Machine Control & Guidance

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Abstract - Innovations in Dredging and Marine Engineering

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1 INTRODUCTION

ALLSAT is one of the leading companies in the sector of GNSS applications. The company focuses on the distribution of GNSS equipment and solution engineering.

Prolec has established itself as one of market leaders in providing machine control systems for excavators involved in both dredging and marine engineering activities. Prolec's success in these most demanding application areas has been achieved because of its industry leading sensors technology.

1.1 History

Prolec introduced:
1st Can Bus Products in Machine Guidance
1st Excavator Graphical Depth Monitor
1st 3D Excavator RTK Machine Guidance (2001)

ALLSAT introduced:
Graphical Fieldbook including RTK corrections over GSM (1997)
First privately run GNSS reference network (1999)
Survey Software on Windows CE based controller (2000)

1.2 Angle Sensors

Sensors used in this application are required to be both robust and accurate, e.g. the AS8 marine grade angle sensor meets both of these requirements. The AS8 is made from marine grade stainless steel and when installed offers a true IP68 installation. While other sensors claim to be suitable for marine use, they are often made from materials more suited to land applications, such as mild steel or aluminium and fitted using traditional cable methods. AS8s are installed using hydraulic hose and all connections are made using hydraulic fittings. The sensors are also extremely accurate at 0.09', which is more than twice as accurate as standard accelerometer based sensors.

Figure 1: AS8 marine grade angle sensor

1.3 Software

The second key element in this area is the application specific software Prolec offers. pcX-Pro has several 'off the shelf' variants, but customisation can be offered to meet specific requirements. The Systems have been used very successfully in marine applications and offers an open architecture to communicate with several industry standard GNSS input strings.

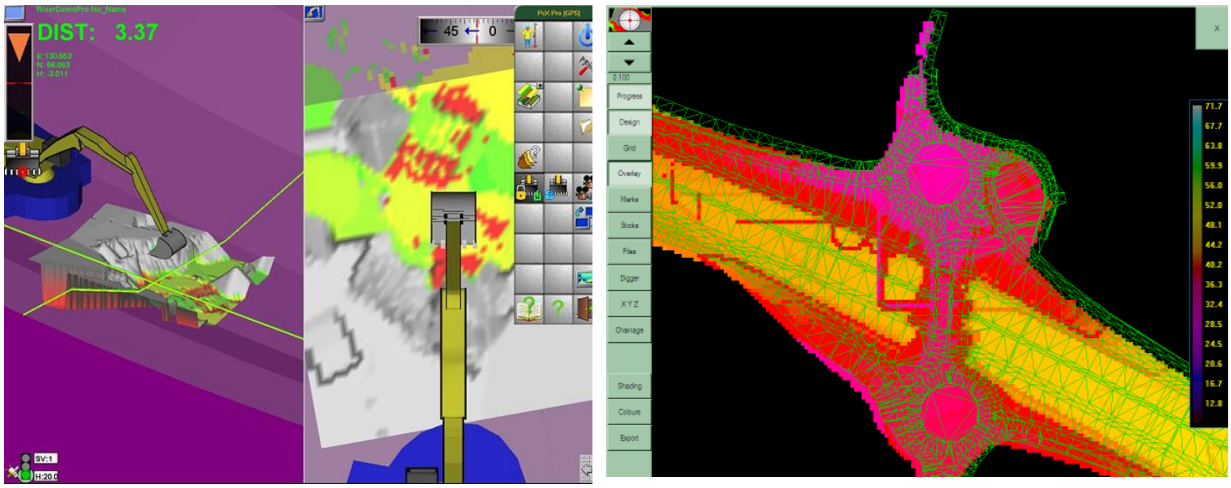

Figure 2: pcX-Pro software

1.4 GNSS Sensors

Here the expertise from ALLSAT helps in providing the specific GNSS components. Very good experiences have been made using JAVAD GNSS sensors in RTK-Heading mode in combination with GNSS reference network services, which increases the flexibility and reduces setup times. The presentation will give some insights on the requirements and challenges for these 3D machine control systems.

Figure 3: JAVAD GNSS sensor and antenna

2 APPLICATIONS

Prolec systems are commonly found in dredging applications, both land based and barge mounted, and are installed on standard excavators, grab dredgers and rope cranes. One of the biggest increases in use of Prolec systems has been for breakwater and armour rock constructions, with Prolec's products being the choice for prestigious projects such as the Palm Island project in Dubai, the Pearl of Qatar and some others which will be used in our presentation.

Figure 4: Backhoe Dredger working for via donau

3 CONCLUSIONS

The use of Angle and GNSS sensors for marine dredging applications is common practice. However, the seamless integration of the different sensors in one common software requires a profound knowledge of the customer requirements. Future improvements will be done by 3 axis dual redundant sensors, Multi-constellation GNSS sensors and integration of safety applications.

REFERENCES

Links:
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