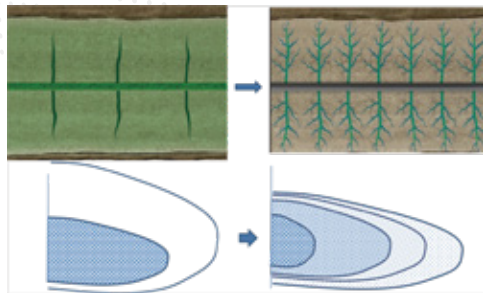


# Full Scale Fracturing Technology Application Case

## Technology introduction

Full scale fracturing technology is researched by Anton's well stimulation team which based on the rich well stimulation experiences on unconventional reservoirs, especially the theoretical research and practical construction of tight oil and gas reservoirs. The core concept of this technology is multi-scale fracture forming and full-scale fracture filling which can be realized through ultimate perforation limited entry fracturing, air suspended sand technology, composite temporary plugging fracture extension control technology and other matching technologies.

Full scale fracturing technology can maximize increasing fracture complexity and effective propping, significantly increase production in low permeability & tight reservoirs and extend well life cycle.



Full scale fracturing plane and longitudinal sketch map

This technology can be widely used in tight oil and gas reservoir stimulation, and has been applied to the XX tight gas reservoir stimulation in sichuan basin with outstanding stimulation results.

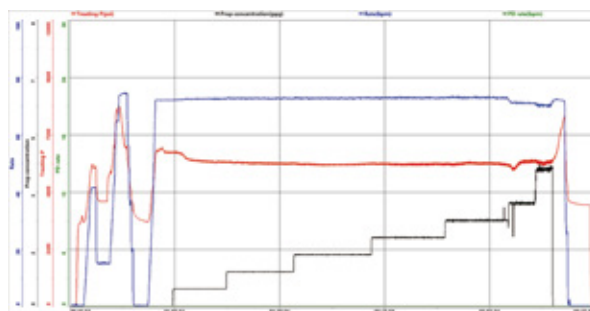
## Technology states

Sichuan basin XX tight gas reservoir has complicated geological conditions with characteristics of low permeability, strong heterogeneity, etc. Target formation XX layer belongs to the typical tight reservoir, depth 1600~3000m, sand thickness 15~20m, porosity 7~9%, permeability 0.1~0.33mD. In order to maximize the stimulation effect, Anton formulated targeted full-scale fracturing technical proposal according to XX layer characteristics, and successfully completed the field implementation.

## Application case

By June 2019, more than 10 Wells had been completed in Sichuan basin XX tight gas reservoir. Through the full scale fracturing technology stimulation, the vertical wells in this region increased production by 1.5 to 3.5 times, and horizontal wells increased production by 3 to 5 times, with more than 7 months stable production period.

Fracturing method	Rate m <sup>3</sup> /min	Fracturing fluid	Average liquid strength m <sup>3</sup> /m	Proppant	Average sand strength m <sup>3</sup> /m	Test production per well 10 <sup>4</sup> m <sup>3</sup> /d
Cased hole (Coiled tubing perforating + annulus multi-stage fracturing technology)	12.0-14.0	Slick water ratio >90%	17.0	Mainly 70/140 Quartz sand	2.0	10-35
Cased hole (Clustering perforation+ plug multi-stage fracturing technology)						



Typical fracturing curve