AUSTIN POWDER

Modelamiento de Vibracion de Campo Cercano y Fragmentacion

ONE AUSTIN

Obtener una distribución adecuada del tamaño de fragmento, es de los aspectos clave del proceso de voladura, ya que existen importantes beneficios al generar un rango de tamaño de fragmento que se adapte no solo al sistema que se alimenta, sino tambien que minimice las fracciones no vendibles y aumente el valor de lo que se puede vender (Cunningham, 2006).

DETONADORES *E*STAR* vs NO ELECTRICOS

- ***SEGURIDAD***

  Comunicación dos vías Blaster-Detonador-Blaster
  Verificación de cada detonador antes-durante el proceso de voladura
  Iniciación Remota desde un punto Seguro

- ***PRECISION***

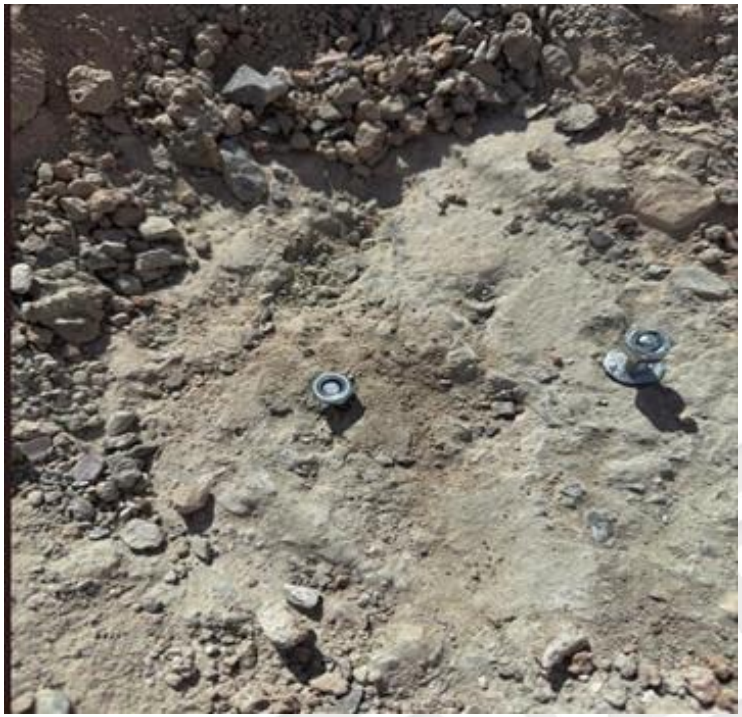
  Cero dispersión en retados, comparado con No - Eléctricos

- ***VERSATILIDAD***

  Versatilidad en el rango de retardos (1-20,000 ms) lo que contribuye a optimizar los diseños de voladura

COMO DEFINIR EL RETARDO ENTRE BARENOS "*MAS APROPIADO PARA MEJORAR LA FRAGMENTACION*"…???

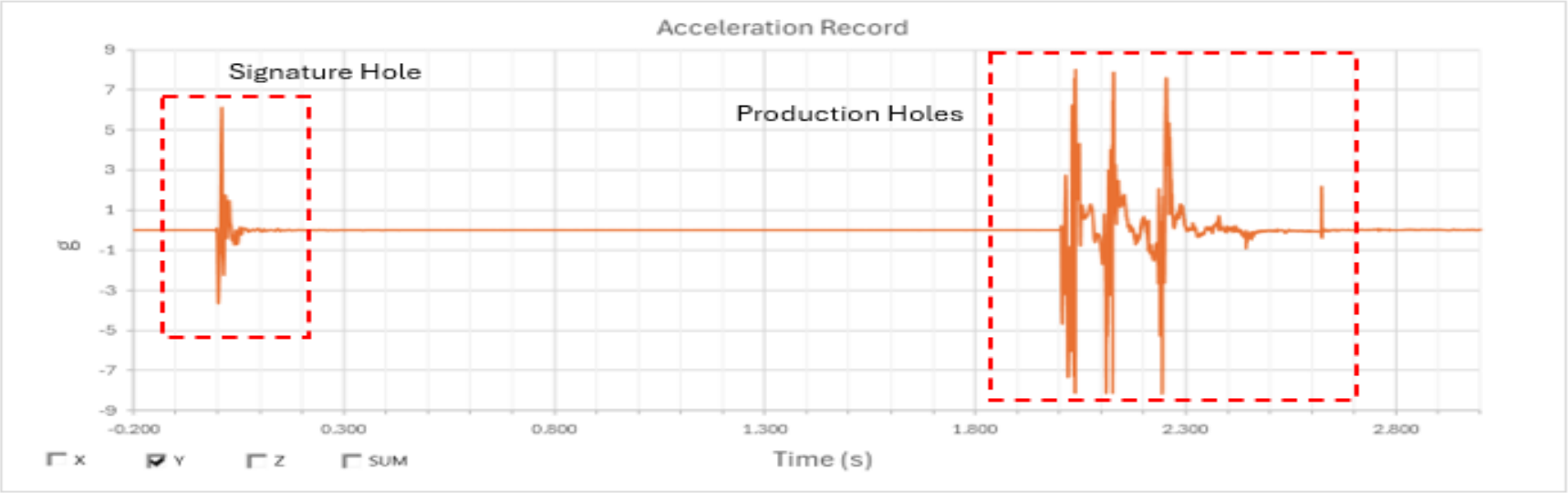
INSTALACION DEL SENSOR

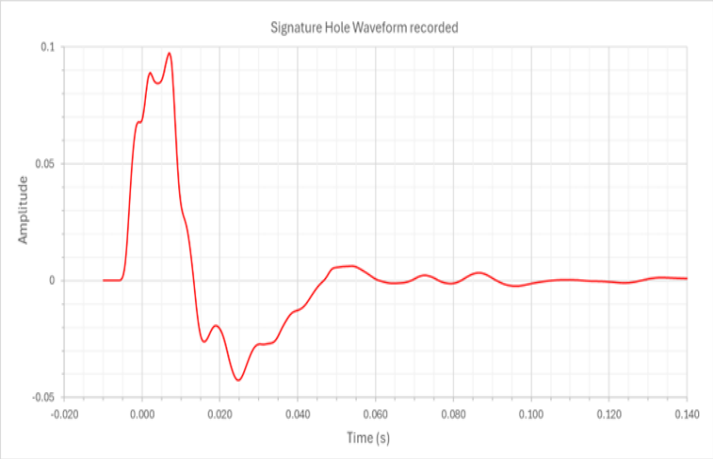


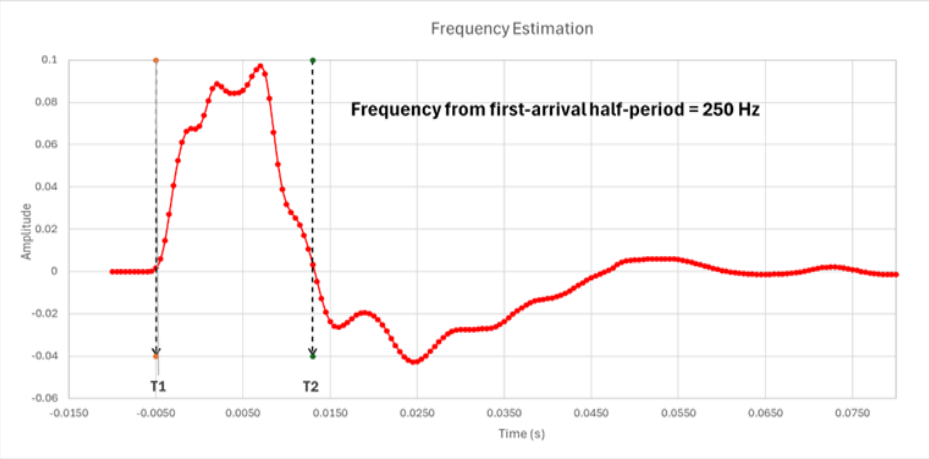
(a)

(b)

a) Tornillos colados sobre la superficie del concreto. b) Sensor (acelerómetro) colocado sobre la superficie del concreto


Acceleration Record
Signature Hole
Production Holes
9
7
5
3
1
-1
-3
-5
-7
-9
-0.200
0.300
0.800
1.300
1.800
2.300
2.800
Time (s)
X
Y
Z
SUM


Signature Hole Waveform recorded
Amplitude
0.1
0.05
0
-0.05
-0.020
0.000
0.020
0.040
0.060
0.080
0.100
0.120
0.140
Time (s)

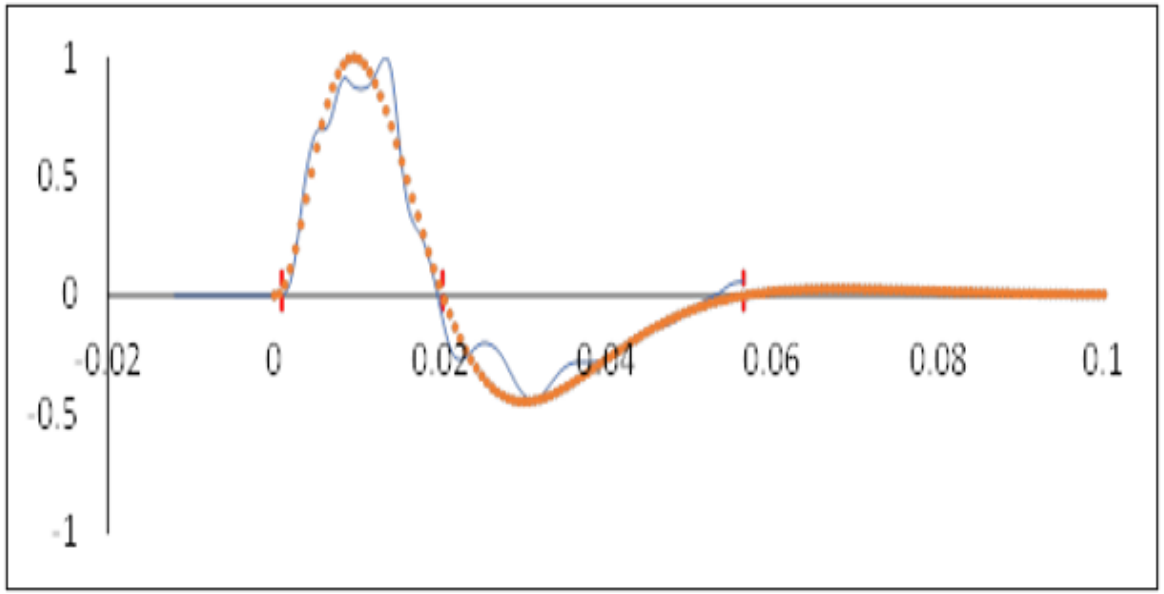

Frequency Estimation
Frequency from first-arrival half-period = 250 Hz
Amplitude
0.1
0.08
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
T1
T2
-0.0150
-0.0050
0.0050
0.0150
0.0250
0.0350
0.0450
0.0550
0.0650
0.0750
Time (s)

HEELAN ELEMENTAL WAVEFORM

El modelo de Heelan permite crear una forma de onda a partir de la siguiente ecuación;

$$S(\tau) = \gamma\eta \times (\tau\,\eta - 2\eta\tau\,\eta{-}1 + \eta(\eta - 1)\tau\,\eta{-}2\,)e\,{-}\tau$$

Donde: $\tau = bt$, **b** y **η** son constantes definidas por el usuario, **t** es tiempo en segundos, $\gamma\eta$ es una constante de normalización para el orden de la ecuación especificado. El parámetro η es referido como orden de la ondícula, y b es usado para crear un tiempo escalado, τ.



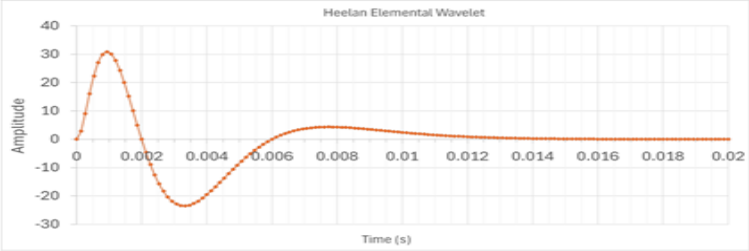
f	250
$\gamma\eta$	0.99900
η	3.00
b	750.00
τ	bt
MNy	15.00
δt	0.000133

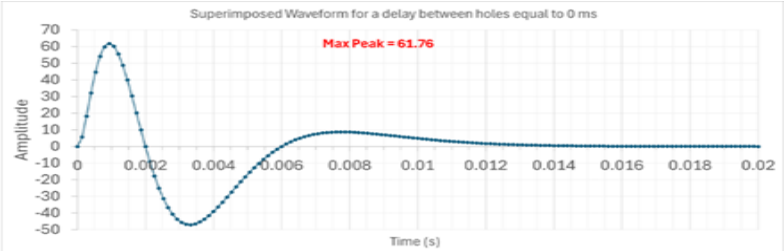
AUSTIN POWDER

ONE AUSTIN

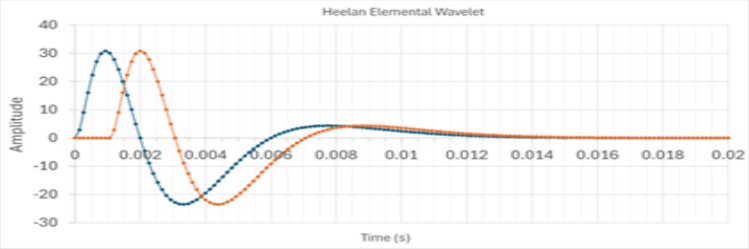
SINCRONIZACION DE ONDA POR RETADO

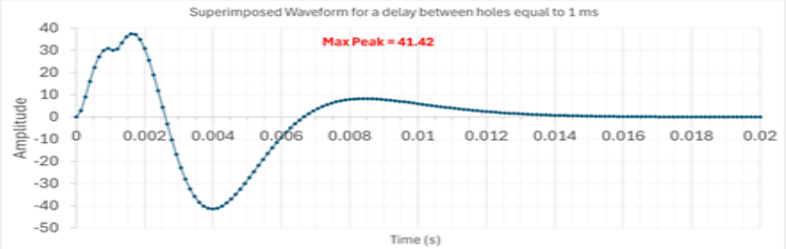
0 ms



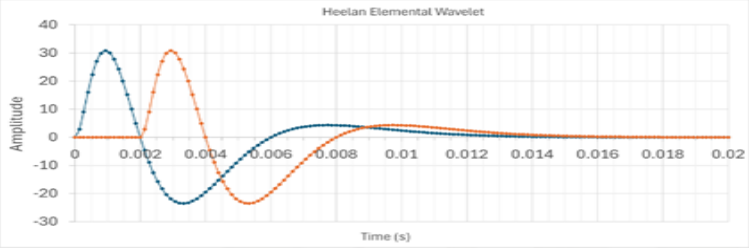


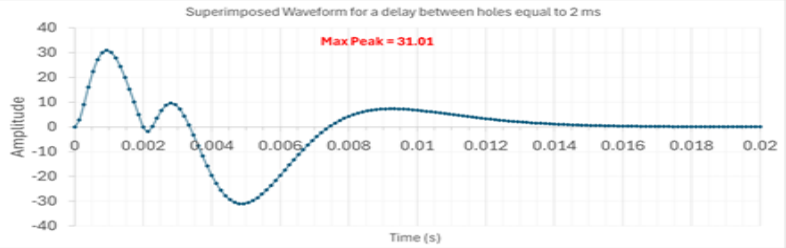
1 ms



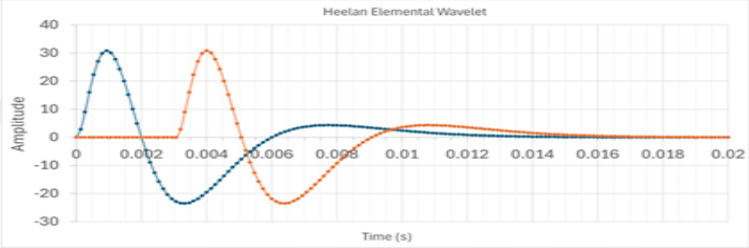


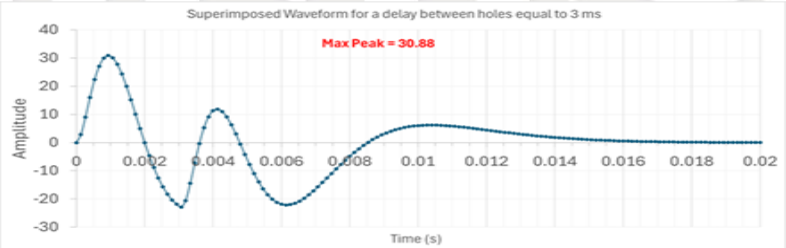
2 ms





3 ms



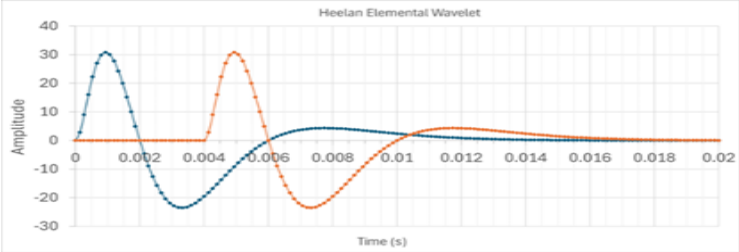


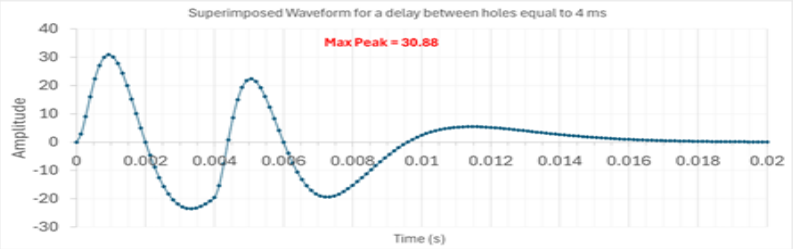
AUSTIN POWDER

ONE AUSTIN

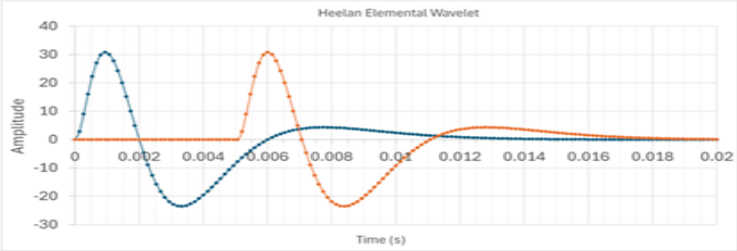
SINCRONIZACION DE ONDA POR RETADO

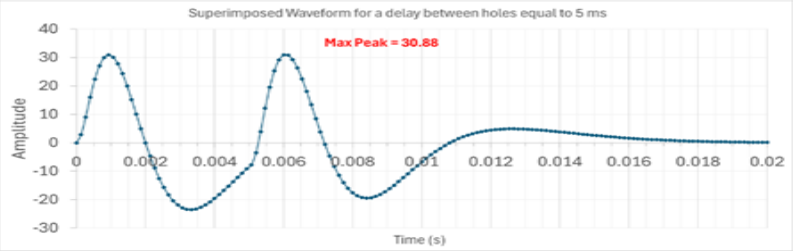
4 ms



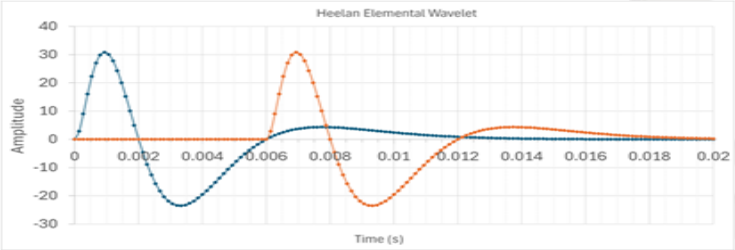


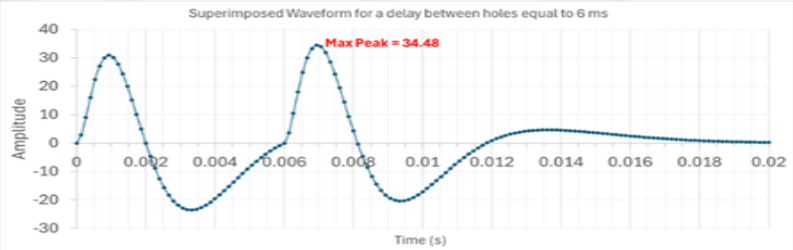
5 ms



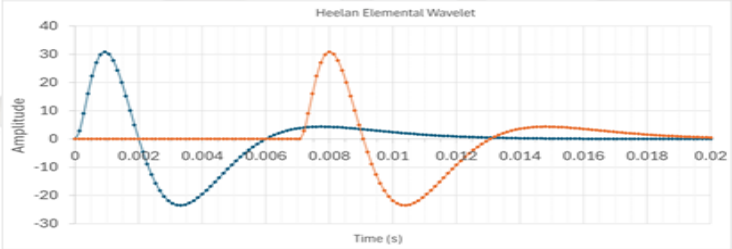


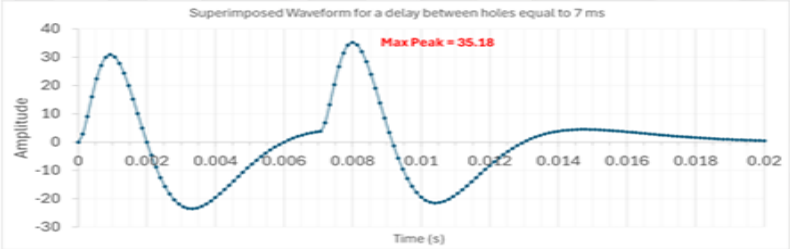
6 ms





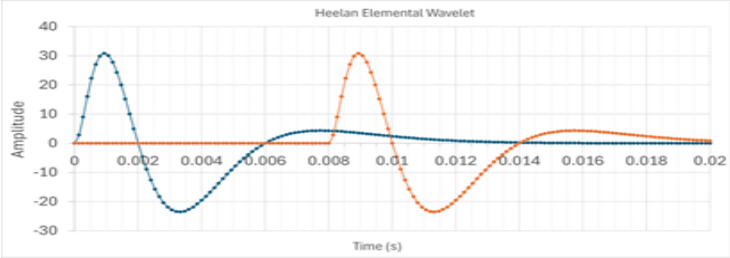
7 ms

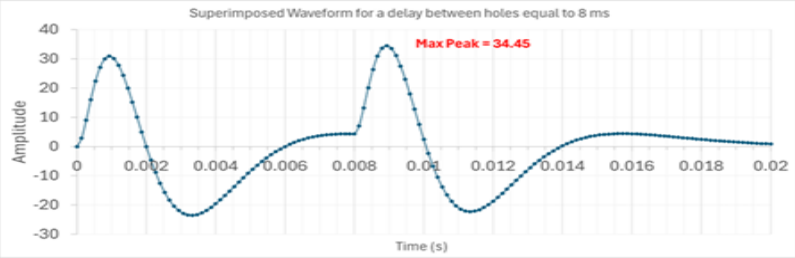




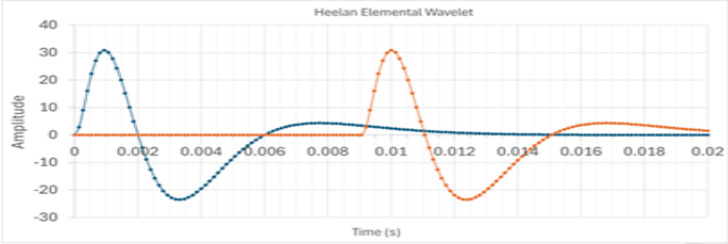
SINCRONIZACION DE ONDA POR RETADO

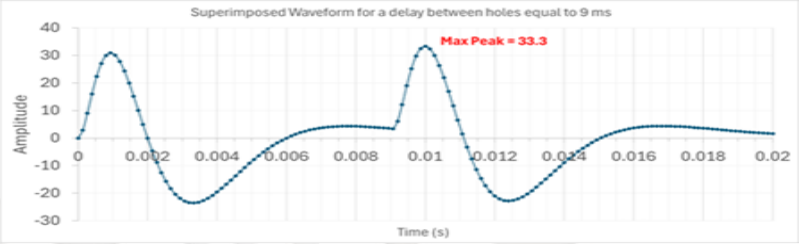
8 ms



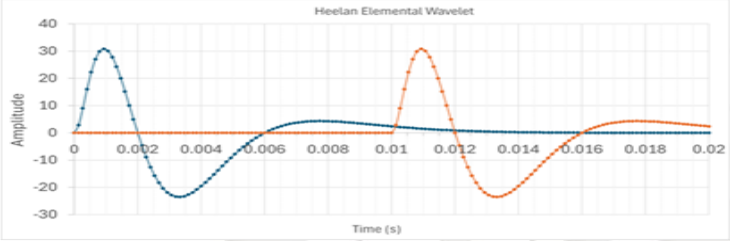


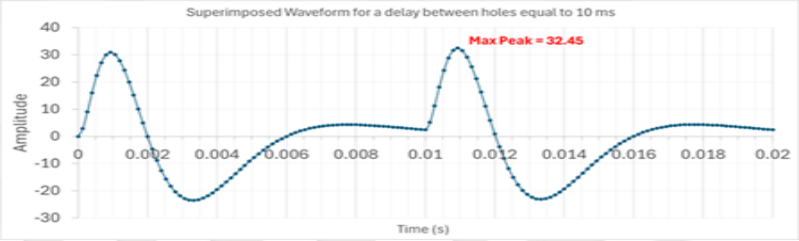
9 ms



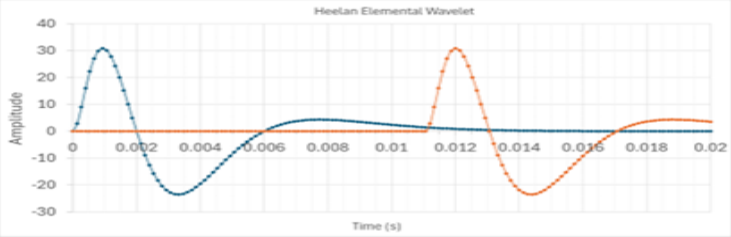


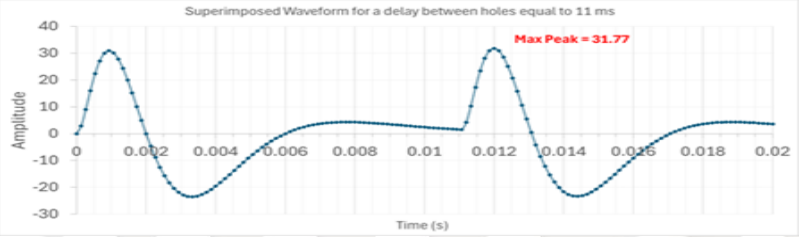
10 ms



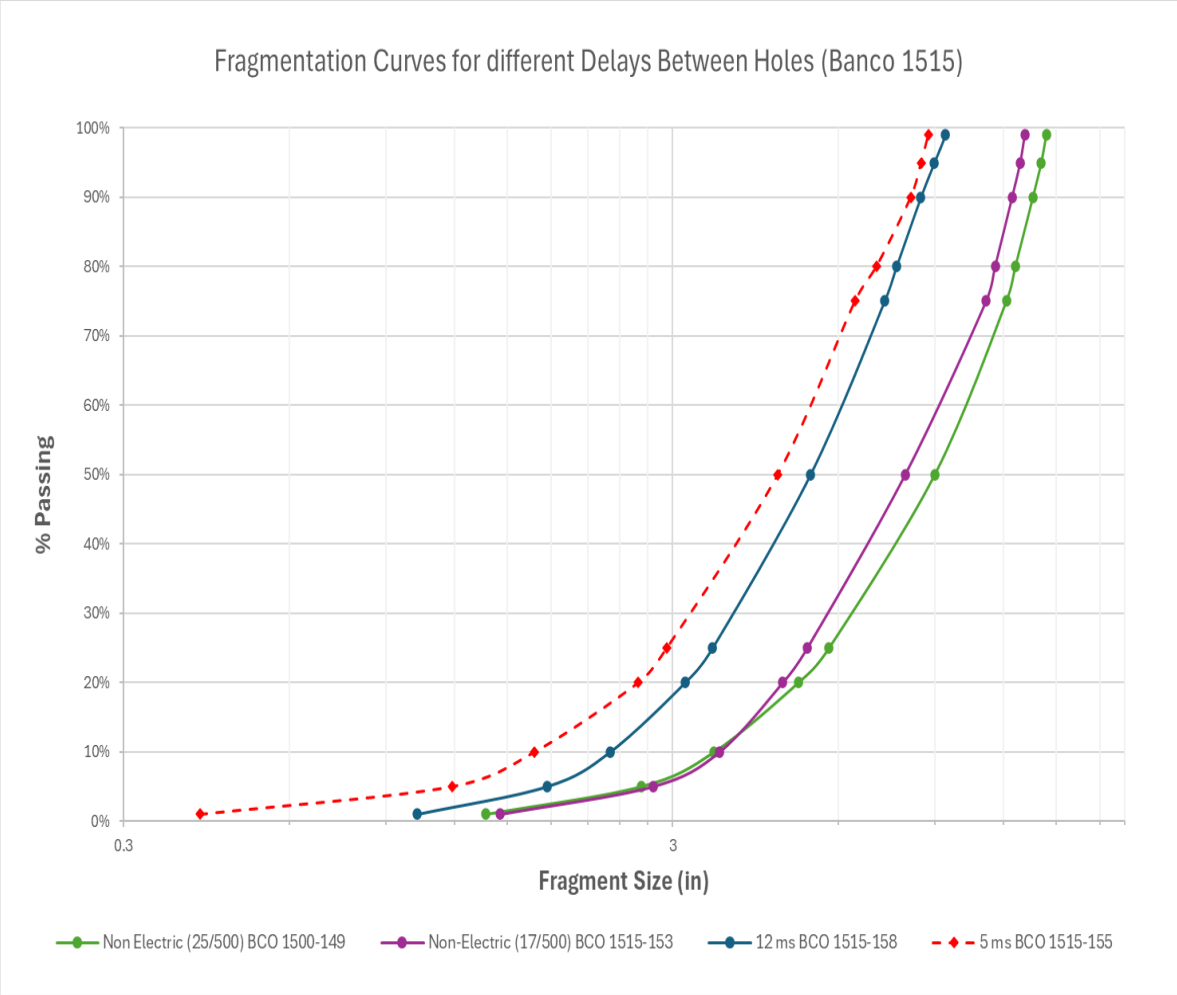


11 ms





CURVAS DE DISTRIBUCION DE FRAGMENTACION



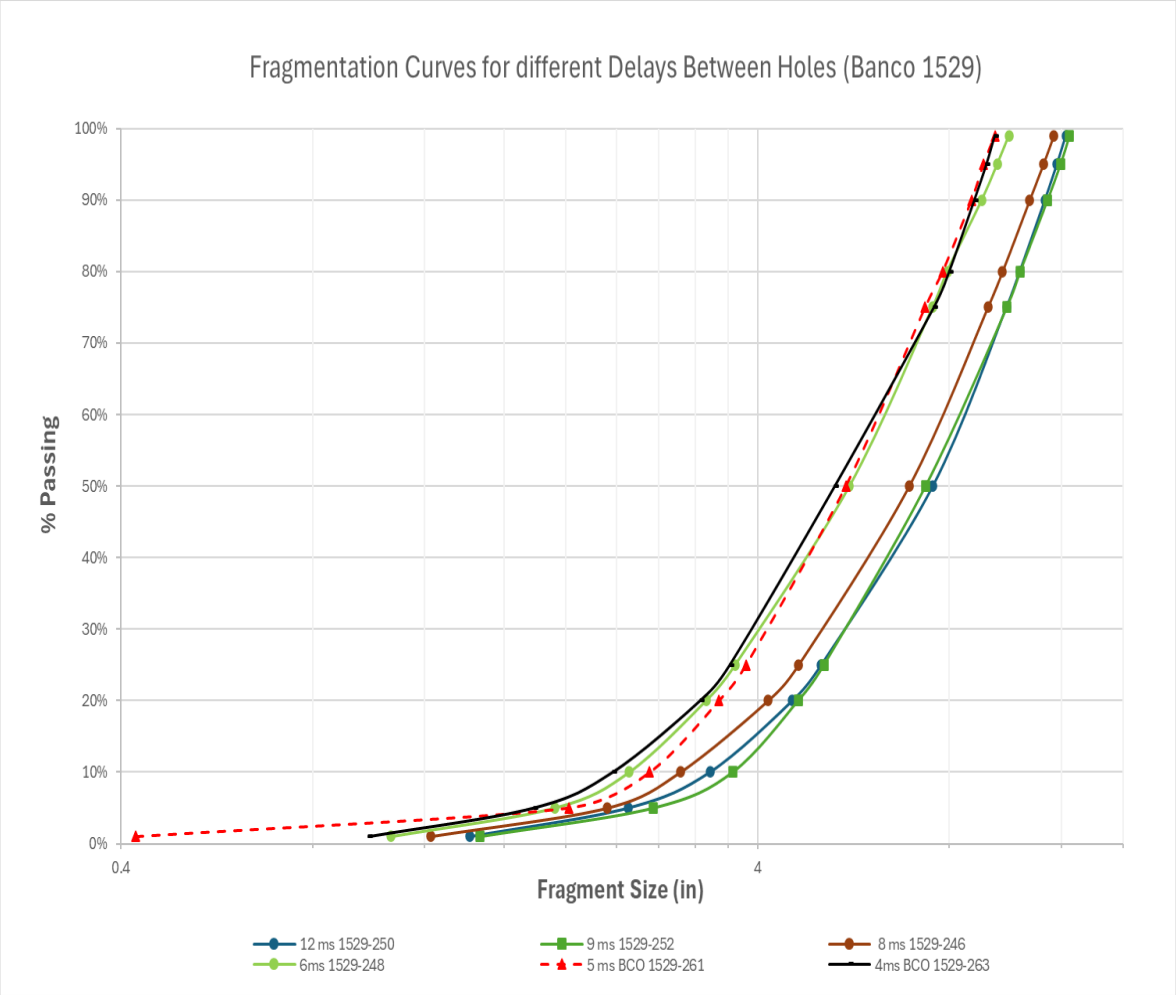
Fragmentation Distribution Curves (Bench 1515)

BENCH 1515		
Timing Scenario	**Xmean**	**Xmax**
25/500	9.00 in	14.46 in
17/500	7.95 in	13.20 in
12 ms	5.35 in	9.51 in
5 ms	4.66 in	8.82 in

BENCH 1515		
Timing Scenario	**Xmean**	**Xmax**
25/500	**112%**	**109%**
17/500	**100%**	**100%**
12 ms	**33%**	**28%**
5 ms	**41%**	**33%**

Table 1. Xmean and Xmax comparison for bench 1515

CURVAS DE DISTRIBUCION DE FRAGMENTACION



Fragmentation Distribution Curves (Bench 1529)

BENCH 1529		
Timing Scenario	**Xmean**	**Xmax**
12 ms	7.55 in	12.31 in
9 ms	7.35 in	12.53 in
8 ms	6.92 in	11.78 in
6 ms	5.58 in	10.05 in
5 ms	5.51 in	9.54 in
4 ms	5.29 in	9.50 in

Table 2. Xmean and Xmax comparison for bench 1529

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