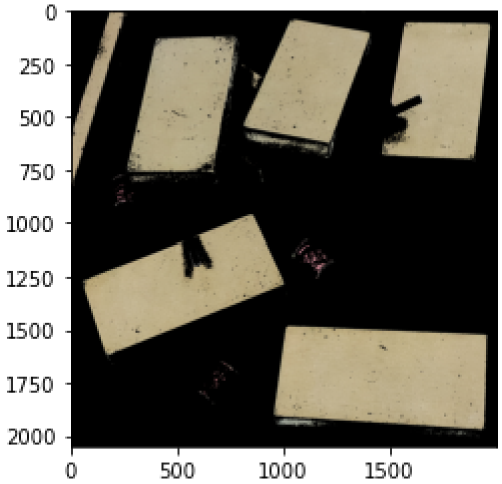

0
250
500
750
1000
1250
1500
1750
2000
0
500
1000
1500


0
250
500
750
1000
1250
1500
1750
2000
0
500
1000
1500





In [17]:
```
cluster = 1
kmeans = cutoutImg.copy()
kmeans = kmeans.reshape((-1, 3))
kmeans[label != cluster] = [0, 0, 0]
kmeans = kmeans.reshape(cutoutImg.shape)
plt.imshow(kmeans)
plt.show()
```



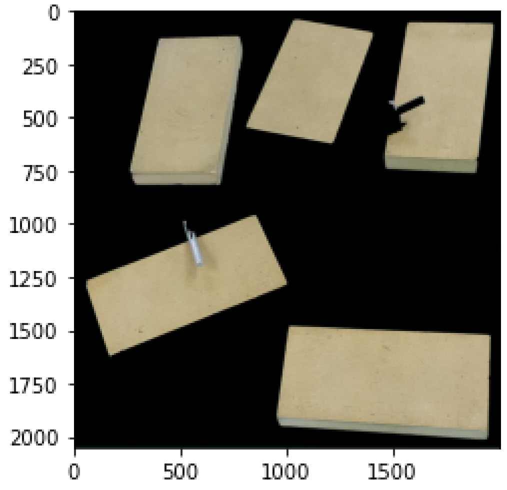
In [ ]:

Conclusiones

Comparamos ambos resultados:

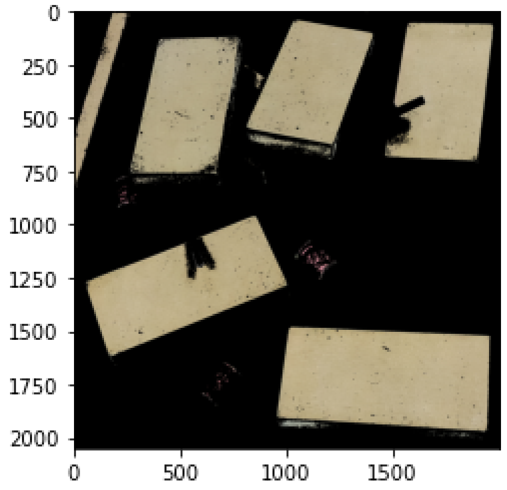
In [18]:
```python
## Watershed
plt.figure()
plt.imshow(watershed,cmap='jet')
```

Out[18]: <matplotlib.image.AxesImage at 0x7f6657e346a0>



In [19]:
```python
##Kmeans
plt.figure()
plt.imshow(kmeans)
```

Out[19]: <matplotlib.image.AxesImage at 0x7f6657d0e850>



Se puede ver como el resultado obtenido por watershed es mejor, y más performante además para este tipo de imágen.