

Gauge Applications



BY SCOTT A. AGER

SCOTT@IESGLOBALINC.COM

2/12/2016 Copyright (c) 2015 IES Global, Inc. All rights reserved.



Gauge Applications

- The gauge can be used on propellant jobs, and **ANY** type of perforating work.
- Tool design or improvement.
- Failure analysis of other Tools.



Gauge Applications

- Verify the actual propellant or perforating burn pressure profile
 - Did it burn properly or did it go “Low Order”?
 - Was there enough propellant to do the job?
 - If the job was not successful, you can use the actual pressure data, collected from the gauge, to design a BETTER job the next time...
- Measure the pressure and temperature after the fracturing or propellant job
- Determine the actual fracturing response of the formation



Gauge Applications

- Record hydraulic fracturing and stimulation jobs
- Record tool movement and impact/vibration, using the Gauge's accelerometers
 - o - Use to analyze tool failures
 - o - Design better tools
- Use pressure data to measure reservoir properties and determine "Frac Closure Pressure"



“Drop Bar” Application

(IES 1-11/16” OD Gauge Only)



“DROP BAR” Application

- Use the “gauge” to fire the StimGun™ Assembly, StimTube™, or *other perforating tools*
- Collect the Pressure / Temperature / Low and High G Acceleration profiles
- Leave the gauge in place to record pressure/ temperature changes **AFTER** the gun fires
- Fish the Gauge out and download the data
- Determine if the tool fired correctly
- Use with propellant or perforating tools



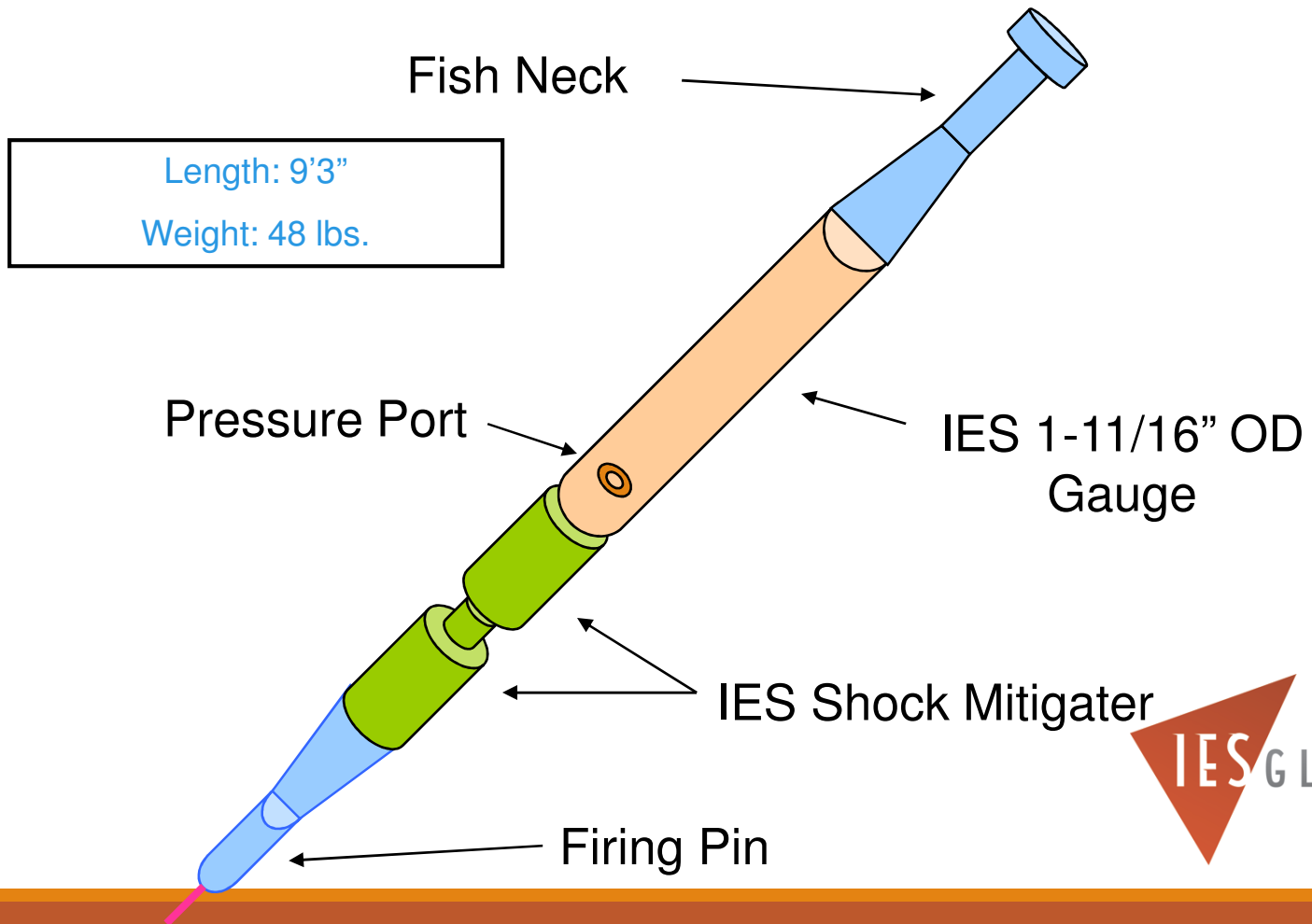
“DROP BAR” Application

DROP BAR WARNINGS....

- If the DROP BAR Gauge is dropping through AIR (no fluid), you can NEVER have a change in the “Restriction ID”. If you do, you can damage the gauge hardware or batteries, and not collect any pressure data
- IF you have a change in the ID restriction in your pipe, be sure it ONLY occurs in FLUID!
- Please let Scott Ager (scott@IESglobalinc.com) review your well diagram for your drop bar application, before your job. Indicate the well depth where the top of the fluid column starts.



Gauge "DROP BAR"



IES “DROP BAR” Gauge



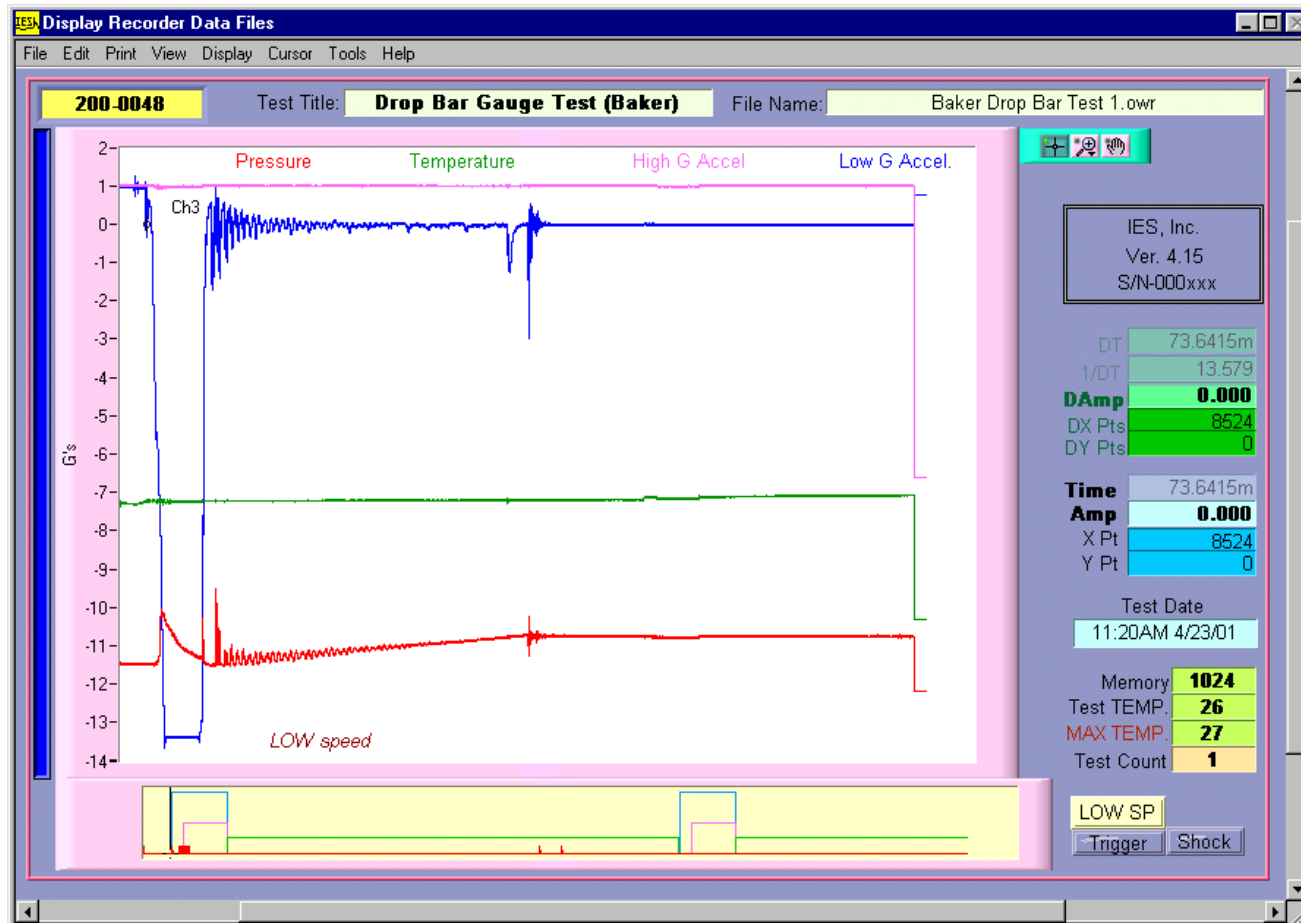
IES “DROP BAR” Gauge



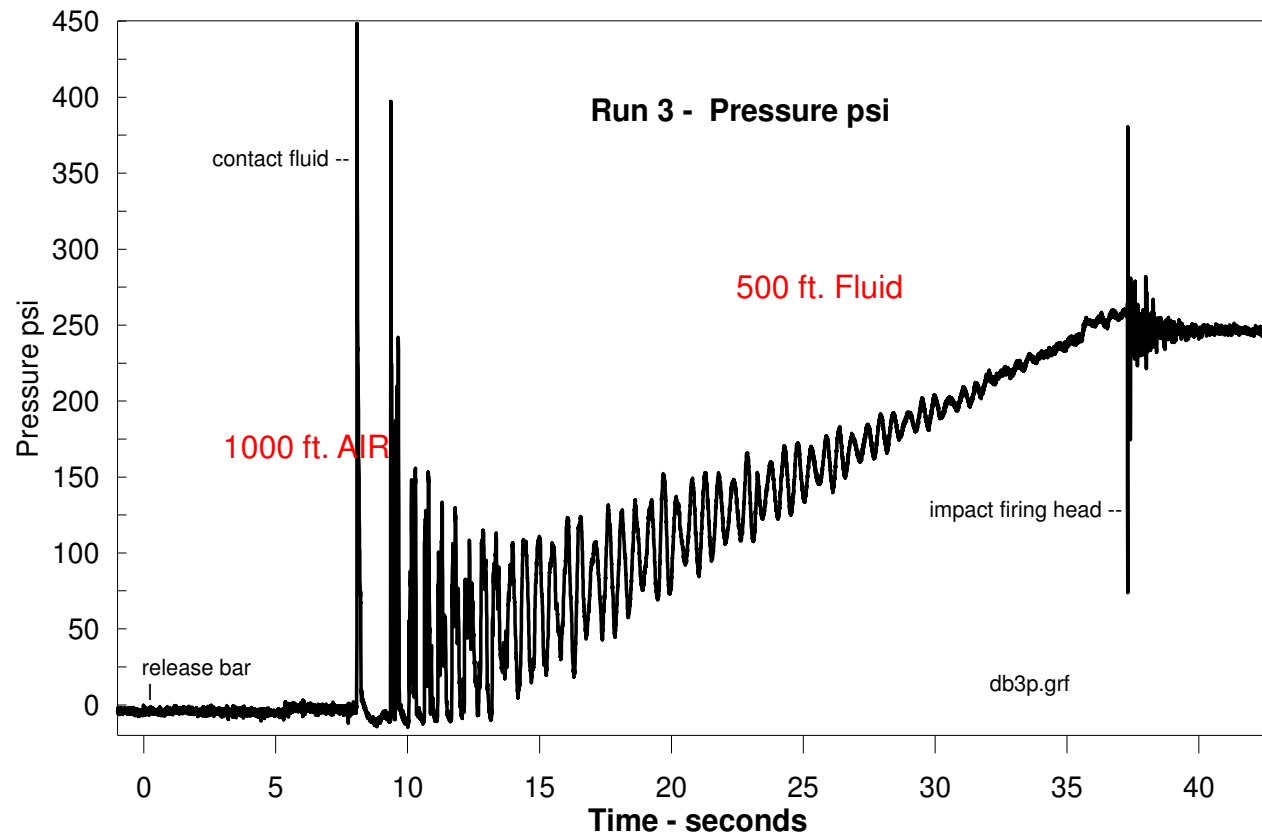
Dropping the gauge



IES "DROP BAR" Gauge Data

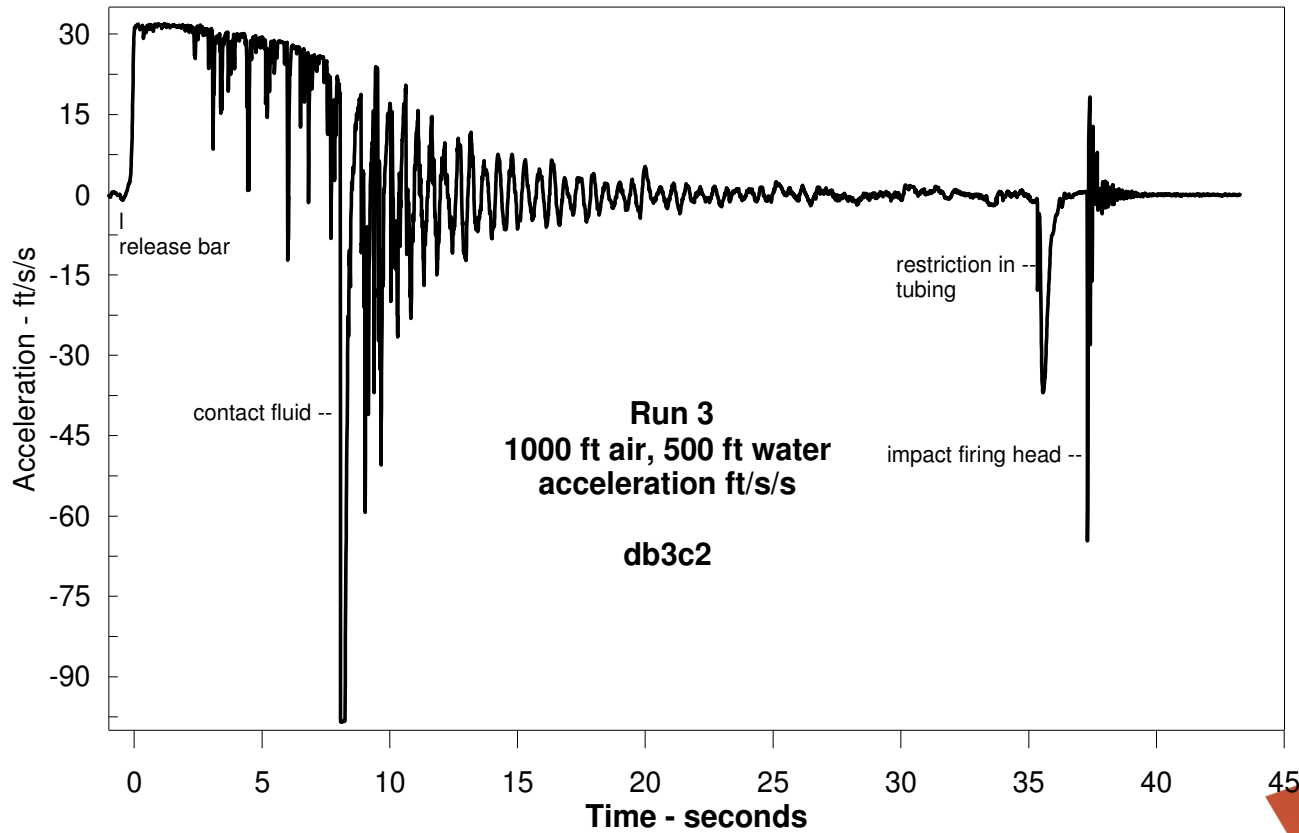


IES "DROP BAR" Gauge Data



Pressure as the Drop Bar goes through fluid

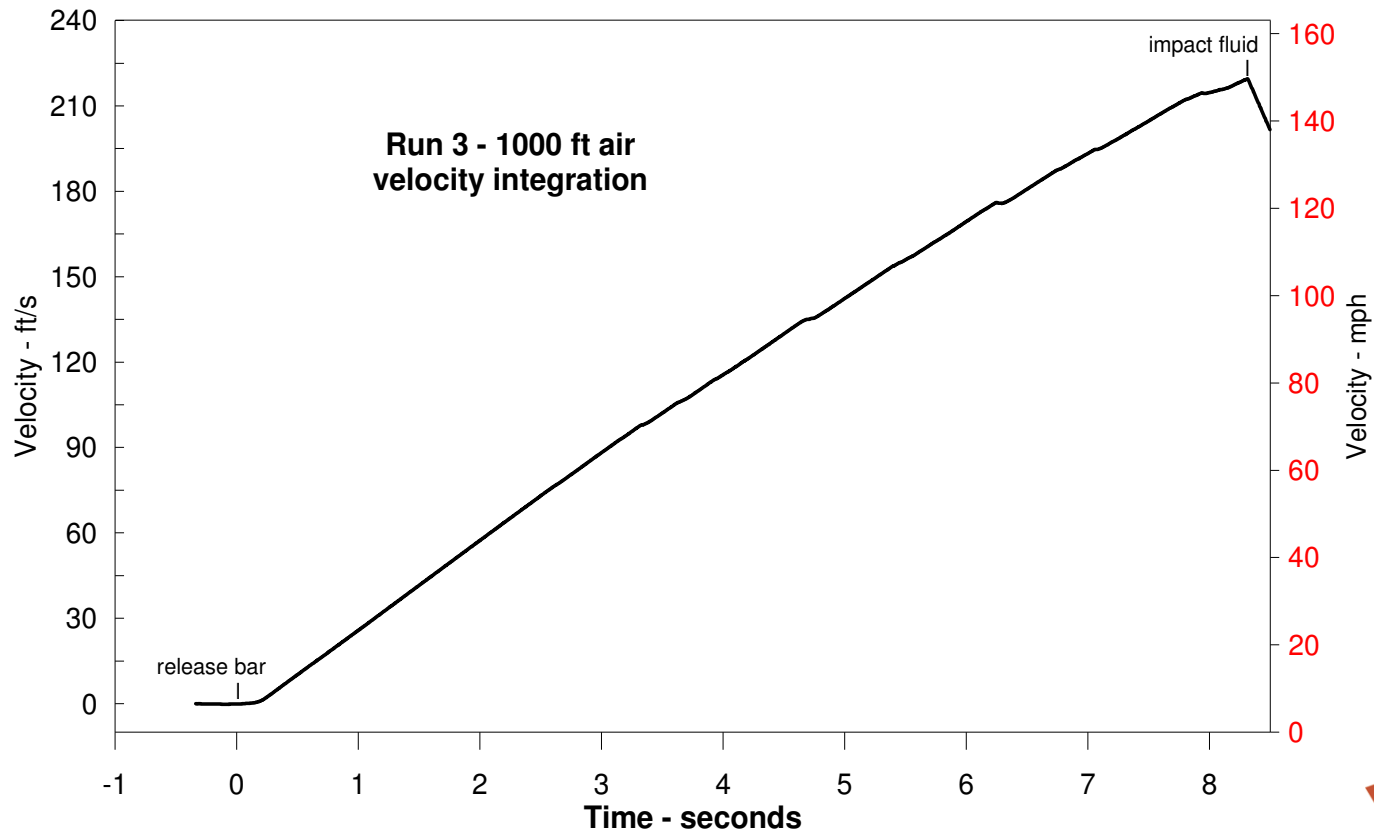
IES "DROP BAR" Gauge Data



Acceleration of the Drop Bar



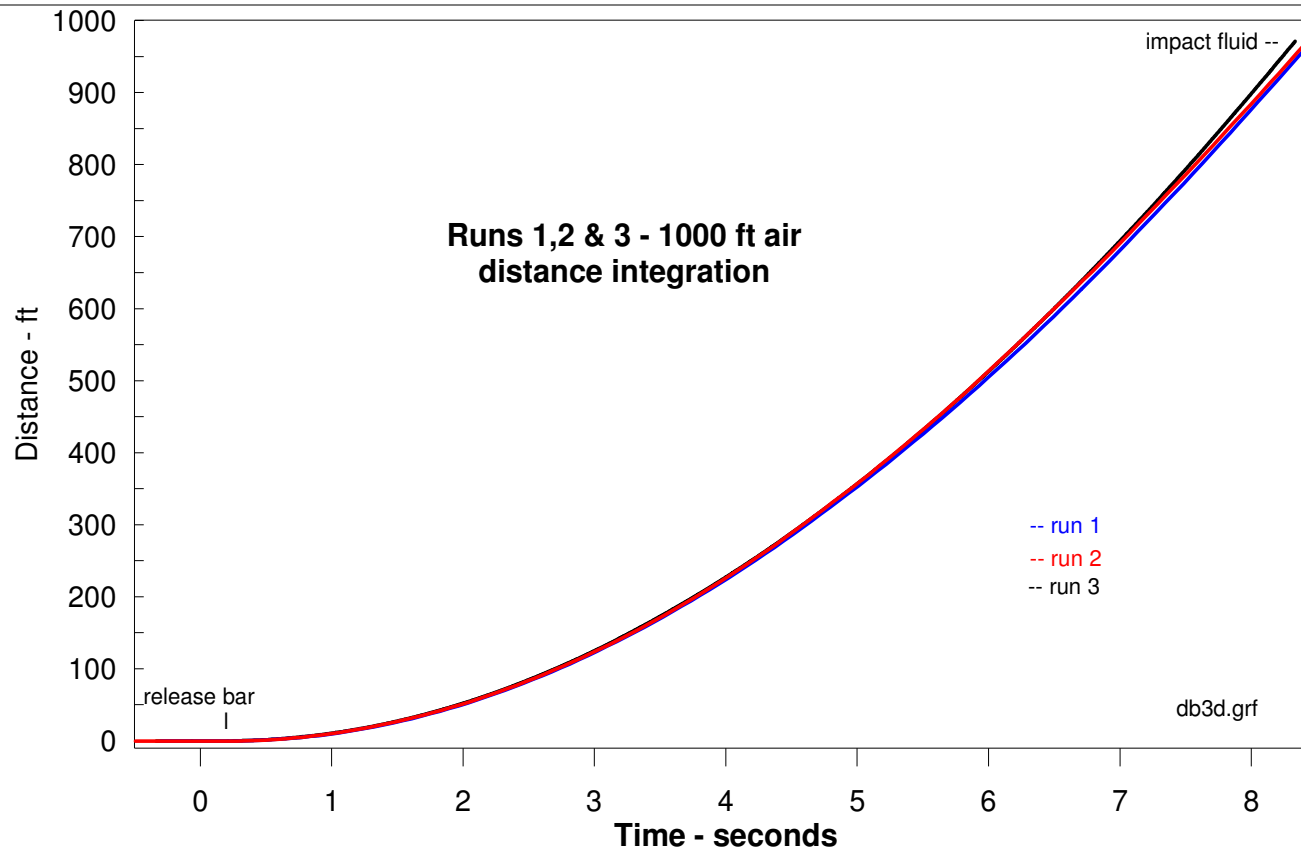
IES "DROP BAR" Gauge



Velocity of the Drop Bar through Air



IES "DROP BAR" Gauge



Distance Drop Bar traveled through Air



Gauge Sensor Applications

- Pressure
- RTD
- High G Accelerometers (60,000 G's)
- Low G Accelerometers (15 G's)

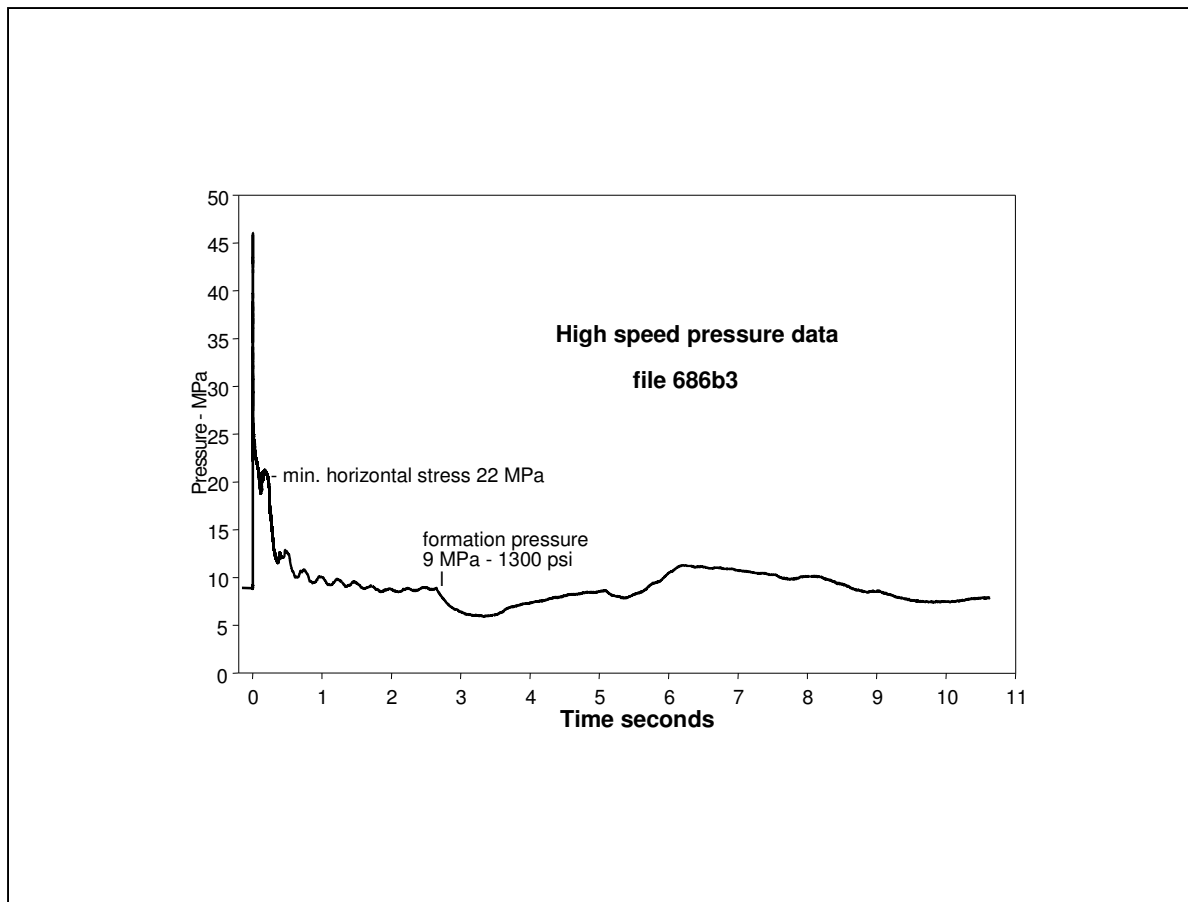


Pressure Data

- High speed pressure data allows you to see the perforating charge and propellant pressure profiles.
- The Pressure Profile after the well comes in, can be monitored for hours after the gun fires.



The pressure from not only the tool burning, but also after the well comes in, can be recorded by the gauge.

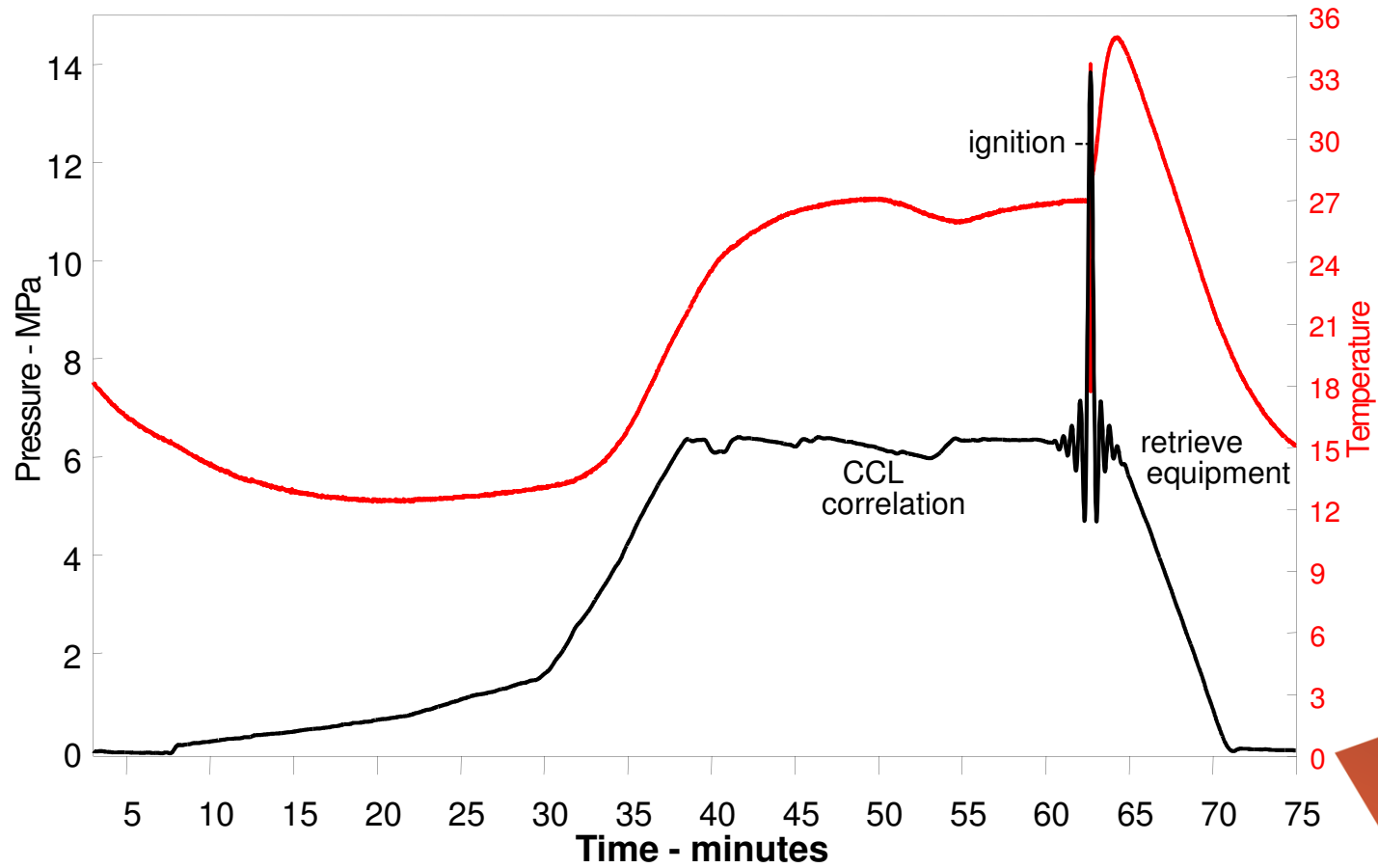


RTD Data

- Shows what happens to the well temperature after a gun fires



If left in the well after a gun fires, you can monitor the temperature changes after the well comes in. The gauge can be left downhole for hours or days.

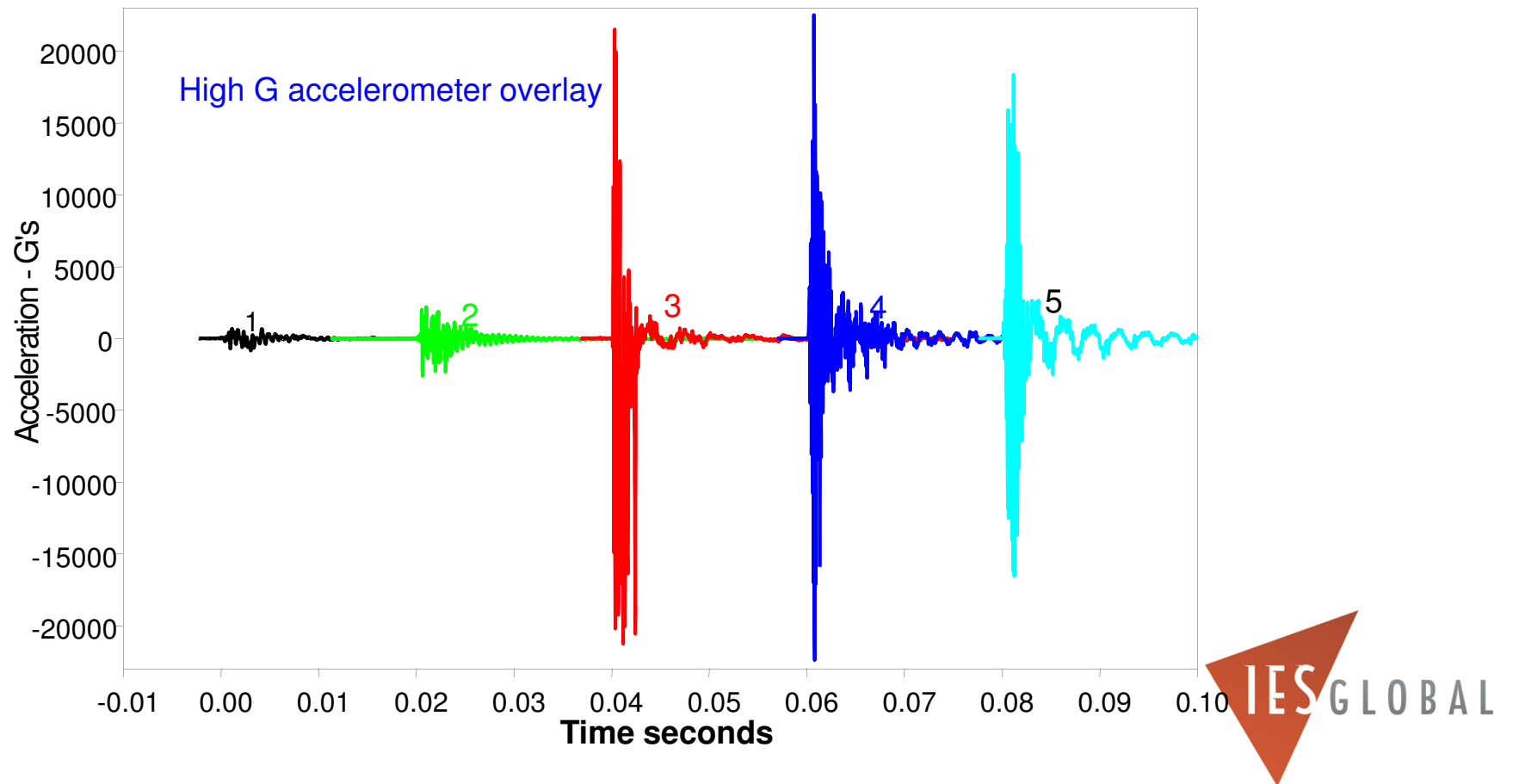


High G Acceleration Data ($\pm 60,000$ G's)

- Measures how much vibration and energy occurs while the gun is burning.
- It can measure the impact forces on the gauge and tool.
- Useful in tool failure analysis and tool design and development, by measuring the downhole environment.



The High G accelerometer is useful in seeing what kind of vibration levels exist in a tool.

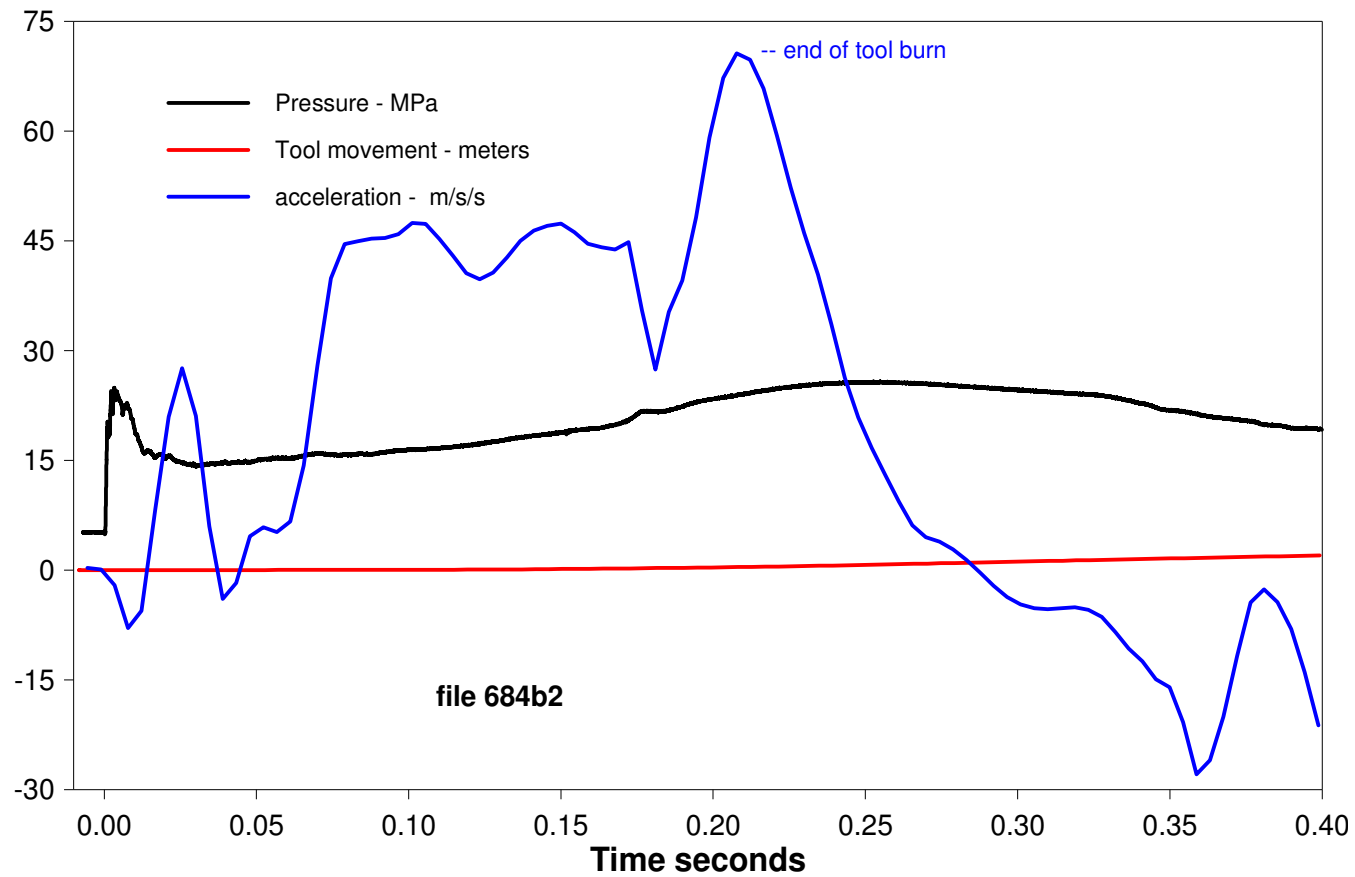


Low G Acceleration Data (± 15 G's)

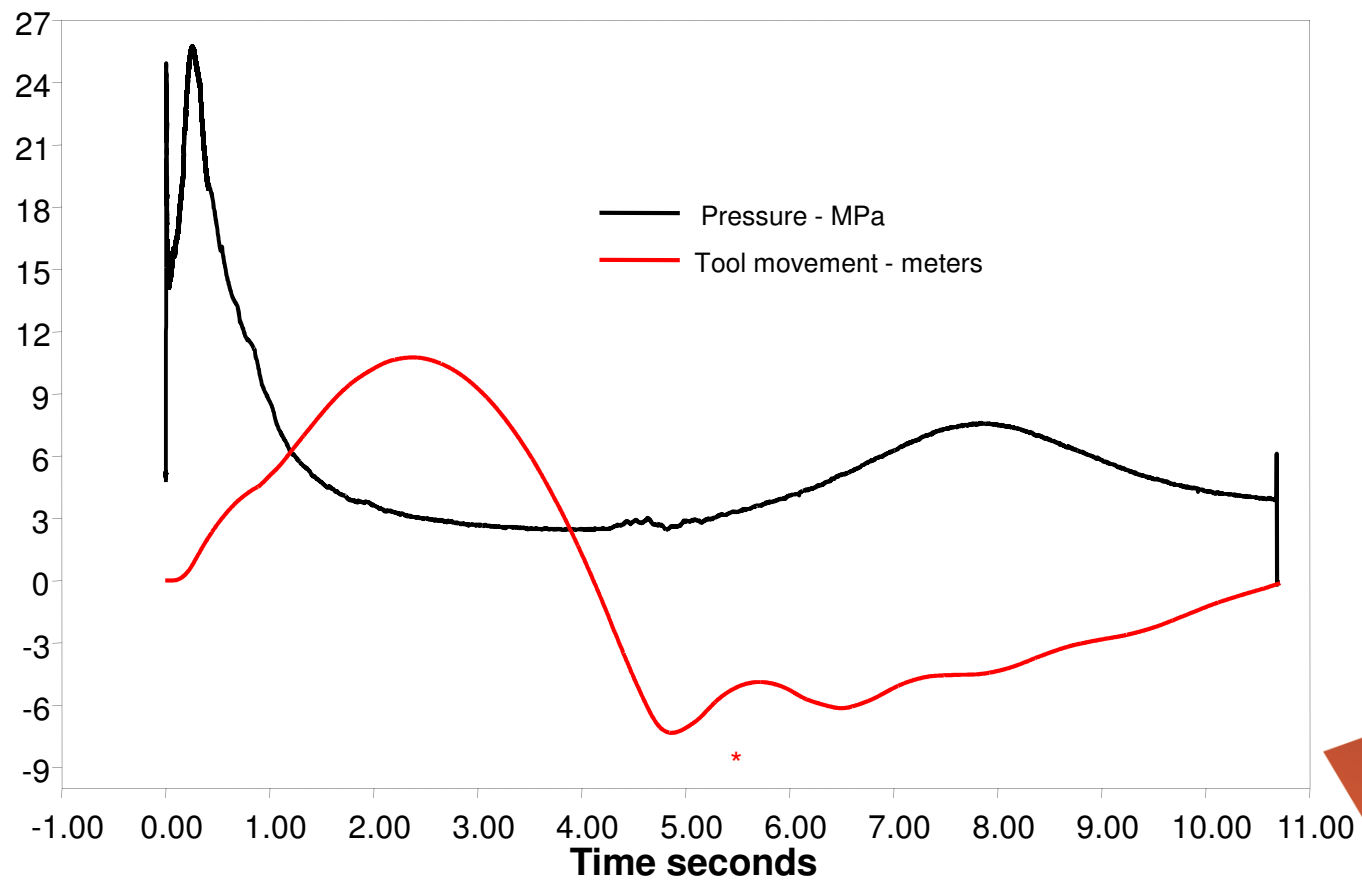
- Measures how much tool velocity and movement occurs while the tool is burning.
- Useful in tool failure analysis and tool design and development.



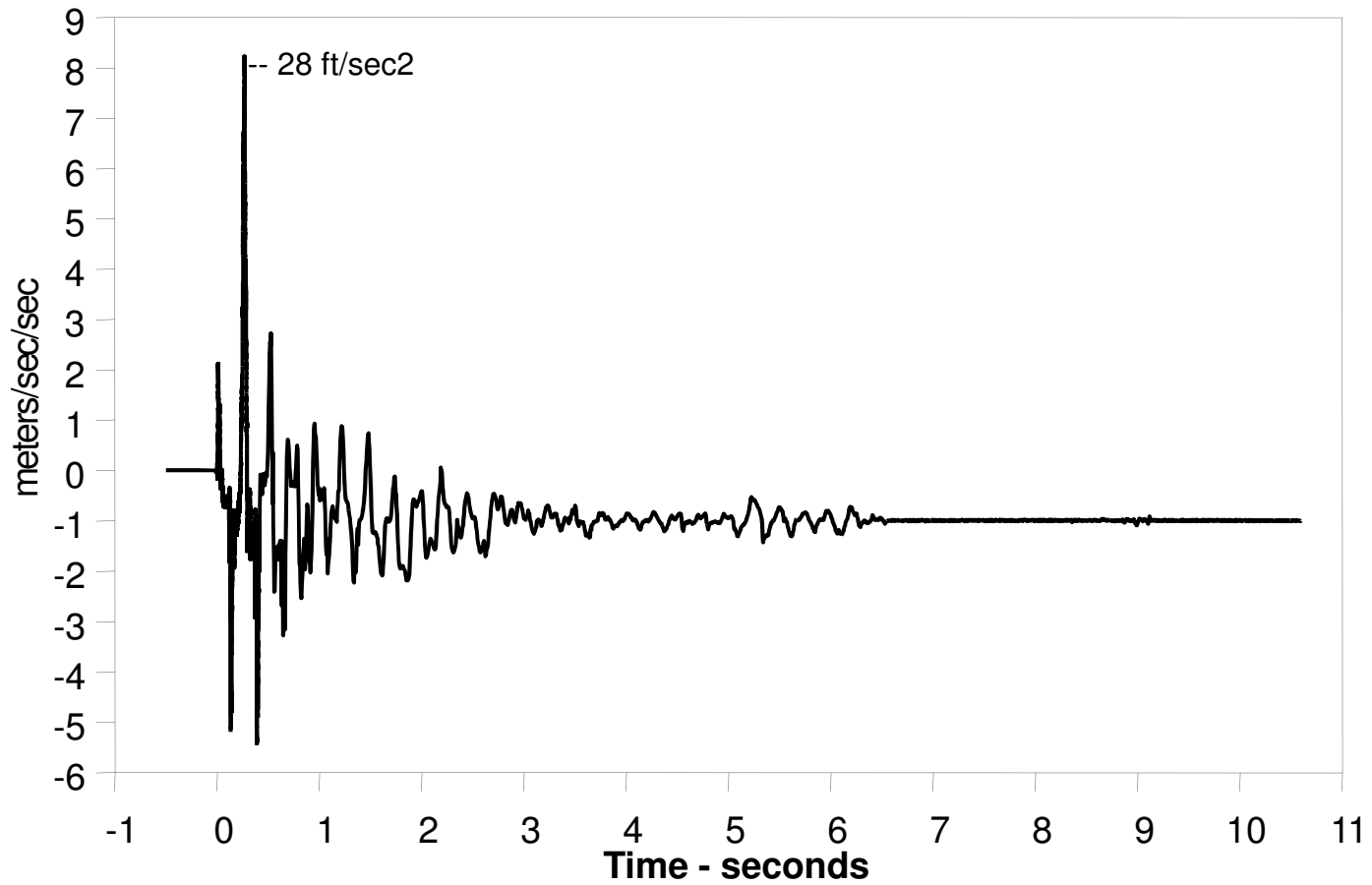
Low G Accelerometers can show you what kind of velocity, and distance your tool moves.



This "TOOL" data can be useful in preventing or predicting possible problems, and allow the design of a better system.



The Low G accelerometer can also show how the tool AND fluid column move together in the well.



Gauge Applications



BY SCOTT A. AGER

