

Please fill in the name of the event you are preparing this manuscript for.	International Petroleum Technology Conference 2023 (15 <sup>th</sup> IPTC)
Please fill in your 5-digit IPTC manuscript number.	IPTC-22960-Abstract
Please fill in your manuscript title.	Innovative Downhole Trajectory Automation Implementation in KSA

Please fill in your author name(s) and company affiliation.

Given Name	Surname	Company
Shamlan	Al-Roomi	SLB
Ahmed	Osman	SLB
Gilles	VIE	SLB
Katerina	Brovko	SLB
Kate	Mantle	SLB
Ling	Li	SLB

This template is provided to give authors a basic shell for preparing your manuscript for submittal to an IPTC meeting or event. Styles have been included (Head1, Head2, Para, FigCaption, etc) to give you an idea of how your finalized paper will look before it is published by IPTC. All manuscripts submitted to IPTC will be extracted from this template and tagged into an XML format; IPTC's standardized styles and fonts will be used when laying out the final manuscript. Links will be added to your manuscript for references, tables, and equations. Figures and tables should be placed directly after the first paragraph they are mentioned in. The technical content of your paper WILL NOT be changed. Please start your manuscript below.

## Abstract

**Objectives/Scope:** The new level of downhole trajectory automation and control within Schlumberger's rotary steerable systems (RSS) tools -the AutoCurve - was introduced and tested in KSA with the collaboration of Saudi Aramco. The objective is to test the new technology's functionalities and robustness in three different curve sections in deep gas fields. Evaluate and validate the AutoCurve performance, study the value it adds in each run and compare its performance to offset wells drilled with the conventional RSS tools.

**Methods, Procedures, Process:** The AutoCurve automatically drilled three curve sections placing them within their given geometrical targets while minimizing human interventions. The AutoCurve utilized advance algorithms and sensor modules to estimate a curvature and update the target inclination and azimuth in a close loop system. By doing that the AutoCurve momentarily adjusts the power and direction within the RSS tools while accommodating any abnormalities, such as formation change. into its calculations. As a result, planned dogleg severity is no longer converted by the directional driller at each corresponding depth, but instead, programmed into the tool at the shop or adjust via a downlink command if needed.

**Results, Observations, Conclusions:** For the three runs in KSA, the AutoCurve was engaged from the kick-off points of curved section and drilled a total of 5,632 ft combined. When compared with offset wells drilled with conventional RSS, statically. the number of downlinks executed were significantly reduced by 60-70% in most runs. With that reduction in human interventions, more on bottom time is helping in delivering the section faster with an estimation to save —10 hours of rig time per 3000 ft. That translated to good CO2 emission and diesel savings (CO2 emission calculations vary by rig]. Lastly. and because the decision making has been switched from the directional drillers to the system downhole, more focus has been put to push for performance and, thus, with the AutoCurve runs executed, slight increase of 15-20% in ROP is witnessed in comparison to offset wells. All while minimizing human error, improving wellbore hole quality and well placement while execution.

**Novel/Additive Information:** Automation and autonomous solutions are important keys to harness Digital adoption. Schlumberger Well Construction is unlocking new ways to innovate in it. This presentation will discuss the implementation and the benefits of the AutoCurve downhole autonomous drilling system which did not only help in drilling with less human intervention and but in delivering quicker wells to operators. The AutoCurve is different than what the competition is offering and does complete the missing link in downhole automation and the Schlumberger's autonomous directional drilling system as complete future project.